AIRSPACE MODERNISATION AIRSPACE CHANGE PROPOSAL

STAKEHOLDER ENGAGEMENT APPENDIX B

M&M1 CORRESPONDENCE & ENGAGEMENT MATERIAL
M&M2 CORRESPONDENCE & ENGAGEMENT MATERIAL

Heathrow

Table of Contents

The material in this document is shown in chronological order.

All airspace design options in this document are subject to change throughout the airspace change process, as options are matured in detail and refined in accordance with safety requirements, design principles, appraisals and stakeholder engagement and consultation.

Heathrow Airspace Modernisation: Methods & Metrics workshop

DD - Airspace <airspace@heathrow.com>

Thu 19/05/2022 14:04

To: [redacted]

Cc: [redacted]

Dear forum members,

At the recent Heathrow Community Noise Forum meeting on 27 April we provided an update on our planned engagement activities for Stage 2 of Heathrow's Airspace Change Proposal for airspace modernisation. We are only formally required by the Government's airspace change process to engage with stakeholders on our comprehensive list of flight path options during this stage, and we are expecting this activity to take place in the autumn of this year.

However, we plan to conduct four separate engagement activities in total, instead of only one, at key points in the Stage 2 process – above and beyond this requirement. We want to share as much information with stakeholders as we can, as early as possible, and to provide you with an opportunity to share your views and help inform the process.

The first of these activities is a "Methods & Metrics" workshop where we will explain our proposed methodology for Stage 2 as we begin to develop and assess our initial long list of broad flight path design options. This will include a discussion on the metrics we will use to demonstrate the high level impacts and benefits of the options in a suitable way at this early stage.

The information presented in this workshop will be technical and complex. We are looking for a smaller, representative group made up of technically-minded members who have an interest and ability in discussing and analysing data. We want this group to help us understand if we could generate additional data beyond CAP1616 requirements to aid stakeholder understanding of impacts and benefits. We are therefore seeking expressions of interest from members who may be interested in taking part.

As the group needs to remain small for this workshop, please consider that you will need to represent a balanced view of the wider forum membership and other community stakeholders who may be interested in airspace change.

The planned date of the workshop is Tuesday 5 July, 10:00am to 2:00pm. There will be a break for lunch, which will be provided by Heathrow. The workshop will be conducted in person and will not be online. It will take place at the airport with the details of the venue to be confirmed.

Please let us know by Thursday 2 June if you would like to take part, by replying to this email.

Kind regards,

[redacted]

[redacted]
Operational Impacts & Community Engagement Lead
Carbon, Communications & Communities

m: [redacted]

Heathrow

RE: Heathrow Airspace Modernisation: Methods & Metrics workshop

DD - Airspace <airspace@heathrow.com>

Mon 23/05/2022 09:17

To: [redacted];DD - Airspace <airspace@heathrow.com>

Cc: [redacted]

Dear [redacted]

Thanks for your expression of interest. We appreciate your offer to engage further with us on this topic and we have registered your interest. We will confirm workshop attendees and details after the deadline for expressions of interest on Thursday 2 June.

Kind regards,

[redacted]

From: [redacted]
Sent: 20 May 2022 14:48
To: [redacted]; DD - Airspace <airspace@heathrow.com>
Cc: [redacted]
Subject: Re: Heathrow Airspace Modernisation: Methods & Metrics workshop

Caution: external email. Unless you recognise the sender and know the content is safe, do not click links or open attachments.

Many thanks for your email below. Please may I put myself forward to attend the workshop. [redacted]

With kind regards,

[redacted]

RE: Heathrow Airspace Modernisation: Methods & Metrics workshop

DD - Airspace <airspace@heathrow.com>
Mon 23/05/2022 09:17

To: [redacted];DD - Airspace <airspace@heathrow.com>; [redacted]
Cc: [redacted]

Dear [redacted],

Thanks for your expression of interest. We appreciate your offer to engage further with us on this topic and we have registered your interest. We will confirm workshop attendees and details after the deadline for expressions of interest on Thursday 2 June.

Kind regards,
[redacted]

From: [redacted]
Sent: 21 May 2022 13:50
To: DD - Airspace <airspace@heathrow.com>; [redacted]
Cc: [redacted]
Subject: Re: Heathrow Airspace Modernisation: Methods & Metrics workshop

Caution: external email. Unless you recognise the sender and know the content is safe, do not click links or open attachments.

[redacted],

I will be pleased to attend.

[redacted]

RE: Heathrow Airspace Modernisation: Methods & Metrics workshop

DD - Airspace <airspace@heathrow.com>
Mon 23/05/2022 09:19
To: [redacted];DD - Airspace <airspace@heathrow.com>
Cc: [redacted]

Dear [redacted],

Thanks for your expression of interest. We appreciate your offer to engage further with us on this topic and we have registered your interest. We will confirm workshop attendees and details after the deadline for expressions of interest on Thursday 2 June.

Kind regards,
[redacted]

From: [redacted]
Sent: 21 May 2022 11:58
To: DD - Airspace <airspace@heathrow.com>
Subject: Re: Heathrow Airspace Modernisation: Methods & Metrics workshop

Good morning [redacted];
I would like to attend the workshop on Airspace Change on Tuesday 5th July @ 2pm [redacted]
Thanks;
[redacted]

RE: Airspace Change workshops

DD - Airspace <airspace@heathrow.com>

Mon 23/05/2022 09:21

To: [redacted];DD - Airspace <airspace@heathrow.com>

Cc: [redacted]

Dear [redacted],

Thanks for your expression of interest. We appreciate your offer to engage further with us on this topic and we have registered your interest. We will confirm workshop attendees and details after the deadline for expressions of interest on Thursday 2 June.

Kind regards,

[redacted]

-----Original Message-----

From: [redacted]

Sent: 22 May 2022 10:45

To: DD - Airspace <airspace@heathrow.com>

Subject: Airspace Change workshops

Hi [redacted],

I would like to attend the workshop on Airspace Change on Tuesday 5th July @ 2pm , [redacted]

Regards,

[redacted]

RE: Heathrow Airspace Modernisation: Methods & Metrics workshop

DD - Airspace <airspace@heathrow.com>
Mon 23/05/2022 10:25
To: [redacted];DD - Airspace <airspace@heathrow.com>
Cc: [redacted]

Dear [redacted],

Thanks for your expression of interest. We appreciate your offer to engage further with us on this topic and we have registered your interest. We will confirm workshop attendees and details after the deadline for expressions of interest on Thursday 2 June.

Kind regards,
[redacted]

From: [redacted]
Sent: 23 May 2022 10:18
To: DD - Airspace <airspace@heathrow.com>
Cc: [redacted]
Subject: Re: Heathrow Airspace Modernisation: Methods & Metrics workshop

Caution: external email. Unless you recognise the sender and know the content is safe, do not click links or open attachments.

Hi All,

I'd like to take part in the workshop on 5th July please.

Regards

[redacted]

[redacted]
Coordinator

E: [redacted]
M: [redacted]

www.hacan.org.uk

HACAN

RE: Heathrow Airspace Modernisation: Methods & Metrics workshop

DD - Airspace <airspace@heathrow.com>
Mon 23/05/2022 12:22

To: [redacted];DD - Airspace <airspace@heathrow.com>; [redacted]

Cc: [redacted]

Dear [redacted],

Thanks for your expression of interest. We appreciate your offer to engage further with us on this topic and we have registered your interest. We will confirm workshop attendees and details after the deadline for expressions of interest on Thursday 2 June.

Kind regards,
[redacted]

From: [redacted]
Sent: 23 May 2022 12:09
To: DD - Airspace <airspace@heathrow.com>; [redacted]
Cc: [redacted]
Subject: RE: Heathrow Airspace Modernisation: Methods & Metrics workshop

Caution: external email. Unless you recognise the sender and know the content is safe, do not click links or open attachments.

Thanks [redacted],

Sounds like a good idea, I would be available to participate on 5th July,

Rgds
[redacted]

RE: Heathrow Airspace Modernisation: Methods & Metrics workshop

DD - Airspace <airspace@heathrow.com>
Mon 23/05/2022 12:24
To: [redacted]
Cc: [redacted]

Dear [redacted],

Thanks for your expression of interest. We appreciate your offer to engage further with us on this topic and we have registered your interest. We will confirm workshop attendees and details after the deadline for expressions of interest on Thursday 2 June.

Kind regards,
[redacted]

From: [redacted]
Sent: 23 May 2022 12:28
To: [redacted]
Cc: [redacted]
Subject: Heathrow Airspace Modernisation: Methods & Metrics workshop

Caution: external email. Unless you recognise the sender and know the content is safe, do not click links or open attachments.

Dear [redacted]

I confirm I would like to attend this workshop. Over the course of the [redacted] I believe I have built up a good understanding of the technical issues that will be discussed, for example in [redacted] as well as the [redacted].

Kind regards

[redacted]

RE: Heathrow Airspace Modernisation: Methods & Metrics workshop

DD - Airspace <airspace@heathrow.com>
Mon 23/05/2022 18:08

To: [redacted];DD - Airspace <airspace@heathrow.com>; [redacted]
Cc: [redacted]

Dear [redacted],

Thanks very much for your expression of interest. We appreciate your offer to engage further with us on this topic.
We will confirm workshop attendees and details after the deadline for expressions of interest on Thursday 2 June.

Kind regards,
[redacted]

From: [redacted]
Sent: 23 May 2022 15:52
To: DD - Airspace <airspace@heathrow.com>; [redacted]
Cc: [redacted]
Subject: RE: Heathrow Airspace Modernisation: Methods & Metrics workshop

Hi [redacted],

Please can you put myself and/or my colleague [redacted].

Thanks,

[redacted]

[redacted] **I Head of Transport Planning & Road Safety**
Environment Culture and Customer Services
London Borough of Hounslow
3rd Floor, Hounslow House
7 Bath Road
TW3 3EB

From: [redacted]
Sent: 31 May 2022 09:52
To: DD - Airspace
Subject: RE: [EXTERNAL] Heathrow Airspace Modernisation: Methods & Metrics workshop

Caution: external email. Unless you recognise the sender and know the content is safe, do not click links or open attachments.

Hi [redacted],

I would like to attend if there is space,

Kind regards,

[redacted]

[redacted]
Environmental Protection Team Leader
Housing and Regulatory Services
Planning, Growth and Sustainability Directorate
Buckinghamshire Council

Re: Heathrow Airspace Modernisation: Methods & Metrics workshop

[redacted]

Wed 01/06/2022 10:29

To: DD - Airspace <airspace@heathrow.com>; [redacted]

Cc: [redacted]

Dear [redacted]

Apologies for a confusing response. It is in my diary for Tuesday 5 July.

Thanks for checking.

Kind regards

[redacted]

Richmond Heathrow Campaign

On 01/06/2022 07:57, DD - Airspace wrote:

Classification: Internal

Good morning [redacted],

The date of the workshop is Tuesday 5th July not Thursday 2nd June (this date was the request to respond by). I hope this does not cause you any inconvenience and you are still able to attend in July.

Kind regards

[redacted]

[redacted]
Airspace, Noise & ATM Specialist

The Compass Centre, Nelson Road
Hounslow, Middlesex, TW6 2GW

w: heathrow.com t: twitter.com/heathrowairport
a: heathrow.com/apps

From: [redacted]
Sent: 27 May 2022 13:26

To: DD - Airspace <airspace@heathrow.com>; [redacted]
Cc: [redacted]
Subject: Re: Heathrow Airspace Modernisation: Methods & Metrics workshop

Caution: external email. Unless you recognise the sender and know the content is safe, do not click links or open attachments.

Dear [redacted]

Yes, I would like to attend the workshop on Thur 2 June on behalf of the Richmond Heathrow Campaign. Thank you for the invitation.

Kind regards

[redacted]

[redacted]

Chair, Richmond Heathrow Campaign

RE: Heathrow Airspace Modernisation: Methods & Metrics workshop

DD - Airspace <airspace@heathrow.com>

Wed 08/06/2022 09:40

To: DD - Airspace <airspace@heathrow.com>; [redacted]

Cc: [redacted]

Bcc: [redacted]

Dear forum members,

Thanks very much for expressing an interest in attending our Methods and Metrics workshop.
We are pleased to confirm the following attendees:

	Name:	Representing:
1	[redacted]	HACAN
2	[redacted]	Molesey Residents Association
3	[redacted]	EGAG
4	[redacted]	EGAG
5	[redacted]	Windsor & Maidenhead
6	[redacted]	TAG
7	[redacted]	TAG
8	[redacted]	LB Hounslow

9	[redacted]	Buckinghamshire Council
10	[redacted]	HASRA
11	[redacted]	Richmond Heathrow Campaign

The workshop will be held at the Compass Centre, Nelson Road, TW6 2GW on Tuesday 5 July, 10:00am to 2:00pm.
Lunch will be provided.

We look forward to seeing you then.

Kind regards,
[redacted]

[redacted]
Operational Impacts & Community Engagement Lead
Carbon, Communications & Communities

m: [redacted]

RE: Heathrow Airspace Modernisation: Methods & Metrics workshop

[redacted]

Wed 08/06/2022 09:46

To: DD - Airspace <airspace@heathrow.com>

Caution: external email. Unless you recognise the sender and know the content is safe, do not click links or open attachments.

[redacted],

Many thanks.

[redacted]

Re: Heathrow Airspace Modernisation: Methods & Metrics workshop

[redacted]

Wed 08/06/2022 09:52

To: DD - Airspace <airspace@heathrow.com>

Caution: external email. Unless you recognise the sender and know the content is safe, do not click links or open attachments.

Good morning [redacted];
Thank you for including me in the 'Airspace' workshop on July 5th. I look forward to participating positively in this important issue.
Regards;
[redacted]

FW: Heathrow Airspace Modernisation: Methods & Metrics workshop

DD - Airspace

Tue 21/06/2022 15:39

To: [redacted]

Cc: [redacted]

1 attachments (371 KB)

220620 FRP meeting.pdf;

Dear [redacted],

Thank you again for your time yesterday – we found it a constructive and informative discussion.

As promised yesterday, below are the details for our upcoming “Methods & Metrics workshop”. Please could you let me know who will attend to represent FRP? Please could you send a maximum of 2 attendees since you will see in the list below that we have intentionally kept this workshop to a small group so that we can cover the technical topics that we know a few of our stakeholders are keen to discuss.

I have also attached the slides we shared yesterday. Thanks to [redacted] for sending through your slides.

Many thanks,

[redacted]

From: [redacted]

Sent: 27 June 2022 09:29

To: [redacted]; DD - Heathrow Community Noise Forum <hcnf@heathrow.com>

Subject: Methods & Metrics

[redacted],

Disappointingly I find that I will be unable to attend the session on Tuesday next week. I hope you are able to offer the space to someone else.

[redacted]

From: DD - Airspace
Sent: 28 June 2022 11:22
To: [redacted]
Cc: [redacted]; DD - Airspace; [redacted]
Subject: FW: Heathrow Airspace Modernisation: Methods & Metrics workshop
Attachments: 220705_Methods & Metrics_Workshop slides_vF.pdf

Dear [redacted],

I understand that we are to email correspondence for [redacted] to you.
Please could you share the below email and the attached slide pack with [redacted]?

Kind regards,
[redacted]

RE: Heathrow Airspace Modernisation: Methods & Metrics workshop

DD - Airspace <airspace@heathrow.com>

Mon 27/06/2022 14:07

To: DD - Airspace <airspace@heathrow.com>

Cc: [redacted]

Bcc: [redacted]

Dear stakeholder,

Thank you for your interest in attending our Methods & Metrics workshop.
The workshop will be held at the Compass Centre, Nelson Road, TW6 2GW on Tuesday 5 July, 10:00am to 2:00pm.
Lunch will be provided.

1. **Please could you let me know if you have any dietary requirements?**
2. **Please could you also provide your vehicle registration if you plan to park at the Compass Centre?**

I have attached the workshop slides for those who would appreciate the opportunity to read these before the workshop. As mentioned previously, this workshop is an additional step in our engagement programme to allow our more technically-minded stakeholders to

discuss our approach to airspace design at a more detailed level. Therefore these slides are necessarily technical and complex, and will not be suitable or accessible for all stakeholders. The slides will be used in the workshop to summarise our current proposed methodology and metrics.

We will have time in the workshop to talk through the material in detail, and to answer any questions that you have. An independent meeting note will be produced (by [redacted] from Headland) after the workshop and that note will be shared with our wider group of stakeholders, including all members of the HCNF/NACF.

We will be hosting workshops for a wider audience in September/October this year, where we will share our Comprehensive List of Options. These workshops are the ones required as part of the CAP1616 process and the material shared will therefore be more suitable for our broader range of stakeholders.

We look forward to seeing you on Tuesday 5 July.

Kind regards,

[redacted]

RE: Heathrow Airspace Modernisation: Methods & Metrics workshop

[redacted]

Mon 27/06/2022 15:49

To: DD - Airspace <airspace@heathrow.com>

Cc: [redacted]

Caution: external email. Unless you recognise the sender and know the content is safe, do not click links or open attachments.

Many thanks for the email and attached slides.

I will drive to the Compass Centre and my registration is [redacted].

[redacted]

Many thanks,

[redacted]

From: [redacted]
Sent: 29 June 2022 14:44
To: DD - Airspace
Cc: [redacted]
Subject: Re: Heathrow Airspace Modernisation: Methods & Metrics workshop

Caution: external email. Unless you recognise the sender and know the content is safe, do not click links or open attachments.

Dear [redacted],

I have done this and will check later that it has been received.

Regards
[redacted]

Re: Heathrow Airspace Modernisation: Methods & Metrics workshop

[redacted]

Tue 28/06/2022 10:37

To: DD - Airspace <airspace@heathrow.com>

Caution: external email. Unless you recognise the sender and know the content is safe, do not click links or open attachments.

Dear [redacted],

- [redacted],
- [redacted]

Best wishes,

[redacted]

FRP

Re: Heathrow Airspace Modernisation: Methods & Metrics workshop

[redacted]

Tue 28/06/2022 10:46

To: DD - Airspace <airspace@heathrow.com>

Caution: external email. Unless you recognise the sender and know the content is safe, do not click links or open attachments.

Morning;
Car reg - [redacted]
Thanks;
[redacted]

Re: Heathrow Airspace Modernisation: Methods & Metrics workshop

[redacted]

Tue 28/06/2022 09:16

To: DD - Airspace <airspace@heathrow.com>

Cc: [redacted]

Caution: external email. Unless you recognise the sender and know the content is safe, do not click links or open attachments.

Dear [redacted]

Thank you for your email and the slide pack. I look forward to seeing you next week.

I would prefer a [redacted]. My car registration plate is [redacted].

Kind regards

[redacted]

RE: Heathrow Airspace Modernisation: Methods & Metrics workshop

[redacted]

Fri 01/07/2022 16:30

To: DD - Airspace <airspace@heathrow.com>

Caution: external email. Unless you recognise the sender and know the content is safe, do not click links or open attachments.

[redacted],

Thks for slides

Car Reg for parking – [redacted]

See you on Tuesday,

Rgds

[redacted]

Re: Heathrow Airspace Modernisation: Methods & Metrics workshop

[redacted]

Sun 03/07/2022 09:49

To: DD - Airspace <airspace@heathrow.com>

Cc: [redacted]

Caution: external email. Unless you recognise the sender and know the content is safe, do not click links or open attachments.

Dear [redacted]

Thank you for the workshop slides.

I would like to park at Compass Centre for the workshop, please - **my car registration is [redacted].**

Kind regards

[redacted]

[redacted], Richmond Heathrow Campaign

M&M Workshop – Technically minded community stakeholder representatives

Tuesday 5 July 2022, 10:00 - 14:00, Compass Centre

Name	Organisation
[redacted]	Heathrow
[redacted]	Heathrow
[redacted]	Heathrow
[redacted]	Heathrow
[redacted]	Heathrow
[redacted]	Heathrow
[redacted]	Heathrow
[redacted]	Heathrow
[redacted]	Heathrow
[redacted]	Heathrow
[redacted]	Headland
[redacted]	Buckinghamshire Council / Heathrow Strategic Planning Group
[redacted]	Molesey Residents Association
[redacted]	HACAN
[redacted]	Friends of Richmond Park
[redacted]	Teddington Action Group
[redacted]	Teddington Action Group
[redacted]	Richmond Heathrow Campaign
[redacted]	Englefield Green Action Group
[redacted]	Englefield Green Action Group
[redacted]	Harmondsworth & Sipson Residents Association
[redacted]	London Borough of Hounslow

From: [redacted]
Sent: 10 July 2022 19:52
To: [redacted]
Cc: DD - Airspace; [redacted]
Subject: M&M Workshop
Attachments: HAL - Design Principles weighting - as tabled by FRP 5Jul22.xlsx

Dear [redacted],
Thanks again for hosting the M&M Workshop at Compass House last Tuesday.

I'm emailing now to:

1. Provide a more detailed FRP response on the metrics for DP2, as agreed towards the end of Tuesday's meeting;
2. To give you an electronic copy of the DP scoring and weighting spreadsheet FRP tabled; and
3. To note briefly some of the points I made in the meeting – in case it's helpful to [redacted] as [redacted] prepares [redacted] meeting record.

I would be grateful if you could confirm receipt of this email.

1. <u>DP2 metrics</u>
On HAL's DP2 slide it says: "*In addition to the noise and carbon metrics covered in the previous slides, we will also generate metrics relating to biodiversity and tranquillity to develop and assess options in line with policy*."

In the meeting I referred HAL to FRP's PEIR consultation submission of 12-Sep-19.

<u>1.1 Biodiversity</u>
For the Expansion Project, Mott McDonald/Wood did an assessment of Biodiversity Net Gain (BNG), which they presented to FRP. Their approach used metrics for habitats such as size, distinctiveness, condition, connectivity and difficulty of restoration, based on condition surveys, with a case study of brown long-eared bats.

Natural England has a Biodiversity Metric, currently in version 3.1. which gives guidance on calculating the loss or gain of biodiversity from developments, but also requires condition surveys. Such condition surveys are available in Richmond Park for some aspects such as acid grassland, anthills and veteran trees.

In the absence of condition surveys, simple metrics for comparative biodiversity in areas affected by HAL aircraft operations could be:

- Number and range of designations - SSSI, SAC, NNR, Historic Landscape;
- Number and variety of habitats, and connectivity; and
- Number of species - especially rare, endangered and protected species and of those most sensitive to noise and nitrogen - and the population of each.

If required, expert assessment of condition with simple rating such as 'poor, medium, good' could be used as an initial guide to the importance of habitats. In our PEIR submission we highlighted the enormous biodiversity of Richmond Park and key species such as bats (11 species), red-listed birds (8 species), badgers, beetles (stag,

cardinal click and 140 other nationally scarce or threatened species), butterflies (42 nationally scarce or threatened species), wildflowers and acid grassland. Many of these species are sensitive to noise or nitrogen.

Finally, you will be aware that the Department for Environment, Food and Rural Affairs published a Consultation on environmental targets on 6-May-22. This consultation shows the importance the government attaches to the environment including the need to take urgent action to halt biodiversity loss.

1.2 Tranquillity

In our PEIR submission we noted the impact of sound exposure on tranquillity and referred to two sources:

- HAL's PEIR document '15-Volume-1-PEIR-Chapter-13-Historic-Environment' 13.7.9 which says "*Temple Group Ltd (2014) Aviation Noise Metric (Temple (2014)) - Research on the Potential Noise Impacts on the Historic Environment by Proposals for Airport Expansion in England, Project No. 6865, Final Report for English Heritage. This aspect of the assessment includes section 3.8 Tranquillity and Soundscape and has been prepared on the basis of section 5.0 Method to Assess Noise Impact on Heritage Assets*"; and
- The CPRE's tranquillity mapping tool. However, while on the face of it this could provide areal tranquillity data, the base data is old (2007) and the granularity (500m squares) too coarse for reliably assessing the tranquillity effect of notional routes

Reliable assessment of noise impacts on tranquillity would better be done by methods such as those set out in 'Tranquil Spaces' (Bentley, 2019)

1.3 Other

A tool that may be useful in terms of including significant green spaces and their value can be found in the Natural Capital Account for London (GLA, Nov 2017)

2. DP scoring and weighting

Please find attached an electronic copy of the DP scoring and weighting spreadsheet FRP tabled. As discussed briefly in the workshop, among other things this suggests initially scoring as a % how well each DP does for a given option, rather than going directly to 'Met, Partially Met, Not Met' as set out in CAP1616 Appendix E. The reasoning is that this ensures the CAP1616 requirement of consistency in options appraisal is achieved, e.g. consistency in what it takes for 'Met' to be achieved as opposed to 'Partially Met'.
Do come back to me if HAL have any questions.

3. Summary of points/suggestions FRP made in the M&M workshop

[redacted] may have picked-up other points I made for FRP. But here are the ones I noted down:

Options:

- Given that it is necessary, under CAP1616, for the options be evaluated in a 'fair and consistent manner', it is important that quantitative tests (e.g. scoring the table of metrics) rather than qualitative judgements, be used to short-list options;
- Even though the 650,000 notional routes are (demonstrably) 'comprehensive', if they are distilled down using subjective judgements the resulting list of Options may well not be comprehensive.

Design Principles scoring and weighting:

- It is critically important: (a) how the metrics will be added up to get a score for each DP on a specific option; and (b) how, for each option, each DP's score will be weighted to arrive at an overall score - which is then used for Stage 2's short-listing of options. Moreover how this is done should meet the CAP1616 test of "*evaluate ... the design options against the design principles in a fair and consistent manner*". To this end, FRP tabled a suggestion method of DP scoring and weighting;

DP1 - safety:

- HAL say "… *there are no metrics for determining safety at this time*". But in the world of aircraft safety analysis there are numerous metrics. Surely the initial assessment of each Option's safety should be done quantitatively in Stage 2;
- FRP noted that Luton had decided to stick with vectored arrivals because PBN could not cope with the volume of arrivals, except in low-traffic periods. Was this not a basic safety issue?

DP3 – operational practices to limit noise:

- FRP suggested an additional metric: arrivals joining point distance – which would play to the vectoring/PBN issue.

DP4 – CO2:

- FRP suggested that "Relative CO2 emissions" should be relative to the 'Do nothing' option;
- FRP questioned whether the AEDT model could reliably compute small variations in fuel burn for differences in Continuous Descent Operations (CDO) (e.g. when increasing thrust during turns), and whether this would lead to a disproportionate balance with noise effects;

DP10 - min. total people experiencing noise:

- FRP pointed out that this DP was about 'people' but the proposed metrics were about 'population' i.e. HAL proposed to assess compliance with the DP's focus on people by using metrics about residents, thereby apparently disenfranchising 6m+ RP visitors in favour of residents and house locations;

DP9 - min. increase in people experiencing noise:

- FRP made the same point as DP10 about 'people' in the DP morphing to 'population' in the metrics;
- FRP also noted that the metrics were using noise as calculated by LOAEL rather than the effect of short bursts of very loud noise overlaid on a very low level of ambient noise (a difference of around 50dB in Richmond Park's case) which certainly were "*people who experience an increase in noise*".

DP6 - respite:

- FRP suggested that, as there was no agreed definition of respite and 6m+ people visited Richmond Park partly to get respite from aircraft noise, a suitable additional DP6 metric would be whether an option effectively removed availability of a significant quiet public open space.

DP2 – CAA compliance etc.:

- Presence of NNRs (National Nature Reserves) and designated Quiet Areas or any other local area that has similar characteristics to a National Park or an AONB and has been identified through community engagement so should be added to SSSI/SAC etc. in the standard slate of metrics;
- On biodiversity and tranquility metrics, FRP's 2019 submission to the PEIR consultation included suitable metrics. FRP would email HAL with details [i.e. this email];
- On air quality impacts, FRP noted that Richmond Park's SSSI status is driven by its extensive rare Lowland Acid Grasslands, which carry much legal protection and are susceptible to nitrogen oxides over long time periods. Richmond Park currently has very low NO2 at 17µgm-3. So: (a) height should be defined as above ground level (AGL) as per CAP 1498 [HAL confirmed this]; (b) the height should be 2,500ft or more; and (c) this assessment should be quantitative, not qualitative – as the data exists

Best regards,
[redacted]
Friends of Richmond Park (FRP)

HAL - Design Principles weighting

Version control: v1.0 5-Jul-22

		Design Principles requirements under CAP1616	Weighting		Option X		Option Y		Option Z	
					DP result	Weighted	DP result	Weighted	DP result	Weighted
Our new airspace design **must**	1	Be safe	Must	10	70%	7.0	90%	9.0	70%	7.0
	2	Remain in accordance with the CAA's published Airspace Modernisation Strategy and any current or future plans associated with it and all other relevant UK policy, legislation and regulatory standards (for example, Air Navigation Guidance). This includes preventing any worsening of local air quality due to emissions from Heathrow's aircraft movements, to remain within local authorities' limits	Must	9	90%	8.1	90%	8.1	70%	6.3
	3	Use noise efficient operational practices to limit and, where possible, reduce adverse impacts from aircraft noise	Must	8	60%	4.8	40%	3.2	55%	4.4
	4	Reduce the contribution to climate change from CO2 emissions and other greenhouse gas emissions arising from Heathrow's aircraft activities	Must	6	60%	3.6	60%	3.6	55%	3.3
	5	Enable Heathrow to make the most operationally efficient and resilient use of its existing two runways, to maximise benefits to the airport, airlines and cargo handlers, passengers, and local communities	Must	6	90%	5.4	90%	5.4	60%	3.6
And **should** also	6	Provide predictable and meaningful respite to those affected by noise from Heathrow's movements	Should	7	40%	2.8	60%	4.2	30%	2.1
	7	Seek to avoid overflying the same communities with multiple routes including those to/from other airports	Should	7	40%	2.8	60%	4.2	30%	2.1
	8	Contribute to minimising the negative impacts of night flights	Should	7	10%	0.7	40%	2.8	10%	0.7
	9	Keep the number of people who experience an increase in noise from the future airspace design to a minimum	Should	7	50%	3.5	20%	1.4	40%	2.8
	10	Keep the total number of people who experience noise from the future airspace design to a minimum	Should	7	60%	4.2	50%	3.5	40%	2.8
	11	Enable the efficiency of other airspace users' operations	Should	5	70%	3.5	70%	3.5	30%	1.5
	12	Minimise the impact to all stakeholders from future changes to Heathrow's airspace	Should	5	80%	4.0	80%	4.0	30%	1.5
		OPTION SCORE				**50.4**		**52.9**		**38.1**

Tabled by FRP at M&M workshop 5-Jul-22

Option X makes it to the Stage 2 short-list (as it passes all 'Must' tests and has high overall score)

Option Y rejected as it fails on a 'Must' DP

For each DP's % rating, there should be a brief rationale. E.g.
"*Main driver for DP3's 40% was impaired CDO usage* "

Option Z fails to make it to the short-list as its score is too low

CAP1616 Stage 2

(para 128): *"... that the change sponsor has in our view:*

- *identified all the possible options*
- *evaluated the design options against the design principles in a fair and consistent manner*

(para 135): " … This appraisal therefore needs to be objective, repeatable and consistent …"

From: DD - Airspace
Sent: 12 July 2022 12:17
To: [redacted]
Cc: DD - Airspace; [redacted]
Subject: RE: M&M Workshop

Hi [redacted],

Thank you for your email. I have passed it on to the wider team and we will get back to you if we have any questions on any of it.

Thanks very much for attending the session last week, and for your useful contributions. The meeting note produced by Headland will be sent to you once ready.

Many thanks,
[redacted]

From: [redacted]
Sent: 12 July 2022 15:07
To: DD - Airspace
Cc: [redacted]
Subject: Re: Heathrow Airspace Modernisation: Methods & Metrics workshop
Attachments: Heathrow Airspace Modernisation - Notes arising from 5 July 22 workshop (final).pdf

Dear [redacted]

Last Tuesday's workshop covered a range of key areas going to the heart of implementation of Airspace Modernisation, noise impacts and community concerns. As discussed with you, in order that the points we raised are not lost we have produced a note, which is attached. It would be appreciated if the Heathrow Design Team could provide a response indicating whether they disagree with the matters raised. As part of the ongoing engagement process, we believe it would be helpful to meet again to explore further these concerns, along with other issues community groups may wish to raise.

Kind regards

[redacted]

Heathrow Airspace Modernisation

Methods and Metrics workshop – 5 July 2022

TAG Community Feedback

Summary of major points arising

- The Design Principles (DP) and the proposed approach in some cases conflict with each other and ANG 17. It was recognised there is an absence of a credible health and annoyance impact evidence base. Of overriding importance, the DPs and resulting approach do not address the key concentration issue.
- The Heathrow (HR) flight path design team recognised that concentration using PBN would have significant adverse effects, which based on international experience will lead to blighted neighbourhoods.
- The HR team considered managed dispersion, based on previous flight path patterns, would not be achievable under PBN. They did not see ways a limited number of highly concentrated routes could be avoided using PBN and recognised this would cause significant effects in the crowded airspace and high-density population around Heathrow airport.
- Whilst the HR team was considering the potential to mitigate the impact of PBN through respite they acknowledged this had severe limitations due to airspace capacity constraints and given Heathrow's location in the middle of very highly populated areas.
- HR airspace design was not addressing the reduction of noise impacts on the ground, nor was it taking account of internationally recognised change impacts as metrics based solely on a static survey were being applied. It was noted ICAO advised the use of overall average LAeq metrics only accounted for one third of aviation noise impacts.
- Airspace redesign seems to be an exercise to investigate lower airmile routes and potentially at a cost of causing very significant adverse impacts over the high-density populations such as those around Heathrow.

Heathrow Business Case

- HR confirmed that this ACP assumes 480,000 ATMs pa. Communities noted this conflicts with assumptions being used by the DfT and ACOG.
- DfT assumptions also conflict with CCC limitations on UK aviation growth. What is HR's position on this and how will this issue be resolved?

Noise

- No study has been undertaken in relation to the environmental/health outcomes of implementing PBN/NextGen and the absolute priority of avoiding the creation of blighted communities living in 'noise sewers' resulting from extreme concentration. This is despite evidence of international experience being provided to the HCNF on numerous occasions over many years.
- All parties accept that LAeq measures are not sufficient to describe annoyance. No metrics have been developed to describe impacts of concentration in the centre of PBN flight paths.
- HR confirmed that its ACP will apply ANG policies. However as noted elsewhere this is not underpinned by a robust evidence base and further some DPs conflict with ANG17.
- ANG specifically defines impacts by reference to health (including annoyance) and requires altitude priorities to be applied (noise the priority up to 7000 ft with balancing with carbon only after 4000ft if a clear case can be made). HR should advise how this will be applied in practice.
- No credible health study on the impact of aviation noise in relation to HR or the UK has been carried out. HR indicated at the meeting it was considering undertaking a local health impact

study. HR should confirm whether it will be carrying out this work and if so the timing and how it will be taken forwards.

- DfT accepts that SoNA needs to be updated and is preparing for this work. This will entail a review of LOAEL, as well as a review of metrics, thresholds and presumably a recalibration of webTAG. HR should advise how this programme of work will be fed into its ACP option appraisal. In the absence of other evidence WHO Guidance should be used, in particular in relation to noise thresholds and the analysis of HR's ACP.
- HR agreed that the CAA's noise cones do not correspond to noise impacts, for example in relation to larger, heavier aircraft. HR will be undertaking its own analysis based on SELs. Communities proposed additional metrics – see analysis section below.

Route usage assumptions

- HR stated 2019 would be its 'Base Case' year.
- The impacts of ACP options will be assessed against this using a 10-year projection in relation to fleet and route usage. This 10-year projection should also be applied to the 2019 base case 'do nothing' scenario.
- It is also essential that HR compares actual noise conditions experienced in 2019 and how assumptions regarding route usage and fleet transition will be factored in. HR should clarify its projection methodologies.
- HR should also advise what control mechanisms and community protections will apply in future concerning increased noise impact resulting from changing commercial demand patterns and new technologies.

Respite, dispersion, and the avoidance of creating blighted communities

- The importance of avoiding the worst impacts of concentration given worldwide experience was discussed. No response has been given by HR in relation to the numerous HCNF presentations on the well documented outcomes of implementing PBN/NextGen in the US.
- HR should provide a statement of the technical constraints it is working within in relation to flight path design, particularly concerning noise sharing and dispersion concerning PBN.
- The treatment of important parks and open spaces, e.g., Richmond, Osterley, Windsor, Bushy and Home Parks needs to be clarified.
- HR has committed to providing respite through easterly departure runway alternation following the expiry of the Cranford Agreement. If departure flight paths combine after a few km, then communities will only see a small benefit close in and real respite for those on departure flight paths will not be provided. A note of what the possibilities will be needs to be produced by HR.
- HR confirmed it was investigating respite – however this seemed to be based on an assumption that a reduction of 9 dBLAeq was needed to create meaningful respite. This is not the communities' understanding of the outcome of the Anderson study, which identified 8-9 dBLmax to be needed to achieve 'valued respite'. This may create a very different set of route design parameters and HR should confirm the basis on which they are progressing their ACP.
- In their study of HR's 2014 PBN trials Anderson reported that the use of LAeq metrics could not explain or differentiate the impacts of concentration. The CAA advised the HCNF that health benefits of £640m over 10 years could be achieved by splitting a single PBN route. In addition, the CAA found as part of their work for the Airports Commission that 'maximum respite' created the lowest health impacts, compared to alternative flight path strategies (such as minimise total or minimise newly affected).

Operations

- The design team said they would use CCO/CDOs for departures and arrivals.
- The communities said this needed further definition if they were to be considered noise efficient (for example higher ascent rates for departures). The design team said they would use the 2019 averages, the implication being 'no change with modernisation'. Achieving higher altitudes is a vital component of AM highlighted by the CAA to minimise aviation's noise impact.

- Communities noted that level flight at 6000ft under stacks requires lower thrust so causing lower noise over communities. Further down the flight path (after passing under the stacks) over lowly populated countryside wider dispersion is possible once climb thrust has to be reapplied
- HR confirmed that the work undertaken by TO70 in relation to departure procedures/climb rates would be considered in designing flight path and system options. HR needs to confirm the timing and how this will be factored in.
- Designing in noise abatement procedures is vital to communities for both departures and arrivals and should be part of modernisation

Design Principles

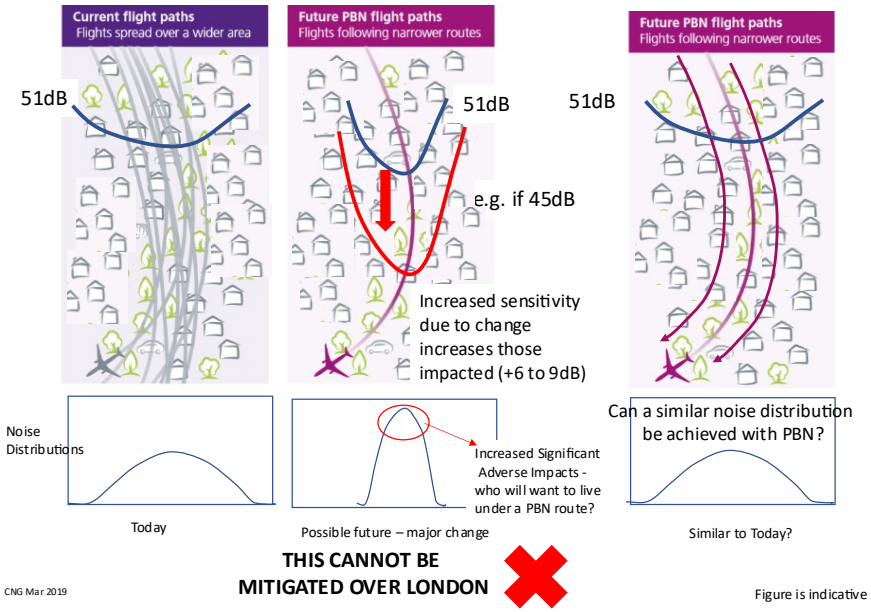
- HR was advised that DPs referred on slides 17 and 18 (which were based on notional cones and numbers of people) conflicted with ANG17, which requires the avoidance and minimisation of significant adverse impacts (assessed by health and wellbeing effects).

Option Appraisal and metrics

- The deficiencies of SoNA14 and webTAG were discussed. ICAO advises that only approx. one third of aviation noise impact is attributable to overall average noise metrics. This needs to be addressed – along with WHO guidance – in the forthcoming reviews of SoNA, LOAEL and Night Noise.
- HR needs to confirm how updated SoNA and LOAEL advice will be applied in the flight path option appraisal process. It is clear that adverse impacts occur at levels below 51dBLeq.
- Communities advised that notwithstanding CAP1616 reporting requirements, average metrics (whether Leq or SEL) do not reflect annoyance.
- Communities proposed the use of noise event N>60/65/70 and 70 dB Lmax contours and single mode metrics reflecting the impacts when communities were actually overflown (by day and hourly equivalent) making explicit assumed respite and time of day assumptions. Change diagrams based on single mode events should be provided. Although these metrics are required as a minimum it is not clear if even these measures pick up all the impacts of concentration as no research has been done in this area.
- HR should use 'gate analysis comparisons' (employed in previous work by PA Knowledge and Anderson) to explain and illustrate the changes that will be caused by concentration along with associated noise modelling.
- It is likely that the loudness and sound energy across a dispersed and concentrated flight path needs to be considered to understand changes and increased annoyance. These factors are concentrated beneath a plane so effects will be most severe under the centre of a flight path, more so if it is concentrated. As loudness and sound energy is logarithmic in nature these effects are not taken account of by looking at the edges of a SEL contour as suggested at 70dB for a single event (or around 60dB LAmax). In fact, by looking at the edges they are more likely to hide real impacts of concentration at the centre.
- All metrics being proposed are static. Whereas change (whether experienced by newly affected communities or residential areas who are more intensely overflown) is known to increase annoyance over many years. Average LAeq are not sensitive to describe these affects (e.g., Andersen report on PBN trials)

A number of the issues identified are summarised in the following diagram;

Why PBN does not work over high population densities



[redacted], TAG, 12/07/22

RE: Heathrow Airspace Modernisation: Methods & Metrics workshop

DD - Airspace <airspace@heathrow.com>

Tue 12/07/2022 15:37

To: [redacted];DD - Airspace <airspace@heathrow.com>

Cc: [redacted]

Dear [redacted],

Thank you for your email. I have passed it on to the wider team and we will get back to you if we have any questions on any of it.

Thanks very much for attending the session last week, and for your useful contributions. The meeting note produced by Headland will be sent to you once ready. We can consider next steps (including the need for further email correspondence or workshops) once we have all read and digested that note.

Many thanks,

[redacted]

Re: Heathrow Airspace Modernisation: Methods & Metrics workshop

[redacted]

Tue 12/07/2022 16:26

To: DD - Airspace <airspace@heathrow.com>

Caution: external email. Unless you recognise the sender and know the content is safe, do not click links or open attachments.

Many thanks [redacted]

Will see you tomorrow.

Kind regards

[redacted]

From: [redacted]
Sent: 12 July 2022 16:58
To: DD - Airspace; [redacted]
Cc: [redacted]

Subject: RE: Heathrow Airspace Modernisation: Methods & Metrics workshop

Caution: external email. Unless you recognise the sender and know the content is safe, do not click links or open attachments.

[redacted],

At last week's workshop [redacted] and I had a really useful discussion about noise complaints and flying under stacks. (pls forward to [redacted] if I have guessed the wrong email)

What we identified was that the detailed nature of the noise complaints under stacks was less clear and would benefit from further examination.

I pointed out that if planes are required to hold level at 6000ft under stacks then thrust levels are reduced so will actually reduce noise levels. We had a quick look at this when To70 was helping communities and this shows planes can fly producing less noise while under stacks, this is a copy of the slide I shared last week;

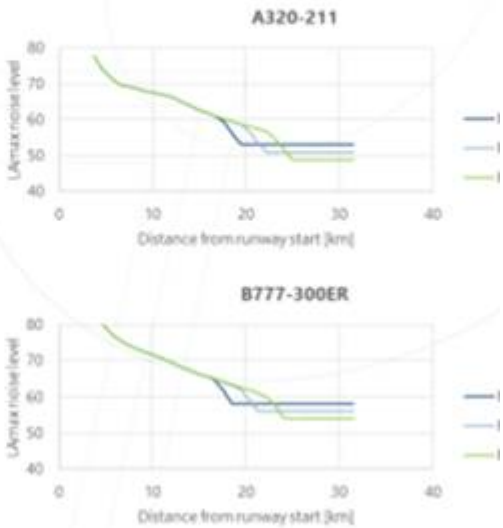
Hold at altitude may be beneficial for night noise over high der communities like London (with climb after high density community passed and

Level flight noise

Estimate of noise level L_{Amax} in dB(A), for hold at 6000 – 8000ft:

	A320-211	B777-300
Hold @ 6000ft	53	58
Hold @ 7000ft	51	56
Hold @ 8000ft	49	54

➔ Holding altitude at 6000+ ft will reduce 60 dB(A) L_{Amax} contours

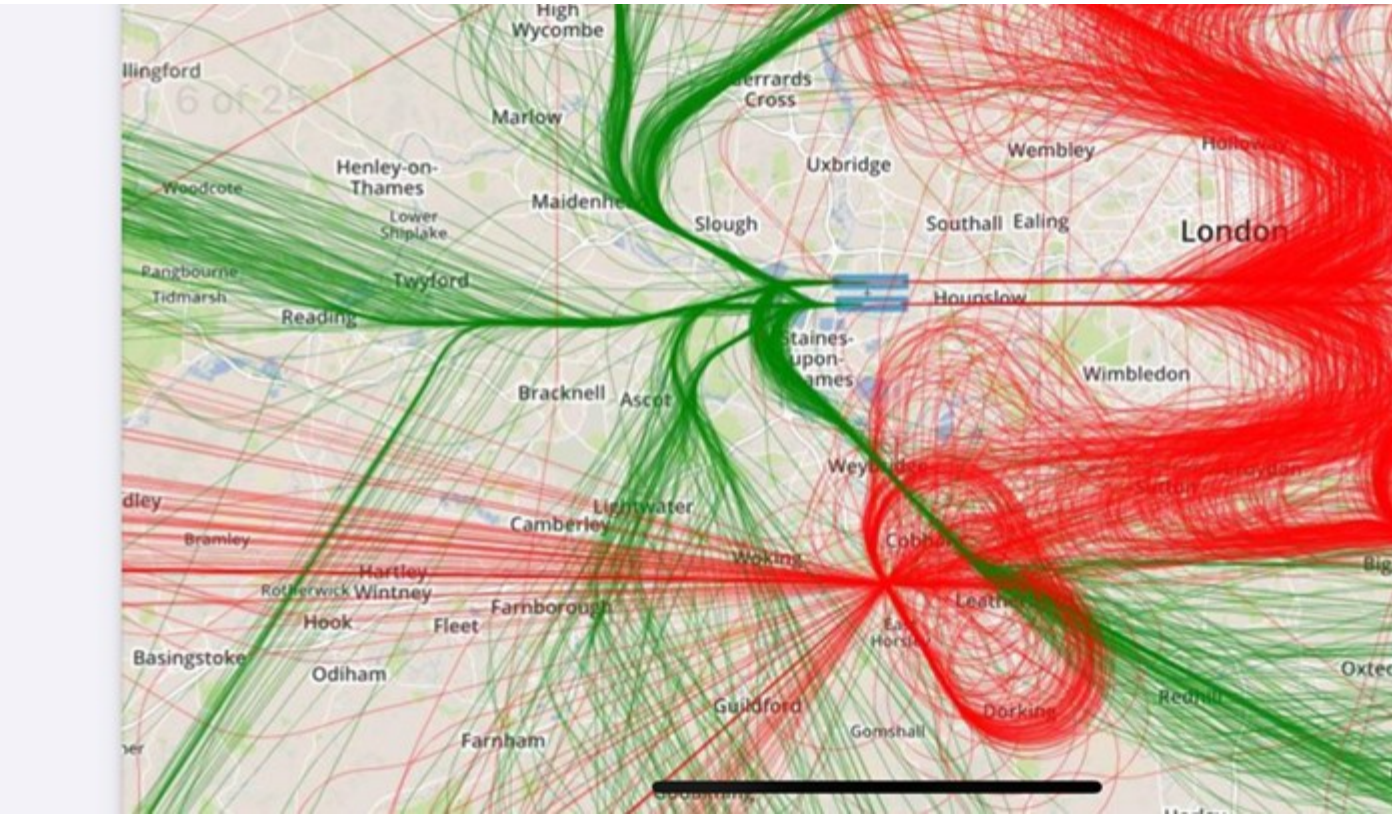


to70

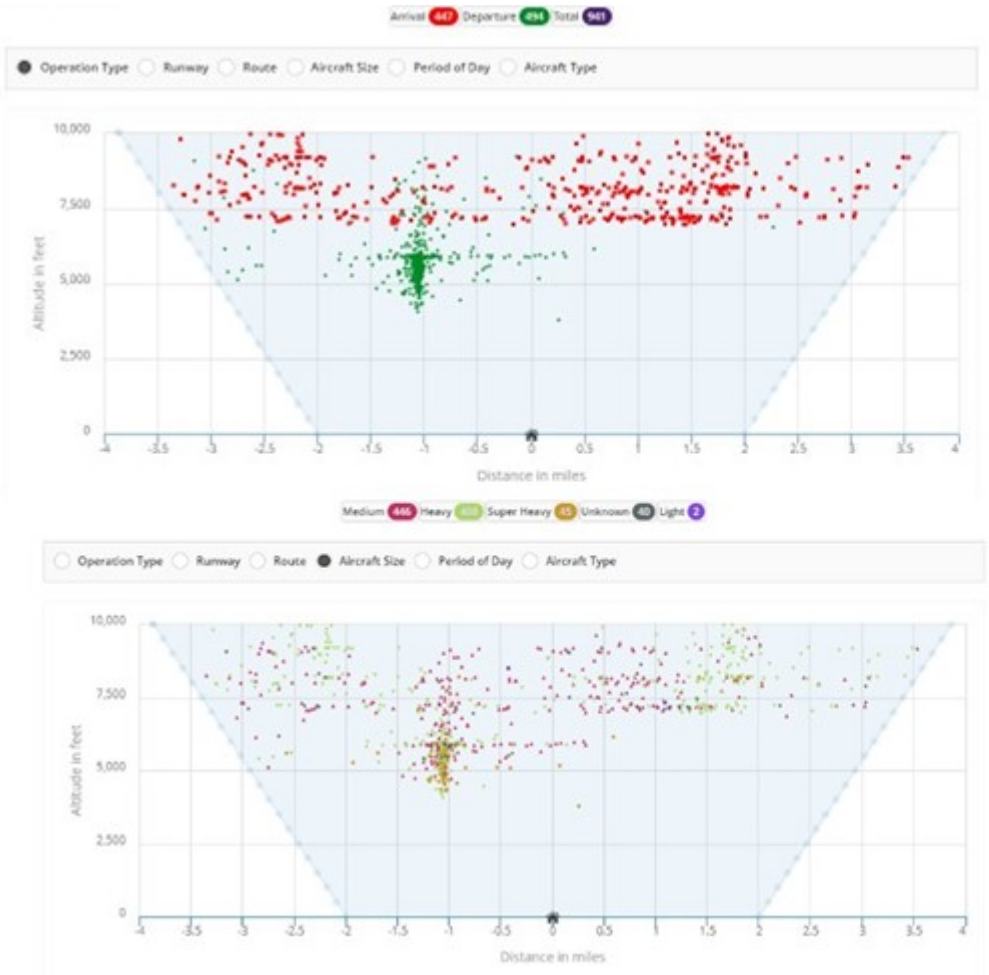
Aviation Consultants

2 July 2022

The question then might be what is causing the complaints. Looking at some flight patterns one obvious point along the Weybridge to Cobham to Leatherhead path is the apparent concentration of flight paths;



In addition after the meeting I thought it would be useful to run x-plane – using a Cobham post code. The results are quite interesting;



This shows that many planes do not even reach 6000ft by this stage in the flight path. In fact many heavies and super heavies are still climbing and will be noisy.

On this basis it seems likely complaints, if they are due to departures, will be more due to concentration and noisy heavies not achieving 6000ft at this stage (in addition to other factors such as time of day).

Does this make sense or do you have different views?

My concern is that airspace modernisation - by avoiding holds under stacks - will not produce any noise benefit in this respect, other factors are more important (concentration, height, time of day, respite etc).

Of cause a detailed analysis may show complaints are also linked to arrivals noise (from stacks) but this could be addressed by exiting the stacks at a higher altitude.

It feels worthwhile to look at the noise complaints under stacks in more detail, if you have this information already it would be good if you could share this,

Rgds

[redacted]

FW: Letter from RHC to HAL ref Airspace Change Proposal

[redacted]

Tue 19/07/2022 15:19

To: DD - Airspace <airspace@heathrow.com>

1 attachments (2 MB)

Letter to [redacted] HAL 18 July Final.pdf;

From: [redacted]
Sent: 18 July 2022 15:08
To: [redacted]
Cc: [redacted]
Subject: Letter from RHC to HAL ref Airspace Change Proposal

Dear [redacted]

Ref: ACP-2021-056 Stage 2 Design and Assess

Please find attached a letter from Richmond Heathrow Campaign to Heathrow on the subject of Heathrow's proposal for airspace modernisation.

Please feel free to circulate the letter to your Heathrow colleagues as wish. Discussion in due course on the content would be much appreciated.

Kind regards

[redacted]

[redacted]

Chair, Richmond Heathrow Campaign

Richmond Heathrow Campaign represents three amenity groups in the London Borough of Richmond upon Thames: The Richmond Society, The Friends of Richmond Green, and the Kew Society, which together have over 2000 members.

Letter to Heathrow Airport Limited
from Richmond Heathrow Campaign, 18 July 2022

To

[redacted]

Dear [redacted],

Ref: Heathrow Airspace Modernisation (FASI South) (ACP-2021-056)
Sponsor: Heathrow; Stage 2, Design and Assess

INTRODUCTION

1. The purpose of the letter is to record issues that we consider need to be addressed and to seek clarifications and assurances from Heathrow on the preparation and implementation of Heathrow's Airspace Change Proposal - Stage 2 Plan and the Engagement Process. Stage 2 started in February 2022 and is planned to complete in Q3 2023. We are concerned that the issues be addressed early in Stage 2. This letter focusses on the CAA's CAP 1616 Guidance on the airspace change process as applied to Heathrow's airspace modernisation.
2. We look forward to receiving Heathrow's draft Plan for Stage 2/Engagement Strategy as soon as possible. We have seen a summary timetable but we believe a comprehensive Plan is required, in which a grid sets out the gathering of evidence and the decisions, their inter-relationship and critical-path timing. We thank Heathrow for the arranging a technical workshop on 5 July, which started the process by focussing on the methods and metrics.
3. It would help to extend the grid to the 'Full Appraisal' in Stage 3a, ahead of the Public Consultation and to include a Needs analysis in the form of a 'Do-Nothing' scenario and an upfront Project Scoping Study to establish the potential costs and benefits from modernisation.
4. Communities around Heathrow approach Airspace Modernisation with great concern. We already experience very significant adverse health impacts from noise and air pollution from the airport's operations (increasingly so with incremental concentration of flight paths and lower flying). We believe there is a very real possibility of conditions worsening significantly for many communities around Heathrow and the wider area as a result of this process and we seek to engage with Heathrow in avoiding environmental harm.
5. We would like to engage constructively in a process that is transparent, open (i.e. not pre-determined), is evidence based, with time allowed for our consideration and with our contribution being given due consideration by Heathrow. We trust that Heathrow will be open to our raising concerns and differences (both residual and new) during option development and evaluation and that we can work together constructively through Stage 2.
6. The CAA's CAP 1616 Guidance (CAP 1616) and the DfT's Air Navigation Guidance 17 (ANG 17), et al, encompass issues that are essential to the Plan and Engagement Process. Communities have collectively expressed concerns regarding both the Design Principles and the initial Engagement Process leading up to the Design Principles submission to the CAA in Stage 1.

   These concerns are significant because some of the Design Principles are capable of different interpretation and inherent conflicts, which could impact on how they will be applied during

Stage 2 of option development. (The Communities' letter of 24 January 2022 sets out these concerns).

7. In places, several relevant policies and guidelines overlap, which raises issues of primacy. Also, roles and responsibilities for the evidence and decisions sometimes overlap. We would welcome assistance from Heathrow in mapping the overlaps so that we are better able to engage with the CAA, DfT, NATS and ACOG, as well as with Heathrow. This should also help identify gaps in policies and guidelines and ownership of the decisions.
8. Having regard to this, we would welcome responses from Heathrow on the Stage 2 Plan and Engagement Process.

STAGE 2 PLAN

The Need for Modernisation.

9. We appreciate that Heathrow has already provided some material to the CAA on the Need for airspace modernisation around Heathrow, including at Stage 1a of CAP 1616, as has the Airspace Change Organising Group (ACOG) in its UK Airspace Modernisation Masterplan.
10. However, at the current stage we would like a greater understanding of the existing problems that modernisation may help to solve and the opportunities for improvement. Heathrow's letter of 14 January 2022 to the CNG states 'There would be a separate process required if Heathrow were to introduce mixed mode or to increase capacity above 480,000 flights (ATMs) per year.' Can Heathrow therefore share information (based on the no expansion scenario) on the following specific and wider issues, for example:
    (i) What are the projections of lost time and cost due to lack of punctuality and resilience?
    (ii) To what extent do existing flight paths deviate from operationally efficient paths from start to finish?
    (iii) What specific conflicts and constraints are there with flights from other airports, General Aviation and new entrants such as drones and air taxis?
    (iv) What are the issues with Air Traffic Control and how can technology help?
    (v) What are the opportunities for noise, air pollution and CO2 emission reductions that could be delivered by airspace change at Heathrow?

    Practically, it would assist to have these issues expressed in the context of a Base Year (say 2019) and a 'Do-Nothing' (Baseline) scenario.
11. We assume that Heathrow will return to pre-covid numbers of flights which were near to the planning limit of 480,000 ATMs a year. The scheduling of these flights varies according to the summer and winter seasons and time of day. In responding to point (i) above on resilience, it would help to understand what airspace headroom capacity there is above the scheduled usage (a) for resilience and (b) for additional flights. Also, it would be helpful to see the projections for passenger numbers in the light of trends for larger aircraft and higher load factors.
12. Can Heathrow assist in seeking an update to NATS' (2017) estimated UK Need in its feasibility study supporting the Airspace Modernisation Strategy. We are concerned that based on an average 2.0% pa demand growth by UK aviation this is now significantly overstated compared to the Climate Change Committee's 6th Carbon Budget, which in turn leads to a significantly overstated 'Do-Nothing' scenario.

Upfront Airspace Modernisation Project Scoping.

13. We also believe a normal requirement of any option appraisal process, would be the establishment at the outset of targets and a framework for evaluating the potential costs and benefits, measured against the 'Do-Nothing' scenario (such a scoping study should reflect the update referred to in para 12 above). We realise final conclusions and decisions can only be arrived at the end of the design process when flight paths have been finalised, but this does not obviate the need for an upfront project scoping study. If this is to be left to the 'Initial Appraisal' at the end of Stage 2 or the 'Full Appraisal' in Stage 3, it will be far too late for meaningful community engagement.

14. We believe that as part of an outline business case it is essential to understand the range of cost-benefit estimates that Heathrow expect as outcomes of modernisation, as this will be fundamental to the identification and assessment of options. The sharing of extant or newly prepared cost-benefit estimates will be invaluable to all stakeholders so that they can understand better how these expectations inform the modelling and other processes needed to develop modernisation proposals.

15. As part of the Scoping Study can Heathrow also assist in reconciling and co-ordinating ACOG's Airspace Modernisation Masterplan and Heathrow's Business Plan that include Heathrow expansion with the Heathrow's Airspace Change Proposal that excludes expansion? The process of integration with the ACOG Masterplan is not clear at the moment and we would welcome an early discussion on the subject. If Heathrow's proposal includes adding airspace capacity for resilience or potentially additional flights (notwithstanding the proposal is based on usage by 480,000 ATMs a year) it would help for these capacity changes to be identified.

16. Also, we are not clear whether it is Heathrow's intention to follow the recommendation in the policies for the 6th Carbon Budget that 'there should be no net expansion of UK airport capacity unless the sector is assessed as being on track to sufficiently outperform a net emissions trajectory that is compatible with achieving Net Zero'. Can Heathrow explain their position on this, please.

Early Collection of Robust Evidence.

17. In a project of this scale and impact it is fundamental that the appraisal and project decisions are supported by a robust evidence base. We believe an early audit of the evidence needed to make rational design decisions is essential and that steps are then taken to address knowledge gaps in a timely manner so as to properly feed into the relevant decisions. In particular, the following will be essential to inform accurate flight path appraisals:

    (i) A new social survey of day and night noise, to remedy the acknowledged deficiencies of the previous SoNA survey.

    (ii) A decision on the application of WHO Guidance values on noise and/or the rationale behind the choice of other metrics or thresholds.

    (iii) Impact evidence on PBN use (in the light of Heathrow's 2014 PBN trials, London City Airport and US experience) and related solutions for the inherent concentration of noise impact.

    (iv) Evidence on the mitigation of concentrated noise by use of multiple flight paths and/or respite.

    (v) Up-to-date air pollution evidence (NOX and particulates) of the impact of the proposed changes, as increasingly the harm on peoples' health and life expectancy is shown to be more serious than previously thought.

    (vi) Current population density and projected growth across the Heathrow Study Area.

(vii) Location of noise sensitive hospitals, schools and parks.

(viii) Assumptions regarding potential aviation fleet change (and the economic, operational and environmental consequences) and its timing.

(ix) Evidence on the reduction of CO2 and timely pathway to Net Zero.

Uncertainty and Risk.

18. We would like to understand how uncertainty and risk and sensitivity analysis will be addressed and factored into the project appraisal and decisions, and what risk assessment, management and mitigation steps Heathrow might take. We note that in the US the AM 'NextGen' project has failed to deliver the projected benefits as well as causing very adverse environmental impacts on some communities and it will be important to understand how these outcomes will be avoided in the case of Heathrow.

Design Tools.

19. Heathrow will need to employ design tools in its project decisions and appraisal, such as the ANCON, AEDT and INM noise models and the government's TAG transport model (presumably updated to reflect the latest evidence). We would welcome early engagement with Heathrow on the use of these tools and models and the decision criteria, as well as the use of Environment and Economic Impact Assessments. We would like to understand what factors can be controlled by Heathrow and those that cannot, and which ones can be quantified and monetised and those where decisions will need to be based on qualitative assessment. We suggest that the Eurocontrol Standard Inputs for Economic Analyses, Edition 9.0, December 2020 (and updates and the Aviation Intelligence portal) could be a useful data sources for modelling.

Optimisation Decision Process.

20. **Generating options.** We would like to continue the process started with the 5 July workshop of understanding how flight paths will be modelled in terms of lateral, vertical and time descriptors (4D) and how they will be operated in future in terms of frequency of flights, aircraft types and passenger loads and passenger kms including periods of respite. We seek to understand the efficiency rating and the noise, air pollution and CO2 emissions and the environmental impact of each flight path option as well for the system as a whole.

21. **Short-listing options**. We would like to understand the process of elimination of flight paths in short listing and the choice of a final set of flight paths and how the options will be assessed against the Design Principles and Policies. It will be important to show how ANG 17 has been applied in relation to noise, altitude-based priorities, CO2, and air pollution and to other factors while ensuring safety. It will be important to extend the population numbers affected to the health impacts and to assess the impact of PBN and concentration versus dispersion.

22. **Fairness.** We would anticipate the option design process to be one of re-allocating legacy flight paths to improve efficiency and environmental impact. Fairness will be an important consideration and we hope the impact of change (recognised by ICAO) can be addressed.

23. **On-going proposals by communities and others**. Over time a number of proposals have been made to reduce noise and air pollution by the CNGs, Heathrow and others - for example: take-off procedures, reducing night flights and solutions for particular noise hot spots. We would like to see how these improvements and ICAO's Balanced Approach have been incorporated in the Airspace Change Proposal and the Stage 2 Plan.

ENGAGEMENT

24. To help ensure the engagement process for Stage 2 is robust we would welcome assurances from Heathrow regarding the following:

    (i) **Timely Information.** Heathrow should circulate reports an appropriate and reasonable period ahead of meetings to discuss the documents and well ahead of deadlines for community responses.

    (ii) **Hierarchy of decisions.** As part of a grid for the Stage 2 Plan we wish to understand the hierarchy of decisions which influence route options and what criteria and evidence underpins them.

    (iii) **Stakeholder Input.** We also wish to understand how stakeholder input will be used and what genuine influence it may have in the formation of the new airspace design. We seek to avoid pre-determined decisions.

    (iv) **Consultations.** When Heathrow gathers evidence from consultations and focus groups we would like to be advised how these groups have been chosen, what briefing material has been provided and have access to the response data, where necessary in redacted or statistical form. Differences in interpretation may arise but it is important for Heathrow, ourselves and others to understand where we differ.

    (v) **Views of other Stakeholders.** Clearly, there are other stakeholders and it is appreciated they may have different views to ourselves; it will be important to us to understand these and how they have influenced the design outcomes.

    (vi) **Monitoring the Plan.** It will be important for communities to engage with Heathrow as the Stage 2 Plan progresses and for there to be the opportunity to identify gaps in the process and engagement and the remedial action needed to ensure the process and engagement are working to Plan.

NEXT STEPS

25. This letter stems from potentially being impacted and wishing to understand and participate as fully as we can in the process by which flight path options will be designed and assessed. We see this letter as a starting point for positive engagement with Heathrow and would welcome your consideration of the issues raised on preparation and implementation of a Plan for Stage 2 and the Engagement Process. It would be appreciated if the letter could be circulated to the appropriate colleagues at Heathrow.

Yours Sincerely,

[redacted]

[redacted]

Chair, Richmond Heathrow Campaign: www.richmondheathrowcampaign.org

Richmond Heathrow Campaign represents three amenity groups in the London Borough of Richmond upon Thames: The Richmond Society, The Friends of Richmond Green, and the Kew Society, which together have over 2000 members.

RE: Letter from RHC to HAL ref Airspace Change Proposal

[redacted]

Tue 19/07/2022 18:14

To: [redacted]

Cc: DD - Airspace <airspace@heathrow.com>

Thanks [redacted] – that's really helpful.

Thanks,
[redacted]

From: [redacted]
Sent: 19 July 2022 18:08
To: [redacted]
Subject: Re: Letter from RHC to HAL ref Airspace Change Proposal

Caution: external email. Unless you recognise the sender and know the content is safe, do not click links or open attachments.

Hi [redacted]

Attached is a Word version. I have worked backwards from the scanned version so hopefully the Word format is okay for you. Let me know if otherwise.

Kind regards

[redacted]

On 19/07/2022 15:23, [redacted] wrote:

> Hi [redacted],
>
> Thank you for your letter. I have forwarded it to all Heathrow attendees of the Methods & Metrics workshop.
>
> I'd like to paste each of your points into a table so that the team can propose suitable information/responses for each point, but I am unable to lift the text from the scan. Would it be possible for you to send me a Word version so that I can more easily share it with the team for comment?
>
> Many thanks,
> [redacted]

From: DD - Airspace
Sent: 26 July 2022 18:39
To: [redacted]
Cc: DD - Airspace
Subject: FW: Methods and Metrics workshop
Attachments: Heathrow airspace change - MM workshop July 22 - Headland DRAFT.docx

Dear [redacted],

Please could you share the attached workshop note and below email with [redacted]?

Many thanks,
[redacted]

From: DD - Airspace <airspace@heathrow.com>
Sent: 26 July 2022 18:36
To: DD - Airspace <airspace@heathrow.com>
Cc: [redacted]
Subject: FW: Methods and Metrics workshop

Hello All,

Thanks again for attending our Methods & Metrics workshop on 5 July. As promised, [redacted] from Headland has produced an independent meeting note. A draft version is attached for attendees' review and comment.

Please let me and/or [redacted] know if you have any concerns about anything in the note. [redacted] email address is: [redacted]

Once the note has been checked for accuracy and finalised, it will be shared with wider members of the NACF.

Many thanks,
[redacted]

methods and metrics workshop

Report of technical workshop between Heathrow and stakeholder group representatives, 5 July 2022

Background

This report provides a minute of the workshop between representatives of Heathrow and of stakeholder group representatives, held at the Heathrow Compass Centre on 5 July 2022, as part of Stage 2 of Heathrow's airspace modernisation proposal. The report was prepared by Headland Consultancy, which had been engaged by Heathrow to independently chair and minute the workshop. The workshop was arranged by Heathrow in response to queries raised by technically-minded stakeholders. All attendees of the Noise and Airspace Community Forum (formerly Heathrow Community Noise Forum) were informed about the workshop and invited to provide an expression of interest if they would like to attend.

Attendees

Name	Organisation
[redacted]	Buckinghamshire Council/HSPG
[redacted]	Englefield Green Action Group
[redacted]	Englefield Green Action Group
[redacted]	Friends of Richmond Park
[redacted]	HACAN
[redacted]	HASRA
[redacted]	Headland
[redacted]	Heathrow
[redacted]	Heathrow
[redacted]	Heathrow
[redacted]	Heathrow
[redacted]	Heathrow
[redacted]	Heathrow
[redacted]	Heathrow
[redacted]	Heathrow
[redacted]	Heathrow
[redacted]	Heathrow
[redacted]	London Borough of Hounslow
[redacted]	Molesey Residents Association
[redacted]	Richmond Heathrow Campaign
[redacted]	Teddington Action Group
[redacted]	Teddington Action Group

Throughout this report, contributions are attributed to the organisation they came from rather than the individual. The ordering of the minute reflects the numbering of the principles, not necessarily the order of the discussion, which ranged across different principles at times. A slide pack, also submitted alongside this minute, was presented as part of the discussion.

Method

0.1	Heathrow	Set out the purpose of the meeting, noting that it is not a requirement of CAP1616 but an exercise in gathering feedback on the proposed method and metrics for designing and assessing airspace options at Stage 2. Invited all participants to ask questions and to make comments and suggestions on the metrics proposed to assess each design principle.

Options Development

0.2	Molesey Residents Association	Asked about assumptions on the diagram of height trajectory. Noted that Heathrow referenced the 'flooding' technique being used in other proposals and asked if other airports use this as well. Asked whether Heathrow had thresholds for acceptability on certain principles. Asked why Heathrow was starting from a blank sheet. Asked whether the mix of aircraft, time of day, and overall volume of flights would be factored into analysis. Asked whether this was based on current or forecast volume of flights.
0.3	Richmond Heathrow Campaign	Asked about the decision to design to 7,000ft rather than 9,000ft. Stated that ACOG iteration 2 suggests airports look to design to 9,000ft. Stated that Gatwick created system options at this point in their process, based on variations on the existing airspace, allowing for a consideration of 80 options rather than many thousands generated from a blank sheet of paper. Also commented that Gatwick started designing based on current legacy routes, rather than from a blank sheet of paper. Suggested that Heathrow should do the same.
0.4	Teddington Action Group	Asked if Heathrow know where aircraft are heading to within the network, and where they're coming from. Asked if the baseline will be an option i.e., today's position.
0.5	HACAN	Asked if the flooding exercise was so Heathrow could do an assessment against the baseline.
0.6	Heathrow	Noted to generate overflight cones for the flooding, Heathrow have assumed a standard of 5.5% climbs, as well as assumed continuous climbs to at least 7,000ft and a 3^{o} approach. However, these issues don't affect the initial data generation for the tracks and will only be relevant when options are created and analysed later in Stage 2. Climb and descent gradients may also be revised at Stage 3. Noted that for noise purposes, Heathrow are required by CAP1616 to look at impacts from 7,000ft and below. For assessing the carbon impact of tracks, a

		decision has been taken to look beyond that, to fixed points far out within the network to provide an early indication of carbon performance. Explained that whilst CAP1616 and ANG2017 require assessments of noise impacts to/from 7,000ft, Heathrow would have to design flight paths that climb/descend to/from FL90 (c.9,000ft) as 7,000ft is not a helpful altitude in airspace design terms. Explained that the 'flooding' technique was useful for generating data to identify options that might optimise for a given principle. CAP1616 asks for options to be created, and each sponsor can determine how they produce that. Some have used flooding, some haven't. Highlighted that the role the flooding technique plays is creating data for 650,000 different lines, from which options for potential flight paths can then be designed. Noted that the fixed points for the analysis were the end of each runway and the transition points to other airspace. Generating lines between those points allows for their comparison. The tracks are relatively unconstrained, but they go straight or turn left or right consistently; there is no "wiggling" of the route, which there might be in an actual design option. Stated that every option will be compared to the baseline, not against each other. Additionally, one option will be to 'do nothing' i.e., the baseline. However, it is Government policy to modernise airspace, so 'do nothing' is likely to be a discounted option as it will not meet the intention of the Government's airspace modernisation strategy. Noted that CAP1616 advises them to forecast 10 years into the future from implementation when conducting the assessment.

Method for choosing between options

0.7	Richmond Heathrow Campaign	Suggested it was necessary to create system options at this stage, as per Gatwick, to ensure that all valid options, so that all valid options were available for consideration at the Stage 3. Commented that Gatwick had started their design process based on legacy routes, not from "a blank sheet" and stated that they would prefer Heathrow to do the same. Discussing usage, commented that CAP1616 does not limit traffic frequency along a route. Airlines are able to change their choice of destination and therefore which route they fly days after new flight paths come into effect.
0.8	Friends of Richmond Park	Asked how many options will be available at Stage 2. Luton had c. 20 and London City had c. 40 options. Suggested that options needed to be reduced to a maximum of 50 to allow for proper engagement. Noted that 650,000 notional routes would be reduced significantly to generate "real" options. Asked how stakeholders could be sure the list of options was "comprehensive" – as required by the CAA – if that process was done subjectively. Suggested Heathrow should score every option against every principle, based on quantitative test, and applying a weighting to each principle. Stated that this would meet the CAP1616 requirement for evaluating in a "fair and consistent manner" whether a principle was Met / Partially Met. Noted their suggestions for how

		Heathrow might do this. [This was later supplied by email]. Stated that use of terminology around systems, options, groups of routes need to be consistently applied by all ACP sponsors.
0.9	HACAN	Asked what the routes will look like and if it will be a process of elimination. Asked whether the elimination of certain options at this stage would be explained. Suggested Community Noise Groups (CNGs) could not reach a judgement if there is not a clear how and why. Asked for data to be published alongside each option.
0.10	Molesey Residents Association	Asked whether Heathrow had thresholds for acceptability when assessing options against principles.
0.11	Englefield Green Action Group	Asked whether an option failing against a “must” principle was grounds for deleting that option.
0.12	Heathrow	Noted that at this stage Heathrow are not looking at full systems. All 8 configurations for runways, departures and arrivals (easterly and westerly) will be combined to create a system option once the initial options development is completed. This will happen at Stage 3 of the process. Noted Gatwick had not created options based on systems but were also generating options in Stage 2 on easterly and westerly departure and arrival configurations, similar to Heathrow. Stated that Gatwick has also started from a blank sheet approach. Noted that certain metrics can only be generated when looking at a full system, so Heathrow needs a full schedule before looking at specific impacts. Decision made to look at a group of routes, gather data, and work that into a manageable list of options at Stage 2. Conscious of the need to ensure routes work for both the easterly and westerly departures. At Stage 3, the routes will be combined into full systems to ensure they work together and assess impacts at a system level. This allows Heathrow to consider many more configurations in Stage 2 rather than just a relatively small number of complete systems. Noted that the requirement in CAP1616 for a “comprehensive” list of options is not defined. Noted that CAA do not define a methodology for choosing between options – that is left to the sponsor to decide. Initial options will be appraised before a short list is produced. This will be shared with community groups including method. Everything will be included on the CAA portal. The CAA process does not require Heathrow to engage community groups at this stage, but Heathrow has taken the decision to. Noted it wasn’t necessary to quantitatively score options against every design principle and noted that doing so might require Heathrow to weight each principle, when prioritisation of principles hadn’t been done at Stage 1. Noted that some principles are defined as “must” and some are defined as “should”. Committed to looking at the suggested methodology for design principle evaluation from Friends of Richmond Park. Committed to looking at exactly what data could be published alongside each option at Stage 2A engagement and whether performance of the options against the design principles could be provided alongside engaging on the options themselves.

Purpose and context of modernisation

0.13	Richmond Heathrow Campaign	Asked whether airspace change was being done on the basis of a 480,000 ATMs cap. Stated Heathrow had previously committed to a 480,000 cap in writing. Suggested the government are on a different page to Heathrow as the airspace modernisation strategy refers to growth. Commented that DfT assumptions conflict with Committee on Climate Change position on aviation emissions. Noted that Gatwick's ACP is on the basis of growth, whereas Heathrow is merely change within the cap. Asked why Heathrow are making this airspace change and what the benefit is. Noted that the South East Taskforce said Heathrow operated perfectly 300 days a year, and commented that Heathrow works quite well today. Asked why Heathrow needed to make further changes. Would have preferred if the process started by looking at legacy airspace and improving that to resolve conflicts with other airports, consider noise hotspots and seek efficiencies around carbon. Suggested that such large change is unnecessary.
0.14	Teddington Action Group	Questioned whether Heathrow could model accurately based on forecast demand, which might not match reality. Noted Heathrow have to reconcile what they are being directed to do by government and climate change commitments. Stated that the purpose of airspace change seemed to be reducing track mileage for airlines, at the expense of noise impact on communities. Suggested that an alternative to airspace change to achieve benefits might be removing late-night flights or introducing steeper climbs and descents. Noted their comments in previous engagement that the Design Principles in some cases conflict with each other and with ANG17.
0.15	Heathrow	Confirmed that the ACP was on the basis of a 480,000 cap in ATMs. Any variation in that would be subject to separate planning consent. Noted that Heathrow is aware of inefficiencies in UK airspace. Noted challenges with existing approaches to stacking which constrains departures. Noted the Government have asked for modernisation for noise, environment, and capacity reasons, to fix issues with delays, and to build resilience. Noted that current airspace across the whole of Europe is not optimal. Noted that even small changes to existing flight paths would have impact. Noted that the airspace design process needs to be robust and demonstrate it has explored all options, because even small changes will still affect some communities. Noted that a blank sheet approach does not automatically infer a radically different style of operation.

LOAEL and the overflight cone

0.16	Richmond Heathrow Campaign	Noted that the effect of aircraft noise is felt well outside the overflight cone. Suggested that the definition of overflight is ridiculous as arrivals on the northern runway can be heard in Richmond which is outside the definition of overflown.

		Questioned the suitability of WebTAG.
0.17	Teddington Action Group	Noted that noise travels outside the overflight 'cone' and therefore the current methodology for assessing impacts is not reflective of reality and does not take into account health impacts. The noise impact of a departing aircraft at 2,000ft is far wider than the cone suggests. Stated that average metrics (whether SEL or Leq) do not reflect annoyance. Stated that Heathrow using LOAEL in this way was at odds with Air Navigation Guidance, in that Heathrow was measuring people affected at a given level, rather than measuring adverse impacts, including health impacts. Stated that ICCAN had reviewed SoNA and found it not to be appropriate. Noted that DfT were undertaking a review and that a new metric is likely to be published in due course. Stated that in the absence of other evidence, WHO guidance should be used. Suggested that Heathrow wait until that metric was established before proceeding with their analysis.
0.18	Englefield Green Action Group	Noted the experience of the 2014 trials, and the number of complaints that those raised, did not match what you might expect using metrics like the LOAEL.
0.19	Heathrow	Noted that overflight is a CAA definition that they are required to use and is intended to indicate the presence of aircraft. Not designed as an acoustic measure, hence using SEL in preference when developing options. Noted that there is a balance between what policy requires – e.g. the 51dB LOAEL - and the metrics that can be used in addition. There are the WHO guidelines, but these also acknowledge that experience of noise is context and locality dependent; therefore if there is a local study, such as SONA, that can be used instead. SONA is Government policy, and this underpins noise appraisal for the CAP1616 process. Noted that longitudinal studies were necessary to understand the impact of noise and complaints and disturbance over time. Noted that Heathrow was required to proceed with airspace modernisation and would use the best metrics available to it at the time. If new metrics were established while the ACP was ongoing, and these became part of the process through changes to policy or associated guidance, these would need to be considered. Committed to look at the use of the overflight definition and the LOAEL – this topic was further explored under Design Principle 9.

Design Principle 1

Our airspace design must be safe.

1.1	Teddington Action Group	Asked whether there were well understood safety thresholds that you could use to assess this quantitatively.
1.2	Friends of Richmond Park	Noted that there are numerous metrics for aircraft safety. Asked if Heathrow could define whether a given option fell within current safety parameters or would require a revision to existing safety parameters.

		Noted that Luton has a subset of their options in which PBN was not to be used at times of heavy traffic for arrivals – queried whether this is because of safety concerns.
1.3	Molesey Residents Association	Asked whether all the tracks generated by the "flooding" process were safe in and of themselves. Asked whether the safety analysis was based on current aircraft capabilities or future capabilities.
1.4	HASRA	Asked whether Heathrow has to use PBN for arrivals.
1.5	Heathrow	Stated that there are published route separation standards, but they have not been updated in a while and don't always reflect the capabilities of modern aircraft, or of guidance. Heathrow needs to consider the capabilities of aircraft today when considering safety, they don't forecast or design for future capabilities. Regarding Luton and PBN, exact spacing between arrivals is easier with vectoring than PBN, so allows for greater efficiency and resilience. Therefore, it is possible that Heathrow will not use PBN on arrivals for every arrival, although will have the capability to do so, as required by the Government's airspace modernisation strategy. Noted that Heathrow is required to have the option for PBN on arrivals but is not required to use it for every arrival for the entire descent. Departures will likely be based on PBN as vectoring from the runway is not possible and the SIDs provide obstacle clearance. Regarding safety of the flooded tracks generated at this early stage of design, stated that many will be PANS-OPS compliant, some will not. Stated that: it is not the case that all new flight paths must be PANS-OPS compliant; CAA can allow exceptional cases but there are some extra steps or checks you go through for those that are not.

Design Principle 2

Our airspace design must remain in accordance with the CAA's published Airspace Modernisation Strategy and any current or future plans associated with it and all other relevant UK Policy, Legislation and Regulatory Standards (for example, Air Navigation Guidance). This includes preventing any worsening of local air quality due to emissions from Heathrow's aircraft movements, to remain within local authorities' limits.

2.1	Friends of Richmond Park	Suggested three considerations: • That National Nature Reserves should also be included in the assessment of sites overflown • Noted that Richmond Park's SSSI status is driven by its extensive rare Lowland Acid Grasslands, which are susceptible to nitrogen oxides. Suggested that air quality impacts should be assessed up to 1,000m, not 1,000ft, as a result. • That they had other specific proposals for measuring this principle, which they committed to write to Heathrow about separately. [This was later supplied by email]. They also asked whether the 1,000ft measure was from sea-level or ground-level, to which Heathrow responded that it was ground-level, i.e. accounting for terrain
2.2	Molesey	Asked why the air quality impact was assessed qualitatively rather than

	Residents Association	quantitatively.
2.3	HASRA	Asked whether Heathrow would undertake a full health impact assessment of the changes.
2.4	Englefield Green Action Group	Suggested that air quality impacts should be assessed up to 1,000m, not 1,000ft.
2.5	Richmond Heathrow Campaign	Asked for Heathrow to experiment with marker additives in its fuel to measure the direct impact of aircraft movements and emissions on the local area.
2.7	Teddington Action Group	Asked Heathrow to reiterate policy that under 4,000ft, noise impact is the sole priority. Asked Heathrow how it assesses impact on areas of tranquillity.
2.8	Heathrow	Responding to the various comments about air quality: Stated that air quality impact assessment requires the full schedule, to understand ground movements, etc., which would be undertaken in full at Stage 3. For the purposes of comparisons between different options, the model assumes that if there are no lateral changes to existing tracks below 1,000ft, there is no differential impact on air quality. If there are turns or track deviations, they would mark that as having a possible impact (potentially positive or negative, depending on its relationship to populations). Noted that Heathrow have a continuous monitoring programme, looking to estimate the footprint of emissions. With regard to the threshold to which air quality is an issue, that Heathrow had a detailed answer on this point, and it was important to get it accurate. Committed to coming back to the group on this topic. With regard to the status of air quality vs noise, it was noted that the effects of aircraft on air quality diminish rapidly with height. The air quality impacts of airports are dominated by emissions at ground level. Impacts from aircraft more than about 200m above the ground are generally negligible. It is highly unlikely that any changes to Heathrow's airspace would affect whether thresholds are exceeded or not. Heathrow noted the request for a full health impact assessment and would consider options for this. There is no requirement for Heathrow to do so, and if a health impact assessment was undertaken then it would be most appropriate at Stage 3. With regard to assessing tranquillity, noted that this was an emerging area, and that Heathrow and other stakeholders including the CAA are continuing to develop their thinking. Committed to responding in writing to Friends of Richmond Park's proposed metrics for biodiversity and tranquillity.

Design Principle 3

Our airspace design must use noise efficient operational practices to limit and, where possible, reduce adverse impacts from aircraft noise.

3.1	Richmond Heathrow Campaign	Suggested that Heathrow consider speed, acceleration and the effect of turns. Queried whether any option would be better than the baseline.
3.2	Teddington Action Group	Stated that CCO and CDO are not necessarily noise efficient procedures – they might result in more noise, or more people affected by noise. Suggested that aircraft could be level over some more populated areas and climb over less populated areas. Stated that level flight at 6000ft under stacks requires lower thrust so causing lower noise over communities. Suggested that further down the flight path (after passing under the stacks) over lowly populated countryside wider dispersion is possible once climb thrust has to be reapplied. Stated that it was essential for the impact of airspace change to be mitigated by the planes flying higher and therefore impacting less people – i.e. by climbing and descending more steeply.
3.3	Friends of Richmond Park	Suggested an additional metric of distance from joining final approach to runway for arrivals. This could show the impacts of using PBN instead of vectoring.
3.4	Heathrow	Noted that noise abatement departure procedures (NADPs) could be applied variously to each option at Stage 3, and a given NADP was not necessarily a one-size-fits-all improvement for every SID. Noted that it would be possible to consider the effect of acceleration for some options, e.g. a tight turn on departure requiring more power, and that that would be looked at that within the assessment of noise impact. Noted that the effects of turning aircraft would be addressed in the noise modelling by the bank angle correction.

Design Principle 4

Our airspace design must reduce the contribution to climate change from CO2 emissions, and other greenhouse gas emissions arising from Heathrow's aircraft activities.

4.1	Richmond Heathrow Campaign	Asked whether Heathrow knew the amount of CO2 that was emitted by aircraft flying between 4-7,000ft. Argued that it was potentially a very small proportion of the total CO2 emitted by aircraft using Heathrow and suggested noise was the more important consideration.
4.2	Englefield Green Action Group	Asked for Heathrow to publish data for each option showing CO2 emissions at 0-4,000ft, 4-7,000ft and above 7,000ft. Asked if carbon consumption was measured for UK airspace only or for the whole flight route internationally.
4.3	Molesey Residents Association	Asked whether the modelling for CO2 emissions took account of NADP options.
4.4	Bucks Council	Stated that making comparisons between noise and carbon is very difficult. Would be interested to see the impacts for carbon if that consideration is being introduced

		at this stage.
4.5	Friends of Richmond Park	Questioned the materiality of carbon amounts. Asked whether the AEDT model could reliably calculate the difference in fuel burn for operational procedures. Suggested "Relative CO2 emissions" should be relative to the "Do nothing" options.
4.4	Heathrow	Noted that the intention of measuring CO2 emissions is to see whether there is a disproportionate impact on CO2 relative to noise, and that it is ultimately for Heathrow to define what is meant by "disproportionate". That is a question for the methodology in assessing options on their impacts across the principles. Noted that aircraft using Heathrow emit about 20m tonnes of CO2 annually (2019 baseline) and that 1.5-2m tonnes of that were from landing and take-off – i.e. a significant proportion. Re NADP options, that yes – the modelling will take account of operational procedures to model fuel burn.

Design Principle 5

Our airspace design must enable Heathrow to make the most operationally efficient and resilient use of its existing two runways, to maximise benefits to the airport, airlines and cargo handlers, passengers, and local communities.

5.1	All	There were no suggestions or comments on this principle.

Design Principle 6

Our airspace design should also provide predictable and meaningful respite to those most affected by noise from Heathrow's movements

6.1	Teddington Action Group	Asked what the potential will be to create dispersion on departure routes using PBN. Suggested that Heathrow look at this in detail and establish what was possible. Stated communities' understanding of the Anderson Acoustics study was that it identified 8-9 dB L_{Amax} as necessary to achieve "valued respite". Asked for the measurement to be based on L_{Amax} rather than L_{Aeq}, noting that L_{Aeq} still allowed for consideration of all aircraft events at various levels as it is an average over time.
6.2	Englefield Green Action Group	Asked whether, conceptually, respite could be achieved through anything other than runway alternation.
6.3	Richmond Heathrow Campaign	Asked for a more precise definition of "predictable" and "meaningful". Noted that the CAA is supposed to be publishing guidance this year. Noted that the costs of respite, in spreading noise out across more people, needed

		to be assessed alongside the benefits.
6.4	Friends of Richmond Park	Asked for the measurement to include respite for people visiting areas of tranquillity, not solely where they live.
6.5	Molesey Residents Association	Asked whether respite would account for populations that are most overflown currently.
6.6	Heathrow	Noted that it was challenging to operate multiple SIDs off the same runway, same general direction to enable dispersion. The more SIDs there are to create dispersion, the less distance is available from adjacent SIDs to deliver predictable respite. Committed to explore what the possibilities are and related this to the discussion under Design Principle 9 for measuring the extent of concentration. Noted current indications are that a 9 dB difference is possible between adjacent departure routes, but the track separation needed to achieve this has to increase the further an aircraft is from the airport. Some work has been undertaken to identify the separations needed for departures. This indicates that by around 10 nautical miles (nm) from start of roll, departure routes may need to be separated by around 1nm. Noted that Heathrow had used the L_{Amax} metric for this analysis based on feedback from community noise groups previously, but committed to look at the issue and come back to the group. Noted that Heathrow was unlikely to use vectoring of departures as a standard procedure, as it is workload intensive and doesn't allow for predictable respite. Noted that the CAA had previously indicated it would be publishing guidance on definitions of respite, which would be useful here. Noted that considerations of the impact on tranquillity would be assessed under Design Principle 2. Re most overflown populations, confirmed that they would be measuring how many of the people who were most affected by noise achieved the 9dB difference in respite.

Design Principle 7

Our airspace design should also seek to avoid overflying the same communities with multiple routes including those to/from other airports

7.1	Molesey Residents Association	Asked how Heathrow's new airspace design might conflict with other airports' proposed designs.
7.2	Richmond Heathrow Campaign	Asked whether Heathrow would undertake to show the noise impacts from all airports' flight paths, not just Heathrow's own. Suggested that there should be combined engagement for areas affected by multiple airports and suggested a meeting of communities from different airports to discuss cumulative impacts.
7.3	HASRA	Reiterated the call for combined engagement by multiple airports.
7.4	Teddington Action	Stated that London City Airport faces constraints due to the current design of airspace. They should be allowed greater flexibility to operate in the most noise

	Group	efficient way. City are forced to fly in at 2,000ft and it impacts noise.
7.5	Heathrow	Noted that at Stage 3 there was a requirement for a cumulative assessment of the impact of all airports' airspace change, and that ACOG had a role to play alongside the sponsors and the CAA in making that happen. Airports are required to engage with their affected communities and there is a further requirement for the respective consultations to be "coordinated" – but how that will work is not yet defined. Heathrow committed to consider whether a combined engagement session with communities from local airports would be possible or valuable.

Design Principle 8

Our airspace design should also contribute to minimising the negative impacts of night flights

8.1	Englefield Green Action Group	Noted that in the case of night flights, it is specifically the heavier aircraft that are more common and cause more disturbance. Named 777, 787 and A380 as being the worst culprits, with 777 perhaps being the best candidate for analysis.
8.2	Heathrow	Noted that, for this principle, the goal was to identify metrics that allow for optimisation of night flights, over and above optimisation of flight paths used during the day. Noted that for the night period and early morning arrivals, Heathrow could take advantage of fewer movements to implement PBN on arrivals, and allow for alternation between sets of routes that are spaced more widely and give meaningful respite between night periods. Also suggested that Heathrow could consider turning on additional departure routes at 9pm to maximise departures, when required, leaving fewer departures after 10pm. Noted that, whilst A320 SEL data had been used for most noise principles, overflight cones from 7,000ft on arrival were broadly representative of the size and length of the 70 dB SEL metric from heavier aircraft.

Design Principle 9

Our airspace design should also keep the number of people who experience an increase in noise from the future airspace design to a minimum.

9.1	Teddington Action group	Noted that departure routes are likely to merge off different runways at some point, and that this means no respite beyond that point. PBN means greater concentration for certain places directly under those routes. Stated that no study had been done on the environmental/health outcomes of implementing PBN, with reference to ANG prioritising impact on health. Experience from the US is that this is intolerable and that PBN would have a direct adverse impact on these communities, leading to "blighted" communities. Asked whether Heathrow has metrics to measure that concentration. Asked whether the government has any guidelines on the effect of

		PBN. Suggested that it was necessary to look at the 80dB cell, not just the 70dB cell. Also suggested that the N65 contour be used. Suggested N60 might be applicable for night. Should be assessed at 10, 20 and 50 overflights per day, as per the metrics to define newly overflown. Asked that the contours be drawn for an A380, not just an A320. Asked for single mode assessment, not just an average where the 70:30 directional split hides certain concentrated effect. Undertook to write with their suggestions on the metrics that they suggest should be used.
9.2	Richmond Heathrow Campaign	Asked whether there was a practical or human limitation on operating a large range of SIDs that would enable greater dispersion of departure routes. Stated their support for the L_{Aeq} metric for arrivals. Reiterated the request for metrics broken out by single events, and hourly, daily and annual averages.
9.3	Molesey Residents Association	Stated that fairness and avoiding concentration are key. Some amount of dispersion, or alternating SIDs, even to replicate the natural dispersion experienced today, would be preferable. Asked Heathrow to explain the choice of 70dB.
9.4	Heathrow	Heathrow welcomed the suggestions on metrics to measure the effects of more concentrated routes and committed to explore them and respond to the group. Noted that lower values of the N65 metric such as 10 N65 effectively represent the outline of 65 dB L_{Amax} footprints of the noisiest aircraft operating across the schedule. At higher values of N65, these will represent the frequency of events from most aircraft operating in the schedule. Stated that averages were used to give an overall picture and to align with the metrics they were required to use at Stage 3. This was also reflected in the choice of 70dB SEL which seeks to understand the influence of a route on L_{Aeq} data. However, noted that it would be possible to generate more fine-grained data and committed to look at whether it was helpful to make that data available as part of engagement. Added a caution that there is a risk of generating too many metrics and losing sight of the principles in all the data.

9.5	Richmond Heathrow Campaign	Asked what the definition of “newly overflown” was.
9.6	Teddington Action group	Asked for Heathrow to publish data on how many times a day a flight path could expect to be used.
9.7	Englefield Green Action Group	Noted that from the perspective of most overflown communities, a definition that assessed overflight as 50 flights per day was preferable.
9.8	Heathrow	Noted that the CAA defines overflight as a single event i.e. an occurrence, rather

		than considering by how many events somebody may consider themselves to be 'overflown'. Noted that to get a picture of Heathrow's overflight patterns, 10, 20 and 50 times per day metrics were preferable. Any lower, and the entire area is deemed overflown; any higher and only initial departure and final approach are deemed overflown. Committed to publishing data on people overflown on each route option at 10, 20 and 50 times per day.

Design Principle 10

Our airspace design should also keep the total number of people who experience noise from the future airspace design to a minimum.

10.1	Englefield Green Action Group	Asked Heathrow to consider the four-hour shoulder periods (0600-1000 and 1800-2200) in their analysis, beyond the proposed $L_{Aeq, 8hr}$. Asked what year Heathrow was taking as its population baseline.
10.2	Friends of Richmond Park	Noted that the metric conflated "people" with "residents". I.e. looking at where people live, not necessarily where they spend time. Noted that 6m people use Richmond Park each year but that none of these people live within the park. Noted that the use of LOAEL masked the impact of very loud noise overlaid on very low ambient noise, as in the case of Richmond Park.
10.3	Richmond Heathrow Campaign	Noted that the London Plan called for a 30% increase in the capital's population. Asked whether that forecast was accounted for in Heathrow's analysis.
10.4	Molesey Residents Association	Asked whether Heathrow is forecasting the effects of population growth, and whether it was using the latest 2021 census data.
10.5	Heathrow	Noted that Heathrow were using a forecast to 2027 – the anticipated start of the new airspace – for population analysis. This was available at the postcode centroid level, and was available for years up to 2040. It is currently based on 2011 census data, but would use 2021 data when that recently released data had been ingested and used to update the forecasts. Further, they take information from local authorities on planning permission for large developments where they can expect new population, and development for other strategic sites. Noted that they were able to look at certain datasets to see where people spend their time, which would allow for the impact on Richmond Park (for example) to be explored. Also noted that they are required to account for AONBs and SSSI under Design Principle 2.

Design Principle 11

Our airspace design should also enable the efficiency of other airspace users' operations.

11.1	All	There were no suggestions or comments on this principle.

Design Principle 12

Our airspace design should also minimise the impact to all stakeholders from future changes to Heathrow's airspace.

12.1	All	There were no suggestions or comments on this principle.

Concluding remarks

13.1	Heathrow	Thanked participants for their attendance and constructive engagement. Committed to addressing and responding on several issues raised during the discussion, namely: • Reviewing the Quantitative DPE methodology suggested by Friends of Richmond Park (0.12) • The amount and type of data published alongside an option, including single event vs average over time metrics (0.12, 9.4, 9.8) • Whether LOAEL is the best metric, how Heathrow would respond if it was supplanted by other metrics(s) under development (0.19) • The choice of L_{Amax} or L_{Aeq} for measuring respite (6.6) • The best way of assessing the impact of potential concentration of flight paths under PBN, including the suitability of the N65 contour (9.4) • The suitability of WebTAG for assessing airspace design impacts (0.19) • How Heathrow / ACOG / other airports would assess and report on the cumulative impact of options and whether there were opportunities for joint engagement by two or more airports (7.5) • Whether Heathrow would conduct a health impact assessment at Stage 3 (2.8) • Responding to Friends of Richmond Park's proposed metrics for tranquillity and biodiversity (2.8) • The choice of threshold for air quality assessments, and rationale for it (2.8) Further noted a "car park" of issues (as it had been referred to in the meeting) that they expected to return to for further discussion at future meetings, partially overlapping with the issues listed above: • The use of LOAEL • WebTAG • Definitions of overflight • Community engagement by multiple airports, cumulative impacts Encouraged any further submissions by email. Noted that a minute of the workshop would be shared with attendees for their comments.

From: [redacted]
Sent: 01 August 2022 17:19
To: DD - Airspace; [redacted]
Cc: [redacted]
Subject: Re: Methods and Metrics workshop - meeting note
Attachments: Heathrow airspace change - MM workshop July 22 - Headland DRAFT - FRP.docx

Dear [redacted] & [redacted],
thanks for sharing the draft meeting note.

Preparing this draft meeting was clearly an heroic effort - well done [redacted] (and [redacted])!

However, FRP have a few concerns where the draft doesn't quite reflect some of the points I made in the meeting, and where a few material responses from HAL are not noted. These are in the attached version of your draft under 'Track changes'.

Also I've included a couple of drafting Comments which I hope are helpful.

Many thanks,
[redacted]
Friends of Richmond Park

From: DD - Airspace
Sent: 16 September 2022 14:22
To: '[redacted]'
Cc: DD - Airspace
Subject: RE: Letter from RHC to HAL ref Airspace Change Proposal

Hi [redacted],

I hope you're well.

Thanks for the further feedback you provided in your letter following the Methods & Metrics workshop. We have compiled a response to the points in your letter, along with responses to the other 3 letters we received after the workshop. I wanted to check whether you are happy for us to share your letter (and our response) with all of the NACF members? I think it would be useful for you all to see our response to the points you have each made, but we can just respond to you directly if you prefer. Please could you let me know?

Many thanks,
[redacted]

From: DD - Airspace
Sent: 16 September 2022 14:26
To: [redacted]
Cc: DD - Airspace
Subject: RE: Heathrow Airspace Modernisation: Methods & Metrics workshop

Dear [redacted], [redacted],

I hope you're both well.

Thanks for the further feedback you provided in [redacted] note and [redacted] email following the Methods & Metrics workshop. We have compiled a response to the points you raised, along with responses to the other 2 letters we received after the workshop. I wanted to check whether you are happy for us to share your note/email (and our responses) with all of the NACF members? I think it would be useful for you all to see our response to the points you have each made, but we can just respond to you directly if you prefer. Please could you let me know?

Many thanks,
[redacted]

From: DD - Airspace
Sent: 16 September 2022 14:33
To: [redacted]
Cc: DD - Airspace; [redacted]
Subject: RE: M&M Workshop

Dear [redacted],

I hope you're well.

Thanks for the further feedback you provided in your email following the Methods & Metrics workshop. We have compiled a response to the points in your email, along with responses to the other 3 letters we received after the workshop. I wanted to check whether you are happy for us to share your email (and our response) with the other workshop attendees and wider HCNF (Heathrow's Community Noise Forum) members? I think it would be useful for you all to see our response to the points you have each made, but we can just respond to you directly if you prefer. Please could you let me know?

Also - thank you for sending a link to the video about the Queen (and Darcey Bussell) at White Lodge – it was a very interesting watch and all the more poignant given recent events.

Many thanks,
[redacted]

From: [redacted]
Sent: 16 September 2022 15:05
To: DD - Airspace
Cc: [redacted]
Subject: Re: M&M Workshop

Caution: external email. Unless you recognise the sender and know the content is safe, do not click links or open attachments.

Dear [redacted],
than you for your email (below) re our post-M&M workshop email.

We are content for HAL to share our email (and our response) with the other M&M workshop attendees and wider HCNF members.

However:

- could you please make sure that we are copied-in on any communications that include or refer to that email (and to our recent EA letter/report)?
- though FRP is not a member of the HNCF, would it be possible for us to be copied all HNCF papers and meeting notes?
- do you have a date yet for the Step 2A workshops (Phase 1) - originally set for some time in the next four weeks?

I'm glad you found the video about the Queen (and Darcey Bussell) at White Lodge interesting. It is indeed especially touching now…

Best wishes,
[redacted]
FRP
[redacted]

From: [redacted]
Sent: 17 September 2022 11:45
To: [redacted]; DD - Airspace
Subject: Re: Heathrow Airspace Modernisation: Methods & Metrics workshop

Caution: external email. Unless you recognise the sender and know the content is safe, do not click links or open attachments.

Hi [redacted]

We have no problem with our note and email being shared. (It is assumed these will be circulated as sent.)

Likewise we are happy for you to circulate your response, which we trust will cover our specific points made rather than generic comments to the three submissions.

Kind regards

[redacted]

From: [redacted]
Sent: 19 September 2022 19:26
To: DD - Airspace
Cc: [redacted]
Subject: Re: Letter from RHC to HAL ref Airspace Change Proposal

Hi [redacted]

Thanks for letting me know of progress on response to the RHC letter. In principle we would support circulation to other NACF members.

Could you let me a sight of the response first and I can get back to you very promptly - say the next day - before wider circulation.

When you say all of the NACF members. Would that include non-resident organisations such as the CAA and NATs. I don't see this as a problem but it would help to know.

Kind regards

[redacted]

Richmond Heathrow Campaign

From: DD - Airspace
Sent: 03 October 2022 13:18
To: [redacted]
Cc: DD - Airspace
Subject: RE: Letter from RHC to HAL ref Airspace Change Proposal
Attachments: 2207_M&M Workshop_further stakeholder feedback_RHC.pdf

Hi [redacted],

I hope you're well. Sorry for the delay in getting this to you – it's taken a while to get everything signed off.

I have attached a document with your questions and our responses to you. Please can you let me know whether you are happy for me to include this in the document I will send all NACF members? We had 2 separate emails from TAG and 1 from Friends of Richmond Park. Both of those organisations have said they are happy for their email (and our response) to be included for all members to read.

Many thanks,
[redacted]

From: [redacted]
Sent: 23 September 2022 16:20
To: DD - Airspace <airspace@heathrow.com>
Cc: [redacted]
Subject: Re: Letter from RHC to HAL ref Airspace Change Proposal

Caution: external email. Unless you recognise the sender and know the content is safe, do not click links or open attachments.

Dear [redacted]

Hopefully you received my reply of 19 Sept. I wondered if you might be able to indicate when you will be able to forward the response to the RHC letter -it would help in planning my time if it were to be next week.

Kind regards

[redacted]

Richmond Heathrow Campaign

Methods & Metrics Workshop: Further Stakeholder Feedback

Contents

	Stakeholder Comment / Question:	Heathrow Response:
RHC1	We look forward to receiving Heathrow's draft Plan for Stage 2/Engagement Strategy as soon as possible. We have seen a summary timetable but we believe a comprehensive Plan is required, in which a grid sets out the gathering of evidence and the decisions, their inter-relationship and critical-path timing.	We will continue to share regular updates on our stakeholder engagement plans for this ACP. We found our workshop on Methods & Metrics to be valuable and we will continue to offer opportunities for technical engagement where appropriate. We will also include a body of evidence for decisions taken on the ACP at each CAA Gateway, and this will be available on the CAA's Airspace Change Portal.
RHC2	It would help to extend the grid to the 'Full Appraisal' in Stage 3a, ahead of the Public Consultation and to include a Needs analysis in the form of a 'Do-Nothing' scenario and an upfront Project Scoping Study to establish the potential costs and benefits from modernisation.	Our Stage 3 engagement plan and proposed timeline will be shared with you when available, but we need to confirm the process for Stage 3 public consultations with surrounding airports before we can provide a more detailed longer-term timeline. This is being coordinated by ACOG through their Masterplan. The costs and benefits of Airspace Modernisation across the UK are set out in the Government's Airspace Modernisation Strategy. Heathrow's Statement of Need sets out our rationale for the project. We are required to modernise our airspace so "do nothing" is not a viable option. However, in accordance with CAP1616, we will compare airspace design options with a 2019 baseline to show the impacts of the proposed changes at Heathrow.

RHC3	Communities around Heathrow approach Airspace Modernisation with great concern. We already experience very significant adverse health impacts from noise and air pollution from the airport's operations (increasingly so with incremental concentration of flight paths and lower flying). We believe there is a very real possibility of conditions worsening significantly for many communities around Heathrow and the wider area as a result of this process and we seek to engage with Heathrow in avoiding environmental harm. We would like to engage constructively in a process that is transparent, open (i.e. not pre-determined), is evidence based, with time allowed for our consideration and with our contribution being given due consideration by Heathrow. We trust that Heathrow will be open to our raising concerns and differences (both residual and new) during option development and evaluation and that we can work together constructively through Stage 2.	Heathrow is keen to engage constructively with interested stakeholder representatives throughout the airspace design process. We have developed a comprehensive programme of engagement, including the recent Methods & Metrics workshop which was set up to ensure constructive and collaborative engagement with our most technically-minded community stakeholders. We have also set up a dedicated email address (airspace@heathrow.com) for stakeholders to share feedback, suggestions and concerns with us.
RHC4	The CAA's CAP 1616 Guidance (CAP 1616) and the DfT's Air Navigation Guidance 17 (ANG 17), et al, encompass issues that are essential to the Plan and Engagement Process. Communities have collectively expressed concerns regarding both the Design Principles and the initial Engagement Process leading up to the Design Principles submission to the CAA in Stage 1. These concerns are significant because some of the Design Principles are capable of different interpretation and inherent conflicts, which could impact on how they will be applied during Stage 2 of option development. (The Communities' letter of 24 January 2022 sets out these concerns). In places, several relevant policies and guidelines overlap, which raises issues of primacy. Also, roles and responsibilities for the evidence and decisions sometimes overlap. We would welcome assistance from Heathrow in mapping the overlaps so that we are better able to engage with the CAA, DfT, NATS and ACOG, as well as with Heathrow. This should also help identify gaps in policies and guidelines and ownership of the decisions. Having regard to this, we would welcome responses from Heathrow on the Stage 2 Plan	Our 12 design principles for airspace modernisation were developed to address the varied objectives and priorities of our broad range of stakeholders. CAP1616 recognises that some of the principles may contradict with one another, and at Stage 2A we are developing a comprehensive list of options to meet each of the varied design principles. Later in Stage 2 we will undertake a Design Principle Evaluation and we will engage with key stakeholders at this point. We will be explicit about how the design principles have been interpreted and the metrics we have used to assess design options against them. The full results of the Design Principle Evaluation will be shared on the CAA's Airspace Change Portal and there will be an opportunity for interested stakeholders to give feedback. Design principles 1-5 have primacy over the other principles since these are requirements that our

	and Engagement Process.	airspace design "must" meet, including all relevant policy. We will seek to develop options that meet all of the design principles as far as possible.
RHC5	We appreciate that Heathrow has already provided some material to the CAA on the Need for airspace modernisation around Heathrow, including at Stage 1a of CAP 1616, as has the Airspace Change Organising Group (ACOG) in its UK Airspace Modernisation Masterplan. However, at the current stage we would like a greater understanding of the existing problems that modernisation may help to solve and the opportunities for improvement. Heathrow's letter of 14 January 2022 to the CNG states 'There would be a separate process required if Heathrow were to introduce mixed mode or to increase capacity above 480,000 flights (ATMs) per year.' Can Heathrow therefore share information (based on the no expansion scenario) on the following specific and wider issues, for example: i. What are the projections of lost time and cost due to lack of punctuality and resilience? ii. To what extent do existing flight paths deviate from operationally efficient paths from start to finish? iii. What specific conflicts and constraints are there with flights from other airports, General Aviation and new entrants such as drones and air taxis? iv. What are the issues with Air Traffic Control and how can technology help? v. What are the opportunities for noise, air pollution and CO2 emission reductions that could be delivered by airspace change at Heathrow? Practically, it would assist to have these issues expressed in the context of a Base Year (say 2019) and a 'Do-Nothing' (Baseline) scenario.	Heathrow is introducing airspace modernisation in line with Government Policy and the primary objective of this ACP is to meet our commitments to the Airspace Modernisation Strategy (AMS). We recognise the benefits set out in the AMS and we are required to undertake this ACP as part of our commitment to the AMS. We have not therefore undertaken our own assessment of specific benefits to Heathrow at this stage. We will assess airspace design options against a 2019 baseline at the Initial Options Appraisal. Where possible we will share information on how the potential design options compare to today's operation from an operational perspective as well as from community and environmental perspectives.
RHC6	We assume that Heathrow will return to pre-covid numbers of flights which were near to the planning limit of 480,000 ATMs a year. The scheduling of these flights varies according to the summer and winter seasons and time of day. In responding to point (i) above on resilience, it would help to understand what airspace headroom capacity there is above the scheduled usage (a) for resilience and (b) for	Future traffic forecasts will be shared at public consultation at Stage 3 and will inform the assessment of impacts of the proposed airspace change. Forecasts will take account of anticipated technological change as well as trends in aircraft types and passenger load factors.

	additional flights. Also, it would be helpful to see the projections for passenger numbers in the light of trends for larger aircraft and higher load factors.	
RHC7	Can Heathrow assist in seeking an update to NATS' (2017) estimated UK Need in its feasibility study supporting the Airspace Modernisation Strategy. We are concerned that based on an average 2.0% pa demand growth by UK aviation this is now significantly overstated compared to the Climate Change Committee's 6th Carbon Budget, which in turn leads to a significantly overstated 'Do-Nothing' scenario.	We are investigating this and will come back to you in due course.
RHC8	We also believe a normal requirement of any option appraisal process, would be the establishment at the outset of targets and a framework for evaluating the potential costs and benefits, measured against the 'Do-Nothing' scenario (such a scoping study should reflect the update referred to in para 12 above). We realise final conclusions and decisions can only be arrived at the end of the design process when flight paths have been finalised, but this does not obviate the need for an upfront project scoping study. If this is to be left to the 'Initial Appraisal' at the end of Stage 2 or the 'Full Appraisal' in Stage 3, it will be far too late for meaningful community engagement. We believe that as part of an outline business case it is essential to understand the range of cost-benefit estimates that Heathrow expect as outcomes of modernisation, as this will be fundamental to the identification and assessment of options. The sharing of extant or newly prepared cost-benefit estimates will be invaluable to all stakeholders so that they can understand better how these expectations inform the modelling and other processes needed to develop modernisation proposals.	Heathrow is introducing airspace modernisation in line with Government Policy and the primary objective of this ACP is to meet our commitments to the Airspace Modernisation Strategy (AMS). We recognise the benefits set out in the AMS but, given we are required to undertake this ACP, we have not undertaken our own assessment of specific costs or benefits to Heathrow. All options will be compared against a 2019 baseline at the Initial Options Appraisal stage. The public consultation at Stage 3 is intended to allow for meaningful community engagement on the proposed flight path options and the relative costs and benefits of them.
RHC9	As part of the Scoping Study can Heathrow also assist in reconciling and co-ordinating ACOG's Airspace Modernisation Masterplan and Heathrow's Business Plan that include Heathrow expansion with the Heathrow's Airspace Change Proposal that excludes expansion? The process of integration with the ACOG Masterplan is not clear at the moment and we would welcome an early discussion on the subject. If Heathrow's proposal includes adding airspace capacity for resilience or potentially additional flights (notwithstanding the proposal is based on usage	This airspace modernisation ACP will propose a new airspace design for the current cap of 480,000 ATMs. Any plans to increase the ATM cap at Heathrow would require planning permission via a separate process. A lot has happened since we were last working on Expansion, however, we still have the policy framework of the ANPS in place. It's been a challenging

	by 480,000 ATMs a year) it would help for these capacity changes to be identified. Also, we are not clear whether it is Heathrow's intention to follow the recommendation in the policies for the 6th Carbon Budget that 'there should be no net expansion of UK airport capacity unless the sector is assessed as being on track to sufficiently outperform a net emissions trajectory that is compatible with achieving Net Zero'. Can Heathrow explain their position on this, please.	couple of years for the business with the pandemic, so we are currently going through a process to make sure that we've got everything lined up before we move forward again. The pandemic has demonstrated that there is significant pent-up demand from passengers and new airlines to operate out of Heathrow. Meeting that demand at the UK's hub airport will be essential to a country that has global and levelling up ambitions. This must be achieved within strict environmental limits and the industry is committed to decarbonisation. We appreciate uncertainty about Heathrow expansion is difficult for the communities around the airport and we will keep local communities informed and engaged as and when any plans change.
RHC10	In a project of this scale and impact it is fundamental that the appraisal and project decisions are supported by a robust evidence base. We believe an early audit of the evidence needed to make rational design decisions is essential and that steps are then taken to address knowledge gaps in a timely manner so as to properly feed into the relevant decisions. In particular, the following will be essential to inform accurate flight path appraisals: i. A new social survey of day and night noise, to remedy the acknowledged deficiencies of the previous SoNA survey. ii. A decision on the application of WHO Guidance values on noise and/or the rationale behind the choice of other metrics or thresholds. iii. Impact evidence on PBN use (in the light of Heathrow's 2014 PBN trials, London City Airport and US experience) and related solutions for the inherent concentration of noise impact. iv. Evidence on the mitigation of concentrated noise by use of multiple flight paths and/or respite. v. Up-to-date air pollution evidence (NOX and particulates) of the impact of the proposed	Where possible we will consider each of the matters raised here and will undertake sensitivity tests where appropriate. We recognise community groups have some concerns regarding SoNA and comparisons with WHO. However, these are issues for Government and whilst these remain Government Policy, Heathrow needs to take account of them in this ACP.

	changes, as increasingly the harm on peoples' health and life expectancy is shown to be more serious than previously thought. vi. Current population density and projected growth across the Heathrow Study Area. vii. Location of noise sensitive hospitals, schools and parks. viii. Assumptions regarding potential aviation fleet change (and the economic, operational and environmental consequences) and its timing. ix. Evidence on the reduction of CO2 and timely pathway to Net Zero.	
RHC11	We would like to understand how uncertainty and risk and sensitivity analysis will be addressed and factored into the project appraisal and decisions, and what risk assessment, management and mitigation steps Heathrow might take. We note that in the US the AM 'NextGen' project has failed to deliver the projected benefits as well as causing very adverse environmental impacts on some communities and it will be important to understand how these outcomes will be avoided in the case of Heathrow.	As part of the CAA's airspace change process the CAA will conduct a post-implementation review (PIR), usually 12 months after implementation. The purpose of the review is to evaluate whether the anticipated impacts and benefits in the original proposal and published decision are as expected. Where there are differences, the review would identify the reasons for these and any steps required to be taken. The PIR is intended to give confidence to local communities that the airspace change will not deliver unanticipated impacts.
RHC12	Heathrow will need to employ design tools in its project decisions and appraisal, such as the ANCON, AEDT and INM noise models and the government's TAG transport model (presumably updated to reflect the latest evidence). We would welcome early engagement with Heathrow on the use of these tools and models and the decision criteria, as well as the use of Environment and Economic Impact Assessments. We would like to understand what factors can be controlled by Heathrow and those that cannot, and which ones can be quantified and monetised and those where decisions will need to be based on qualitative assessment. We suggest that the Eurocontrol Standard Inputs for Economic Analyses, Edition 9.0, December 2020 (and updates and the Aviation Intelligence portal) could be a useful data sources for modelling.	We recognise that some of our community stakeholders are highly engaged and technically-minded and we are keen to work collaboratively with you. Our recent Methods & Metrics workshop was set up to initiate constructive engagement on the approach we will take to Stage 2 of the ACP and further technical workshops will be held if appropriate. Our intention at Stage 2 is to use a model developed for AEDT. This model will be the subject of a validation exercise in line with CAA CAP2091 guidance which sets out the parameters and describes the various inputs and their origin. In addition to the validation exercise, we will undertake comparative work with the ANCON model. This

		work will be reported at the end of Stage 2 to establish relative uncertainty in the modelling at this stage. The outputs from the modelling will be fed into the Government's TAG models.
RHC13	**Generating options.** We would like to continue the process started with the 5 July workshop of understanding how flight paths will be modelled in terms of lateral, vertical and time descriptors (4D) and how they will be operated in future in terms of frequency of flights, aircraft types and passenger loads and passenger kms including periods of respite. We seek to understand the efficiency rating and the noise, air pollution and CO2 emissions and the environmental impact of each flight path option as well for the system as a whole.	Where available, this information will be shared at either Stage 2 or at Stage 3 public consultation, in accordance with the CAP1616 process. We will share more detailed technical information, and seek feedback on it, at a future Methods & Metrics session if appropriate.
RHC14	**Short-listing options.** We would like to understand the process of elimination of flight paths in short listing and the choice of a final set of flight paths and how the options will be assessed against the Design Principles and Policies. It will be important to show how ANG 17 has been applied in relation to noise, altitude-based priorities, CO2, and air pollution and to other factors while ensuring safety. It will be important to extend the population numbers affected to the health impacts and to assess the impact of PBN and concentration versus dispersion.	This information will be presented when we engage with you on the Initial Options Appraisal during Stage 2 engagement sessions.
RHC15	**Fairness.** We would anticipate the option design process to be one of re-allocating legacy flight paths to improve efficiency and environmental impact. Fairness will be an important consideration and we hope the impact of change (recognised by ICAO) can be addressed.	"Fairness" is subjective and previous engagement on airspace topics has clearly demonstrated that one person's idea of a "fair" airspace design can be very different to another person's view. We are not aware of an ICAO position on "impact of change" so please could you share any source with us.
RHC16	**On-going proposals by communities and others.** Over time a number of proposals have been made to reduce noise and air pollution by the CNGs, Heathrow and others - for example: take-off procedures, reducing night flights and solutions for particular noise hot spots. We would like to see how these improvements and ICAO's Balanced Approach have been	ICAO's balanced approach is considered in the development of our Noise Action Plan, which is reviewed every 5 years. Our ACP will need to deliver outcomes that align with our Noise Action Plan.

	incorporated in the Airspace Change Proposal and the Stage 2 Plan.	
RHC17	To help ensure the engagement process for Stage 2 is robust we would welcome assurances from Heathrow regarding the following: i. Timely Information. Heathrow should circulate reports an appropriate and reasonable period ahead of meetings to discuss the documents and well ahead of deadlines for community responses. ii. Hierarchy of decisions. As part of a grid for the Stage 2 Plan we wish to understand the hierarchy of decisions which influence route options and what criteria and evidence underpins them. iii. Stakeholder Input. We also wish to understand how stakeholder input will be used and what genuine influence it may have in the formation of the new airspace design. We seek to avoid pre-determined decisions. iv. Consultations. When Heathrow gathers evidence from consultations and focus groups we would like to be advised how these groups have been chosen, what briefing material has been provided and have access to the response data, where necessary in redacted or statistical form. Differences in interpretation may arise but it is important for Heathrow, ourselves and others to understand where we differ. v. Views of other Stakeholders. Clearly, there are other stakeholders and it is appreciated they may have different views to ourselves; it will be important to us to understand these and how they have influenced the design outcomes. vi. Monitoring the Plan. It will be important for communities to engage with Heathrow as the Stage 2 Plan progresses and for there to be the opportunity to identify gaps in the process and engagement and the remedial action needed to ensure the process and engagement are working to Plan.	Our plans for engagement have been developed to ensure we share information with, and collect feedback from, stakeholders at key points throughout the airspace change process. Our engagement plans go beyond the requirements of the CAP1616 process to include opportunities for more collaborative technical discussions with our most highly engaged community representatives, such as at the recent Methods & Metrics workshop.

From: [redacted]
Sent: 04 October 2022 10:03
To: DD - Airspace
Cc: [redacted]
Subject: Re: Letter from RHC to HAL ref Airspace Change Proposal

Caution: external email. Unless you recognise the sender and know the content is safe, do not click links or open attachments.

Thanks, [redacted]

I will get back to you very shortly

Kind regards

[redacted]

From: [redacted]
Sent: 06 October 2022 11:57
To: DD - Airspace
Cc: [redacted]
Subject: Re: Letter from RHC to HAL ref Airspace Change Proposal

Caution: external email. Unless you recognise the sender and know the content is safe, do not click links or open attachments.

Dear [redacted]

Thanks for Heathrow's response to the RHC letter of 18 July 2022. RHC is happy for you to circulate to the NACF the RHC letter and your response of 3 October. We will want to continue addressing the issues raised and Heathrow's responses as CAP 1616 progresses.

Could you make it clear please when circulating RHC's letter and Heathrow's responses that RHC has not actually or implicitly approved Heathrow's responses and that we will be considering them in good time. Of course I cannot speak for the enquiries from the other groups.

I have just seen your email on further workshops and plan on attending but will respond separately on that.

Kind regards

[redacted]

[redacted]

Chair, Richmond Heathrow Campaign

From: [redacted]
Sent: 11 October 2022 12:18
To: DD - Airspace
Cc: [redacted]
Subject: Re: Heathrow ACP Stage 2A Engagement: Invitation to Workshops

Caution: external email. Unless you recognise the sender and know the content is safe, do not click links or open attachments.

Dear [redacted]

Thank you for the invitation to join the ACP Stage 2A workshops. I confirm I would like to join the 2.00pm 9 November session.

It would be helpful if you could let us know when we will receive the HAL response to our submission following the 7 July methods and metrics workshop. I understood you were going to circulate this to all workshop members together with our note on follow up points to the meeting.

With kind regards

[redacted]

From: DD - Airspace
Sent: 19 October 2022 14:06
To: [redacted]
Cc: DD - Airspace
Subject: FW: Methods and Metrics workshop
Attachments: 2207 Heathrow MM workshop_Meeting Note_vF.pdf; 2207_M&M Workshop_further stakeholder feedback_vF.pdf

Hi [redacted],

Please could you share the below email and attachments with [redacted]?

Many thanks,
[redacted]

From: DD - Airspace <airspace@heathrow.com>
Sent: 19 October 2022 14:04
To: DD - Airspace <airspace@heathrow.com>
Cc: [redacted]
Subject: RE: Methods and Metrics workshop

Hi All,

Thank you to those of you who responded with comments on [redacted] draft meeting note – [redacted] has reviewed these and updated the meeting note accordingly. The final version is now attached and will be shared with the wider NACF members.

We also received further feedback from some of you. We have collated all of this feedback, and Heathrow's responses, into the attached document. I have checked that the authors of the emails/letters are happy for me to share both their correspondence and our responses with you all.
I hope it proves useful.
Apologies for the delay in getting these documents finalised for you. It is a complex and technical area and we wanted to ensure we responded appropriately on every point raised.

Thank you again for your engagement during and after the workshop – we found it to be a very useful session and we hope you did too.

We look forward to seeing you all at our upcoming Stage 2A workshops.

Many thanks,
[redacted]

METHODS AND METRICS WORKSHOP

Report of technical workshop between Heathrow and stakeholder group representatives, 5 July 2022

Background

This report provides a minute of the workshop between representatives of Heathrow and of stakeholder group representatives, held at the Heathrow Compass Centre on 5 July 2022, as part of Stage 2 of Heathrow's airspace modernisation proposal. The report was prepared by Headland Consultancy, which had been engaged by Heathrow to independently chair and minute the workshop. The workshop was arranged by Heathrow in response to queries raised by technically-minded stakeholders. All attendees of the Noise and Airspace Community Forum (formerly Heathrow Community Noise Forum) were informed about the workshop and invited to provide an expression of interest if they would like to attend.

Attendees

Name	Organisation
[redacted]	Buckinghamshire Council/HSPG
[redacted]	Englefield Green Action Group
[redacted]	Englefield Green Action Group
[redacted]	Friends of Richmond Park
[redacted]	HACAN
[redacted]	HASRA
[redacted]	Headland
[redacted]	Heathrow
[redacted]	Heathrow
[redacted]	Heathrow
[redacted]	Heathrow
[redacted]	Heathrow
[redacted]	Heathrow
[redacted]	Heathrow
[redacted]	Heathrow
[redacted]	Heathrow
[redacted]	Heathrow
[redacted]	London Borough of Hounslow
[redacted]	Molesey Residents Association
[redacted]	Richmond Heathrow Campaign
[redacted]	Teddington Action Group
[redacted]	Teddington Action Group

Throughout this report, contributions are attributed to the organisation they came from rather than the individual. The ordering of the minute reflects the numbering of the principles, not necessarily the order of the discussion, which ranged across different principles at times. A slide pack, also submitted

alongside this minute, was presented as part of the discussion.

Method

0.1	Heathrow	Set out the purpose of the meeting, noting that it is not a requirement of CAP1616 but an exercise in gathering feedback on the proposed method and metrics for designing and assessing airspace options at Stage 2. Invited all participants to ask questions and to make comments and suggestions on the metrics proposed to assess each design principle.

Options Development

0.2	Molesey Residents Association	Asked about assumptions on the diagram of height trajectory. Noted that Heathrow referenced the 'flooding' technique being used in other proposals and asked if other airports use this as well. Asked whether Heathrow had thresholds for acceptability on certain principles. Asked why Heathrow was starting from a blank sheet. Asked whether the mix of aircraft, time of day, and overall volume of flights would be factored into analysis. Asked whether this was based on current or forecast volume of flights.
0.3	Richmond Heathrow Campaign	Asked about the decision to design to 7,000ft rather than 9,000ft. Stated that ACOG iteration 2 suggests airports look to design to 9,000ft. Stated that Gatwick created system options at this point in their process, based on variations on the existing airspace, allowing for a consideration of 80 options rather than many thousands generated from a blank sheet of paper. Also commented that Gatwick started designing based on current legacy routes, rather than from a blank sheet of paper. Suggested that Heathrow should do the same.
0.4	Teddington Action Group	Asked if Heathrow know where aircraft are heading to within the network, and where they're coming from. Asked if the baseline will be an option i.e., today's position.
0.5	HACAN	Asked if the flooding exercise was so Heathrow could do an assessment against the baseline.
0.6	Heathrow	Noted to generate overflight cones for the flooding, Heathrow have assumed a standard of 5.5% climbs, as well as assumed continuous climbs to at least 7,000ft and a 3^{o} approach. However, these issues don't affect the initial data generation for the tracks and will only be relevant when options are created and analysed later in Stage 2. Climb and descent gradients may also be revised at Stage 3. Noted that for noise purposes, Heathrow are required by CAP1616 to look at impacts from 7,000ft and below. For assessing the carbon impact of tracks, a decision has been taken to look beyond that, to fixed points far out within the network to provide an early indication of carbon performance.

		Explained that whilst CAP1616 and ANG2017 require assessments of noise impacts to/from 7,000ft, Heathrow would have to design flight paths that climb/descend to/from FL90 (c.9,000ft) as 7,000ft is not a helpful altitude in airspace design terms. Explained that the 'flooding' technique was useful for generating data to identify options that might optimise for a given principle. CAP1616 asks for options to be created, and each sponsor can determine how they produce that. Some have used flooding, some haven't. Highlighted that the role the flooding technique plays is creating data for 650,000 different lines, from which options for potential flight paths can then be designed. Noted that the fixed points for the analysis were the end of each runway and the transition points to other airspace. Generating lines between those points allows for their comparison. The tracks are relatively unconstrained, but they go straight or turn left or right consistently; there is no "wiggling" of the route, which there might be in an actual design option. Stated that every option will be compared to the baseline, not against each other. Additionally, one option will be to 'do nothing' i.e., the baseline. However, it is Government policy to modernise airspace, so 'do nothing' is likely to be a discounted option as it will not meet the intention of the Government's airspace modernisation strategy. Noted that CAP1616 advises them to forecast 10 years into the future from implementation when conducting the assessment.

Method for choosing between options

0.7	Richmond Heathrow Campaign	Suggested it was necessary to create system options at this stage, as per Gatwick, to ensure that all valid options, so that all valid options were available for consideration at the Stage 3. Commented that Gatwick had started their design process based on legacy routes, not from "a blank sheet" and stated that they would prefer Heathrow to do the same. Discussing usage, commented that CAP1616 does not limit traffic frequency along a route. Airlines are able to change their choice of destination and therefore which route they fly days after new flight paths come into effect.
0.8	Friends of Richmond Park	Asked how many options will be available at Stage 2. Luton had c. 20 and London City had c. 40 options. Suggested that options needed to be reduced to a maximum of 50 to allow for proper engagement. Noted that 650,000 notional routes would be reduced significantly to generate "real" options. Asked how stakeholders could be sure the list of options was "comprehensive" – as required by the CAA – if that process was done subjectively. Suggested that, to achieve the Stage 2 short-listing of options, Heathrow should score every option against every principle, based on quantitative test, and applying a weighting to each principle. Stated that this would meet the CAP1616 requirement for evaluating in a "fair and consistent manner" whether a principle was Met / Partially Met. Noted their suggestion for how Heathrow might do this. [This was later supplied by email]. Stated that use of terminology around systems, options, groups of routes need to be

		consistently applied by all ACP sponsors.
0.9	HACAN	Asked what the routes will look like and if it will be a process of elimination. Asked whether the elimination of certain options at this stage would be explained. Suggested Community Noise Groups (CNGs) could not reach a judgement if there is not a clear how and why. Asked for data to be published alongside each option.
0.10	Molesey Residents Association	Asked whether Heathrow had thresholds for acceptability when assessing options against principles.
0.11	Englefield Green Action Group	Asked whether an option failing against a “must” principle was grounds for deleting that option.
0.12	Heathrow	Noted that at this stage Heathrow are not looking at full systems. All 8 configurations for runways, departures and arrivals (easterly and westerly) will be combined to create a system option once the initial options development is completed. This will happen at Stage 3 of the process. Noted Gatwick did not create options based on systems either and also generated options in Stage 2 on easterly and westerly departure and arrival configurations, similar to Heathrow. Stated that Gatwick has also started from a blank sheet approach. Stated that the table of data (as presented in the workshop) will be calculated for all the notional tracks. This data is distinct from the metrics which will be used to assess route options. Noted that certain metrics can only be generated when looking at a full system, so Heathrow needs a full schedule before looking at specific impacts. Decision made to look at a group of routes, gather data, and work that into a manageable list of options at Stage 2. Conscious of the need to ensure routes work for both the easterly and westerly departures. The Heathrow Stage 2 options will be groups of routes, not systems. At Stage 3, the Stage 2 options will be combined into full systems to ensure they work together and assess impacts at a system level. This allows Heathrow to consider many more configurations in Stage 2 rather than just a relatively small number of complete systems. Noted that the requirement in CAP1616 for a “comprehensive” list of options is not very clearly defined. Noted that CAA does not define a methodology for choosing between options either – that is left to the sponsor to decide. Initial options will be appraised before a short list is produced. Committed to sharing the methodology used to get from notional routes to flight path options with community groups at Stage 2A engagement sessions.. Information shared at engagement sessions will then be included on the CAA portal. Noted that the CAA process does not require Heathrow to engage community groups on methods and metrics prior to Stage 2A engagement, but Heathrow has taken the decision to work more closely with our more technically-minded stakeholders. Noted it wasn’t necessary to quantitatively score options against every design principle and noted that doing so might require Heathrow to weight each principle, when prioritisation of principles hadn’t been done at Stage 1. Noted that some principles are defined as “must” and some are defined as “should”. Committed to looking at the suggested methodology for design principle evaluation from Friends of Richmond Park.

		Committed to looking at exactly what data could be published alongside each option at Stage 2A engagement and whether performance of the options against the design principles could be provided alongside engagement on the options themselves. Noted that, short-listed options emerging from Stage 2 may be adjusted at Stage 3. If those changes were substantive, Heathrow may re-engage the community. Noted that there is a question as to what counts as a substantively new option.

Purpose and context of modernisation

0.13	Richmond Heathrow Campaign	Asked whether airspace change was being done on the basis of a 480,000 ATMs cap. Stated Heathrow had previously committed to a 480,000 cap in writing. Suggested the government are on a different page to Heathrow as the airspace modernisation strategy refers to growth. Commented that DfT assumptions conflict with Committee on Climate Change position on aviation emissions. Noted that Gatwick's ACP is on the basis of growth, whereas Heathrow is merely change within the cap. Asked why Heathrow are making this airspace change and what the benefit is. Noted that the South East Taskforce said Heathrow operated perfectly 300 days a year, and commented that Heathrow works quite well today. Asked why Heathrow needed to make further changes. Would have preferred if the process started by looking at legacy airspace and improving that to resolve conflicts with other airports, consider noise hotspots and seek efficiencies around carbon. Suggested that such large change is unnecessary.
0.14	Teddington Action Group	Questioned whether Heathrow could model accurately based on forecast demand, which might not match reality. Noted Heathrow have to reconcile what they are being directed to do by government and climate change commitments. Stated that the purpose of airspace change seemed to be reducing track mileage for airlines, at the expense of noise impact on communities. Suggested that an alternative to airspace change to achieve benefits might be removing late-night flights or introducing steeper climbs and descents. Noted their comments in previous engagement that the Design Principles in some cases conflict with each other and with ANG17.
0.15	Heathrow	Confirmed that the ACP was on the basis of a 480,000 cap in ATMs. Any variation in that would be subject to separate planning consent. Noted that Heathrow is aware of inefficiencies in UK airspace. Noted challenges with existing approaches to stacking which constrains departures. Noted the Government have asked for modernisation for noise, environment, and capacity reasons, to fix issues with delays, and to build resilience. Noted that current airspace across the whole of Europe is not optimal. Noted that even small changes to existing flight paths would have impact. Noted that

		the airspace design process needs to be robust and demonstrate it has explored all options, because even small changes will still affect some communities. Noted that a blank sheet approach does not automatically infer a radically different style of operation.

LOAEL and the overflight cone

0.16	Richmond Heathrow Campaign	Noted that the effect of aircraft noise is felt well outside the overflight cone. Suggested that the definition of overflight is ridiculous as arrivals on the northern runway can be heard in Richmond which is outside the definition of overflown. Questioned the suitability of WebTAG.
0.17	Teddington Action Group	Noted that noise travels outside the overflight 'cone' and therefore the current methodology for assessing impacts is not reflective of reality and does not take into account health impacts. The noise impact of a departing aircraft at 2,000ft is far wider than the cone suggests. Stated that average metrics (whether SEL or Leq) do not reflect annoyance. Stated that Heathrow using LOAEL in this way was at odds with Air Navigation Guidance, in that Heathrow was measuring people affected at a given level, rather than measuring adverse impacts, including health impacts. Stated that ICCAN had reviewed SoNA and found it not to be appropriate. Noted that DfT were undertaking a review and that a new metric is likely to be published in due course. Stated that in the absence of other evidence, WHO guidance should be used. Suggested that Heathrow wait until that metric was established before proceeding with their analysis.
0.18	Englefield Green Action Group	Noted the experience of the 2014 trials, and the number of complaints that those raised, did not match what you might expect using metrics like the LOAEL.
0.19	Heathrow	Noted that overflight is a CAA definition that they are required to use and is intended to indicate the presence of aircraft. Not designed as an acoustic measure, hence using SEL in preference when developing options. Noted that there is a balance between what policy requires – e.g. the 51dB LOAEL - and the metrics that can be used in addition. There are the WHO guidelines, but these also acknowledge that experience of noise is context and locality dependent; therefore if there is a local study, such as SONA, that can be used instead. SONA is Government policy, and this underpins noise appraisal for the CAP1616 process. Noted that longitudinal studies were necessary to understand the impact of noise and complaints and disturbance over time. Noted that Heathrow was required to proceed with airspace modernisation and would use the best metrics available to it at the time. If new metrics were established while the ACP was ongoing, and these became part of the process through changes to policy or associated guidance, these would need to be considered. Committed to look at the use of the overflight definition and the LOAEL – this topic was further explored under Design Principle 9.

Design Principle 1

Our airspace design must be safe.

1.1	Teddington Action Group	Asked whether there were well understood safety thresholds that you could use to assess this quantitatively.
1.2	Friends of Richmond Park	Noted that there are numerous metrics for aircraft safety. Asked if Heathrow could define whether a given option fell within current safety parameters or would require a revision to existing safety parameters. Noted that Luton has generally chosen vectored arrival options and PBN was not to be used for arrivals except in low traffic periods – queried whether this is because of safety concerns.
1.3	Molesey Residents Association	Asked whether all the tracks generated by the "flooding" process were safe in and of themselves. Asked whether the safety analysis was based on current aircraft capabilities or future capabilities.
1.4	HASRA	Asked whether Heathrow has to use PBN for arrivals.
1.5	Heathrow	Stated that there are published route separation standards, but they have not been updated in a while and don't always reflect the capabilities of modern aircraft, or of guidance. Heathrow needs to consider the capabilities of aircraft today when considering safety, they don't forecast or design for future capabilities. Regarding Luton and PBN, exact spacing between arrivals is easier with vectoring than PBN, so allows for greater efficiency and resilience. Therefore, it is likely Heathrow will use vectoring on arrivals in this ACP. Noted that Heathrow is required to have the option for PBN on arrivals under the Government's airspace modernisation strategy, but is not required to use it for every arrival for the entire descent. Departures will likely be based on PBN as vectoring from the runway is not possible and the SIDs provide obstacle clearance. Regarding safety of the flooded tracks generated at this early stage of design, stated that many will be PANS-OPS compliant, some will not. Stated that: it is not the case that all new flight paths must be PANS-OPS compliant; CAA can allow exceptional cases but there are some extra steps or checks you go through for those that are not.

Design Principle 2

Our airspace design must remain in accordance with the CAA's published Airspace Modernisation Strategy and any current or future plans associated with it and all other relevant UK Policy, Legislation and Regulatory Standards (for example, Air Navigation Guidance). This includes preventing any worsening of local air quality due to emissions from Heathrow's aircraft movements, to remain within local authorities' limits.

2.1	Friends of Richmond Park	Suggested three considerations: • That National Nature Reserves and designated Quiet Areas or (as per CAP1616) any other local area that has similar characteristics to a National Park or an AONB and has been identified through community engagement should also be included in the assessment of sites overflown • Noted that Richmond Park's SSSI status is driven by its extensive rare Lowland Acid Grasslands, which are susceptible to nitrogen oxides over long time periods. Richmond Park currently has very low NO2 at 17µgm-3. Suggested that air quality impacts should be assessed up to 1,000m, not 1,000ft, as per ICAO 9889. • That FRP's 2019 submission to the PEIR consultation included suitable metrics and they had other specific proposals for measuring this principle, which they committed to write to Heathrow about separately. [This was later supplied by email]. Also asked whether the heights were from sea-level or ground-level, to which Heathrow responded that it was ground-level, i.e. accounting for terrain
2.2	Molesey Residents Association	Asked why the air quality impact was assessed qualitatively rather than quantitatively.
2.3	HASRA	Asked whether Heathrow would undertake a full health impact assessment of the changes.
2.4	Englefield Green Action Group	Suggested that air quality impacts should be assessed up to 1,000m, not 1,000ft.
2.5	Richmond Heathrow Campaign	Asked for Heathrow to experiment with marker additives in its fuel to measure the direct impact of aircraft movements and emissions on the local area.
2.7	Teddington Action Group	Asked Heathrow to reiterate policy that under 4,000ft, noise impact is the sole priority. Asked Heathrow how it assesses impact on areas of tranquillity.
2.8	Heathrow	Responding to the various comments about air quality: Stated that air quality impact assessment requires the full schedule, to understand ground movements, etc., which would be undertaken in full at Stage 3. For the purposes of comparisons between different options, the model assumes that if there are no lateral changes to existing tracks below 1,000ft, there is no differential impact on air quality. If there are turns or track deviations, they would mark that as having a possible impact (potentially positive or negative, depending on its relationship to populations). Noted that Heathrow have a continuous monitoring programme, looking to estimate the footprint of emissions. With regard to the threshold to which air quality is an issue, that Heathrow had a

		detailed answer on this point, and it was important to get it accurate. Committed to coming back to the group on this topic. With regard to the status of air quality vs noise, it was noted that the effects of aircraft on air quality diminish rapidly with height. The air quality impacts of airports are dominated by emissions at ground level. Impacts from aircraft more than about 200m above the ground are generally negligible. It is highly unlikely that any changes to Heathrow's airspace would affect whether thresholds are exceeded or not. Heathrow noted the request for a full health impact assessment and would consider options for this. There is no requirement for Heathrow to do so, and if a health impact assessment was undertaken then it would be most appropriate at Stage 3. With regard to assessing tranquillity, noted that this was an emerging area, and that Heathrow and other stakeholders including the CAA are continuing to develop their thinking. Committed to responding in writing to Friends of Richmond Park's proposed metrics for biodiversity and tranquillity.

Design Principle 3

Our airspace design must use noise efficient operational practices to limit and, where possible, reduce adverse impacts from aircraft noise.

3.1	Richmond Heathrow Campaign	Suggested that Heathrow consider speed, acceleration and the effect of turns. Queried whether any option would be better than the baseline.
3.2	Teddington Action Group	Stated that CCO and CDO are not necessarily noise efficient procedures – they might result in more noise, or more people affected by noise. Suggested that aircraft could be level over some more populated areas and climb over less populated areas. Stated that level flight at 6000ft under stacks requires lower thrust so causing lower noise over communities. Suggested that further down the flight path (after passing under the stacks) over lowly populated countryside wider dispersion is possible once climb thrust has to be reapplied. Stated that it was essential for the impact of airspace change to be mitigated by the planes flying higher and therefore impacting less people – i.e. by climbing and descending more steeply.
3.3	Friends of Richmond Park	Suggested an additional metric of distance from joining final approach to runway for arrivals. This could show the impacts of using PBN instead of vectoring.
3.4	Heathrow	Noted that noise abatement departure procedures (NADPs) could be applied variously to each option at Stage 3, and a given NADP was not necessarily a one-size-fits-all improvement for every SID. Noted that it would be possible to consider the effect of acceleration for some options, e.g. a tight turn on departure requiring more power, and that that would be looked at that within the assessment of noise impact. Noted that the effects of turning aircraft would be addressed in the noise modelling by the bank angle correction. Noted that they weren't suggesting metrics to assess this Design Principle, but that they would likely note any options that might inhibit particular noise efficient operational procedures.

Design Principle 4

Our airspace design must reduce the contribution to climate change from CO2 emissions, and other greenhouse gas emissions arising from Heathrow's aircraft activities.

4.1	Richmond Heathrow Campaign	Asked whether Heathrow knew the amount of CO2 that was emitted by aircraft flying between 4-7,000ft. Argued that it was potentially a very small proportion of the total CO2 emitted by aircraft using Heathrow and suggested noise was the more important consideration.
4.2	Englefield Green Action Group	Asked for Heathrow to publish data for each option showing CO2 emissions at 0-4,000ft, 4-7,000ft and above 7,000ft. Asked if carbon consumption was measured for UK airspace only or for the whole flight route internationally.
4.3	Molesey	Asked whether the modelling for CO2 emissions took account of NADP options.

	Residents Association	
4.4	Bucks Council	Stated that making comparisons between noise and carbon is very difficult. Would be interested to see the impacts for carbon if that consideration is being introduced at this stage.
4.5	Friends of Richmond Park	Questioned the materiality of carbon amounts. Asked when CO2 benefits become material when balanced against noise. Asked whether the AEDT model could reliably calculate the difference in fuel burn for operational procedures, such as when increasing thrust during turns. Suggested “Relative CO2 emissions” should be relative to the “Do nothing” options.
4.4	Heathrow	Noted that the intention of measuring CO2 emissions is to see whether there is a disproportionate impact on CO2 relative to noise, and that it is ultimately for Heathrow to define what is meant by “disproportionate”. That is a question for the methodology in assessing options on their impacts across the principles. Noted that aircraft using Heathrow emit about 20m tonnes of CO2 annually (2019 baseline) and that 1-2m tonnes of that were from landing and take-off – i.e. a significant proportion. Re NADP options, that yes – the modelling will take account of operational procedures to model fuel burn.

Design Principle 5

Our airspace design must enable Heathrow to make the most operationally efficient and resilient use of its existing two runways, to maximise benefits to the airport, airlines and cargo handlers, passengers, and local communities.

5.1	All	There were no suggestions or comments on this principle.

Design Principle 6

Our airspace design should also provide predictable and meaningful respite to those most affected by noise from Heathrow's movements

6.1	Teddington Action Group	Asked what the potential will be to create dispersion on departure routes using PBN. Suggested that Heathrow look at this in detail and establish what was possible. Stated communities’ understanding of the Anderson Acoustics study was that it identified 8-9 dB L_{Amax} as necessary to achieve “valued respite”. Asked for the measurement to be based on L_{Amax} rather than L_{Aeq}, noting that L_{Aeq} still allowed for consideration of all aircraft events at various levels as it is an average over time.
6.2	Englefield Green Action	Asked whether, conceptually, respite could be achieved through anything other than runway alternation.

	Group	
6.3	Richmond Heathrow Campaign	Asked for a more precise definition of “predictable” and “meaningful”. Noted that the CAA is supposed to be publishing guidance this year. Noted that the costs of respite, in spreading noise out across more people, needed to be assessed alongside the benefits.
6.4	Friends of Richmond Park	Suggested that, as there was no agreed definition of respite and 6m+ people visited Richmond Park partly to get respite from aircraft noise, a suitable additional DP6 metric would be whether an option effectively removed availability of a significant quiet public open space, i.e. measurement to include respite for people visiting areas of tranquillity, not solely where they live.
6.5	Molesey Residents Association	Asked whether respite would account for populations that are most overflown currently.
6.6	Heathrow	Noted that it was challenging to operate multiple SIDs off the same runway, same general direction to enable dispersion. The more SIDs there are to create dispersion, the less distance is available from adjacent SIDs to deliver predictable respite. Committed to explore what the possibilities are and related this to the discussion under Design Principle 9 for measuring the extent of concentration. Noted current indications are that a 9 dB difference is possible between adjacent departure routes, but the track separation needed to achieve this has to increase the further an aircraft is from the airport. Some work has been undertaken to identify the separations needed for departures. This indicates that by around 10 nautical miles (nm) from start of roll, departure routes may need to be separated by around 1nm. Noted that Heathrow had used the L_{Amax} metric for this analysis based on feedback from community noise groups previously, but committed to look at the issue and come back to the group. Noted that Heathrow was unlikely to use vectoring of departures as a standard procedure, as it is workload intensive and doesn’t allow for predictable respite. Noted that the CAA had previously indicated it would be publishing guidance on definitions of respite, which would be useful here. Noted that considerations of the impact on tranquillity would be assessed under Design Principle 2. Re most overflown populations, confirmed that they would be measuring how many of the people who were most affected by noise achieved the 9dB difference in respite.

Design Principle 7

Our airspace design should also seek to avoid overflying the same communities with multiple routes including those to/from other airports

7.1	Molesey Residents Association	Asked how Heathrow’s new airspace design might conflict with other airports’ proposed designs.

7.2	Richmond Heathrow Campaign	Asked whether Heathrow would undertake to show the noise impacts from all airports' flight paths, not just Heathrow's own. Suggested that there should be combined engagement for areas affected by multiple airports and suggested a meeting of communities from different airports to discuss cumulative impacts.
7.3	HASRA	Reiterated the call for combined engagement by multiple airports.
7.4	Teddington Action Group	Stated that London City Airport faces constraints due to the current design of airspace. They should be allowed greater flexibility to operate in the most noise efficient way. City are forced to fly in at 2,000ft and it impacts noise.
7.5	Heathrow	Noted that at Stage 3 there was a requirement for a cumulative assessment of the impact of all airports' airspace change, and that ACOG had a role to play alongside the sponsors and the CAA in making that happen. Airports are required to engage with their affected communities and there is a further requirement for the respective consultations to be "coordinated" – but how that will work is not yet defined. Heathrow committed to consider whether a combined engagement session with communities from local airports would be possible or valuable. States that for Stage 2 all analysis would be based on the A320 aircraft type. Analysis at Stage 2B and beyond would account for Heathrow's full fleet mix.

Design Principle 8

Our airspace design should also contribute to minimising the negative impacts of night flights

8.1	Englefield Green Action Group	Noted that in the case of night flights, it is specifically the heavier aircraft that are more common and cause more disturbance. Named 777, 787 and A380 as being the worst culprits, with 777 perhaps being the best candidate for analysis.
8.2	Heathrow	Noted that, for this principle, the goal was to identify metrics that allow for optimisation of night flights, over and above optimisation of flight paths used during the day. Noted that for the night period and early morning arrivals, Heathrow could take advantage of fewer movements to implement PBN on arrivals, and allow for alternation between sets of routes that are spaced more widely and give meaningful respite between night periods. Also suggested that Heathrow could consider turning on additional departure routes at 9pm to maximise departures, when required, leaving fewer departures after 10pm. Noted that, whilst A320 SEL data had been used for most noise principles, overflight cones from 7,000ft on arrival were broadly representative of the size and length of the 70 dB SEL metric from heavier aircraft.

Design Principle 9

Our airspace design should also keep the number of people who experience an increase in noise from the future airspace design to a minimum.

9.1	Teddington Action group	Noted that departure routes are likely to merge off different runways at some point, and that this means no respite beyond that point. PBN means greater concentration for certain places directly under those routes. Stated that no study had been done on the environmental/health outcomes of implementing PBN, with reference to ANG prioritising impact on health. Experience from the US is that this is intolerable and that PBN would have a direct adverse impact on these communities, leading to "blighted" communities. Asked whether Heathrow has metrics to measure that concentration. Asked whether the government has any guidelines on the effect of PBN. Suggested that it was necessary to look at the 80dB cell, not just the 70dB cell. Also suggested that the N65 contour be used. Suggested N60 might be applicable for night. Should be assessed at 10, 20 and 50 overflights per day, as per the metrics to define newly overflown. Asked that the contours be drawn for an A380, not just an A320. Asked for single mode assessment, not just an average where the 70:30 directional split hides certain concentrated effect. Undertook to write with their suggestions on the metrics that they suggest should be used.
9.2	Friends of Richmond Park	Noted that 'people' in this DP had changed to 'population' in the metrics i.e. Heathrow proposed to assess compliance with DP9 via focus on people by using metrics about residents, thereby apparently disenfranchising 6m+ RP visitors in favour of residents and house locations. Also noted that the metrics were using noise as calculated by LOAEL rather than the effect of short bursts of very loud noise overlaid on a very low level of ambient noise (a difference of around 50dB in Richmond Park's case) which certainly were "people who experience an increase in noise".
9.3	Richmond Heathrow Campaign	Asked whether there was a practical or human limitation on operating a large range of SIDs that would enable greater dispersion of departure routes. Stated their support for the L_{Aeq} metric for arrivals. Reiterated the request for metrics broken out by single events, and hourly, daily and annual averages.
9.4	Molesey Residents Association	Stated that fairness and avoiding concentration are key. Some amount of dispersion, or alternating SIDs, even to replicate the natural dispersion experienced today, would be preferable. Asked Heathrow to explain the choice of 70dB.
9.5	Heathrow	Heathrow welcomed the suggestions on metrics to measure the effects of more concentrated routes and committed to explore them and respond to the group. Noted that lower values of the N65 metric such as 10 N65 effectively represent the outline of 65 dB L_{Amax} footprints of the noisiest aircraft operating across the schedule. At higher values of N65, these will represent the frequency of events from

		most aircraft operating in the schedule. Stated that averages were used to give an overall picture and to align with the metrics they were required to use at Stage 3. This was also reflected in the choice of 70dB SEL which seeks to understand the influence of a route on L_{Aeq} data. However, noted that it would be possible to generate more fine-grained data and committed to look at whether it was helpful to make that data available as part of engagement. Added a caution that there is a risk of generating too many metrics and losing sight of the principles in all the data.
9.6	Richmond Heathrow Campaign	Asked what the definition of "newly overflown" was.
9.7	Teddington Action group	Asked for Heathrow to publish data on how many times a day a flight path could expect to be used.
9.8	Englefield Green Action Group	Noted that from the perspective of most overflown communities, a definition that assessed overflight as 50 flights per day was preferable.
9.9	Heathrow	Noted that the CAA defines overflight as a single event i.e. an occurrence, rather than considering by how many events somebody may consider themselves to be 'overflown'. Noted that to get a picture of Heathrow's overflight patterns, 10, 20 and 50 times per day metrics were preferable. Any lower, and the entire area is deemed overflown; any higher and only initial departure and final approach are deemed overflown. Committed to publishing data on people overflown on each route option at 10, 20 and 50 times per day. Committed to identifying any options impacting areas of tranquillity and taking these additional factors into consideration.

Design Principle 10

Our airspace design should also keep the total number of people who experience noise from the future airspace design to a minimum.

10.1	Englefield Green Action Group	Asked Heathrow to consider the four-hour shoulder periods (0600-1000 and 1800-2200) in their analysis, beyond the proposed $L_{Aeq, 8hr}$. Asked what year Heathrow was taking as its population baseline.
10.2	Friends of Richmond Park	Noted that 'people' in this DP had changed to 'population' in the metrics i.e. Heathrow proposed to assess compliance with DP10 via focus on people by using metrics about residents, thereby apparently disenfranchising 6m+ RP visitors in favour of residents and house locations. Noted that the use of LOAEL masked the impact of very loud noise overlaid on very low ambient noise, as in the case of Richmond Park.
10.3	Richmond	Noted that the London Plan called for a 30% increase in the capital's population.

	Heathrow Campaign	Asked whether that forecast was accounted for in Heathrow's analysis.
10.4	Molesey Residents Association	Asked whether Heathrow is forecasting the effects of population growth, and whether it was using the latest 2021 census data.
10.5	Heathrow	Noted that Heathrow were using a forecast to 2027 – the anticipated start of the new airspace – for population analysis. This was available at the postcode centroid level, and was available for years up to 2040. It is currently based on 2011 census data, but would use 2021 data when that recently released data had been ingested and used to update the forecasts. Further, they take information from local authorities on planning permission for large developments where they can expect new population, and development for other strategic sites. Heathrow committed to identifying any options impacting areas of tranquillity and taking these additional factors into consideration, and noted that they were able to look at certain datasets to see where people spend their time, which would allow for the impact on Richmond Park (for example) to be explored. Also noted that they are required to account for AONBs and SSSI under Design Principle 2.

Design Principle 11

Our airspace design should also enable the efficiency of other airspace users' operations.

11.1	All	There were no suggestions or comments on this principle.

Design Principle 12

Our airspace design should also minimise the impact to all stakeholders from future changes to Heathrow's airspace.

12.1	All	There were no suggestions or comments on this principle.

Concluding remarks

13.1	Heathrow	Thanked participants for their attendance and constructive engagement. Committed to addressing and responding on several issues raised during the discussion, namely: • Reviewing the Quantitative DPE methodology suggested by Friends of Richmond Park (0.12) • Committed to sharing the methodology used to get from notional routes to flight path options with community groups at Stage 2A engagement sessions. (0.12) • The amount and type of data published alongside an option, including single event vs average over time metrics (0.12, 9.5, 9.9) • Whether LOAEL is the best metric, how Heathrow would respond if it was supplanted by other metrics(s) under development (0.19)

		• The choice of L_{Amax} or L_{Aeq} for measuring respite (6.6) • The best way of assessing the impact of potential concentration of flight paths under PBN, including the suitability of the N65 contour (9.5) • The suitability of WebTAG for assessing airspace design impacts (0.19) • How Heathrow / ACOG / other airports would assess and report on the cumulative impact of options and whether there were opportunities for joint engagement by two or more airports (7.5) • Whether Heathrow would conduct a health impact assessment at Stage 3 (2.8) • Identifying any options impacting areas of tranquillity and taking the additional factors into consideration (10.5) • Responding to Friends of Richmond Park's proposed metrics for tranquillity and biodiversity (2.8) • The choice of threshold for air quality assessments, and rationale for it (2.8) Further noted a "car park" of issues (as it had been referred to in the meeting) that they expected to return to for further discussion at future meetings, partially overlapping with the issues listed above: • The use of LOAEL • WebTAG • Definitions of overflight • Community engagement by multiple airports, cumulative impacts Encouraged any further submissions by email. Noted that a minute of the workshop would be shared with attendees for their comments.

Methods & Metrics Workshop: Further Stakeholder Feedback

Contents

	Stakeholder Comment / Question:	Heathrow Response:
FRP1	<u>Biodiversity</u> For the Expansion Project, Mott McDonald/Wood did an assessment of Biodiversity Net Gain (BNG), which they presented to FRP. Their approach used metrics for habitats such as size, distinctiveness, condition, connectivity and difficulty of restoration, based on condition surveys, with a case study of brown long-eared bats. Natural England has a Biodiversity Metric, currently in version 3.1. which gives guidance on calculating the loss or gain of biodiversity from developments, but also requires condition surveys. Such condition surveys are available in Richmond Park for some aspects such as acid grassland, anthills and veteran trees. In the absence of condition surveys, simple metrics for comparative biodiversity in areas affected by HAL aircraft operations could be: • Number and range of designations - SSSI, SAC, NNR, Historic Landscape; • Number and variety of habitats, and connectivity; and • Number of species - especially rare, endangered and protected species and of those most sensitive to noise and nitrogen - and the population of each. If required, expert assessment of condition with simple rating such as 'poor, medium, good' could be used as an initial guide to the importance of habitats. In our PEIR submission we highlighted the enormous biodiversity	Achieving Biodiversity Net Gain (BNG) is a legislative requirement (enforced after secondary legislation due in late 2023 is passed) to provide a better biodiversity baseline post development when compared to that which would occur had development not taken place. This requirement is intended to prevent biodiversity loss occurring as a result of land take to accommodate built development. There was significant consideration and assessment of the baseline at Richmond Park undertaken to support the Heathrow Expansion project, however this was in part to determine whether proposals, and in particular changes to overflying, could enhance the biodiversity that exists in the Park which might help the Expansion Project meet its BNG requirements that would arise due to the land take that would have occurred to accommodate the development proposed near to the Airport. Our airspace change for airspace modernisation is considerably different to the Expansion Project

	of Richmond Park and key species such as bats (11 species), red-listed birds (8 species), badgers, beetles (stag, cardinal click and 140 other nationally scarce or threatened species), butterflies (42 nationally scarce or threatened species), wildflowers and acid grassland. Many of these species are sensitive to noise or nitrogen. Finally, you will be aware that the Department for Environment, Food and Rural Affairs published a Consultation on environmental targets on 6-May-22. This consultation shows the importance the government attaches to the environment including the need to take urgent action to halt biodiversity loss.	and the ACP does not involve the same scale of on the ground development. Some ground works may be required to enable easterly alternation and we will be able to inform you on any requirements for biodiversity assessment once we have confirmed the planning process for these works. The ACP process requires some assessment of biodiversity impacts but not to the same degree as the BNG assessment required for Expansion. Understanding, and where possible avoiding, any new adverse effects to the Park as a result of this Airspace Change will be a consideration of the work undertaken. This Airspace Change could potentially lead to a reduction in current overflight of the Park, but the biodiversity consideration will need to be balanced against other objectives of this airspace change including the design principle to reduce noise for people overflown.
FRP2	<u>Tranquillity</u> In our PEIR submission we noted the impact of sound exposure on tranquillity and referred to two sources: • HAL's PEIR document '15-Volume-1-PEIR-Chapter-13-Historic-Environment' 13.7.9 which says "*Temple Group Ltd (2014) Aviation Noise Metric (Temple (2014)) - Research on the Potential Noise Impacts on the Historic Environment by Proposals for Airport Expansion in England, Project No. 6865, Final Report for English Heritage. This aspect of the assessment includes section 3.8 Tranquillity and Soundscape and has been prepared on the basis of section 5.0 Method to Assess Noise Impact on Heritage Assets*"; and • The CPRE's tranquillity mapping tool. However, while on the face of it this	We recognise the sources you state here and will refer to these in our assessment of options. We will also take account of any emerging best practice. It should be noted that any tranquillity assessment will be more appropriate at Stage 3 once system options have been prepared for the Full Options Appraisal.

	could provide areal tranquillity data, the base data is old (2007) and the granularity (500m squares) too coarse for reliably assessing the tranquillity effect of notional routes Reliable assessment of noise impacts on tranquillity would better be done by methods such as those set out in 'Tranquil Spaces' (Bentley, 2019)	
FRP3	1.3 Other A tool that may be useful in terms of including significant green spaces and their value can be found in the Natural Capital Account for London (GLA, Nov 2017)	At Stage 3, the impact of our airspace proposal on tranquillity will be assessed using TAG, in accordance with current Government Policy. We will also review whether additional alternative methods might be used to support the assessment.
FRP4	**2. DP scoring and weighting** Please find attached an electronic copy of the DP scoring and weighting spreadsheet FRP tabled. As discussed briefly in the workshop, among other things this suggests initially scoring as a % how well each DP does for a given option, rather than going directly to 'Met, Partially Met, Not Met' as set out in CAP1616 Appendix E. The reasoning is that this ensures the CAP1616 requirement of consistency in options appraisal is achieved, e.g. consistency in what it takes for 'Met' to be achieved as opposed to 'Partially Met'. Do come back to me if HAL have any questions.	Our approach to weighting and scoring will be shared as part of Stage 2 engagement. FRP's proposed approach will be considered.
FRP5	Given that it is necessary, under CAP1616, for the options be evaluated in a 'fair and consistent manner', it is important that quantitative tests (e.g. scoring the table of metrics) rather than qualitative judgements, be used to short-list options	This has been added to the meeting note
FRP6	Even though the 650,000 notional routes are (demonstrably) 'comprehensive', if they are distilled down using subjective judgements the resulting list of Options may well not be comprehensive.	This is included in the meeting note
FRP7	Design Principles scoring and weighting: It is critically important: (a) how the metrics will be added up to get a score for each DP on a specific option; and (b) how, for each option, each DP's score will be weighted to arrive at an overall score - which is then used for Stage 2's short-listing of options. Moreover how this is done should meet the CAP1616 test of	Our approach to weighting and scoring will be shared as part of Stage 2 engagement. FRP's proposed approach will be considered.

	"*evaluate ... the design options against the design principles in a fair and consistent manner*". To this end, FRP tabled a suggestion method of DP scoring and weighting;	
FRP8	DP1 - safety: HAL say "… *there are no metrics for determining safety at this time*". But in the world of aircraft safety analysis there are numerous metrics. Surely the initial assessment of each Option's safety should be done quantitatively in Stage 2; FRP noted that Luton had decided to stick with vectored arrivals because PBN could not cope with the volume of arrivals, except in low-traffic periods. Was this not a basic safety issue?	At Stage 2 we will undertake a qualitative assessment of the options against each design principle. This will include consideration of whether each option appears viable from a safety perspective. A full quantitative risk assessment will be undertaken during Stages 3 and 4 to consider ATC operating procedures and hazard analysis, but a full system design (departures + arrivals for easterly and westerly operations) is needed before we can do this. There are no safety concerns re using PBN for arrivals and PBN is already used for arrivals across the UK and around the world. However, PBN may not consistently allow for high landing rates in a Heathrow environment with varying runway spacing, so some degree of vectoring on arrivals is likely to be required.
FRP9	DP3 – operational practices to limit noise: FRP suggested an additional metric: arrivals joining point distance – which would play to the vectoring/PBN issue.	Aircraft currently join final approach anywhere between 8 nautical miles (nm) and 18nm from the runway, with 10–16nm being most common. We are exploring whether it would be possible and beneficial to be more prescriptive on where aircraft must join final approach.
FRP10	DP4 – CO2: FRP suggested that "Relative CO2 emissions" should be relative to the 'Do nothing' option; FRP questioned whether the AEDT model could reliably compute small variations in fuel burn for differences in Continuous Descent Operations (CDO) (e.g. when increasing thrust during turns), and whether this would lead to a disproportionate balance with noise effects;	The Initial Options Appraisal (IOA) will consider relative CO_2 emissions compared to the current airspace arrangements. For the IOA, the modelling of fuel burn and CO_2 will assume a consistent set of arrival and departure procedures. At Stage 3, the Full Options Appraisal (FOA) will take further account of the

		procedures that are to be applied to the airspace designs. The AEDT model is designed to compute fuel burn in line with international methods. These include the Boeing Fuel Flow Method 2 (BFFM2) for operations up to 10,000ft, and the EUROCONTROL BADA 3 methodology and associated datasets for operations above 10,000ft to a common point of cruise. Different arrival and departure procedures modelled in AEDT affect the fuel flows which are then converted into CO_2 emissions.
FRP11	<u>DP10 - min. total people experiencing noise:</u> FRP pointed out that this DP was about 'people' but the proposed metrics were about 'population' i.e. HAL proposed to assess compliance with the DP's focus on people by using metrics about residents, thereby apparently disenfranchising 6m+ Richmond Park visitors in favour of residents and house locations;	For the Initial Options Appraisal (IOA) at Stage 2 we will focus on the population exposed to aircraft noise. However, at Stage 3, when a Full Options Appraisal (FOA) is required and the number of options has reduced, we will undertake a full environmental appraisal of each option's environmental impacts. Should these options result in changes over Richmond Park, or other sites of its kind, we will consider whether this would have any effect on its ecology or tranquillity, or on the recreational and amenity benefits it provides in accordance with Policy requirements.
FRP12	<u>DP9 - min. increase in people experiencing noise:</u> FRP made the same point as DP10 about 'people' in the DP morphing to 'population' in the metrics; FRP also noted that the metrics were using noise as calculated by LOAEL rather than the effect of short bursts of very loud noise overlaid on a very low level of ambient noise (a difference of around 50dB in Richmond Park's case) which certainly were "*people who experience an increase in noise*".	For the Initial Options Appraisal (IOA) at Stage 2, we will prepare N65 contours to articulate the number of events above 65dB L_{Amax} for each option. At Stage 3, we will explore the use of L_{Amax} footprints alongside information relating to route use to describe impacts with respect to aircraft event levels.

FRP13	<u>DP6 - respite:</u> FRP suggested that, as there was no agreed definition of respite and 6m+ people visited Richmond Park partly to get respite from aircraft noise, a suitable additional DP6 metric would be whether an option effectively removed availability of a significant quiet public open space.	A provisional assessment of tranquillity will take place under assessment against DP2. We will need to consider the impact on tranquillity within our full options appraisal, and we will also assess impacts on the recreational and amenity benefits that public spaces such as Richmond Park provide.
FRP14	<u>DP2 – CAA compliance etc.:</u> Presence of NNRs (National Nature Reserves) and designated Quiet Areas or any other local area that has similar characteristics to a National Park or an AONB and has been identified through community engagement so should be added to SSSI/SAC etc. in the standard slate of metrics; On biodiversity and tranquility metrics, FRP's 2019 submission to the PEIR consultation included suitable metrics. FRP would email HAL with details [i.e. this email]; On air quality impacts, FRP noted that Richmond Park's SSSI status is driven by its extensive rare Lowland Acid Grasslands, which carry much legal protection and are susceptible to nitrogen oxides over long time periods. Richmond Park currently has very low NO2 at 17µgm-3. So: (a) height should be defined as above ground level (AGL) as per CAP 1498 [HAL confirmed this]; (b) the height should be 2,500ft or more; and (c) this assessment should be quantitative, not qualitative – as the data exists	Where an airspace option overflies a designated Quiet Area, a qualitative assessment will be undertaken. The location of habitat sites and the impact upon these will be considered as part of the wider biodiversity assessments at Stage 3. There is a national objective to protect vegetation and ecosystems from nitrogen oxides (NOx). Compliance against these limits is monitored to avoid an increased risk of damage to vegetation. The NOx objective applies at locations which are: • more than 20km from an agglomeration, i.e., more than 20km from an area with a population of more than 250,000; • more than 5km away from built up areas of more than 5,000 people; • more than 5km away from industrial sources regulated under Part A of the 1990 Environment Act; and, • more than 5km away from motorways At most ecological receptors in the Heathrow study area, the NOx Objective does not apply on the basis that at least one or more of the four exclusion criteria listed above apply.

		The NOx objective does not apply at most ecological receptors in the Heathrow study area. The predominant route by which emissions will affect the land in the vicinity of an airport is through the depositing of atmospheric emissions. Some ecological receptors can be sensitive to pollutants, particularly nitrogen compounds, which can affect the character of the habitat through eutrophication (nutrient enrichment) and acidification. Critical loads for nitrogen are a quantitative estimate of the level of exposure at which significant harmful effects on sensitive elements of the environment might occur, based on present knowledge. It should be noted that critical loads are not statutory standards which must be achieved but are an indicator of when harmful effects might occur for different habitat types. Typically, an airport-related air quality assessment considers emissions from aircraft engines in the landing and take-off (LTO) flight phases on the ground and up to 3,000 feet (~1000 metres) above the ground. Where sensitive habitats are located in areas where the Objective applies or where the habitats may be sensitive to changes in level of nutrient or acid deposition, they will be considered in the assessment.
TAG1	The Design Principles (DP) and the proposed approach in some cases conflict with each other and ANG 17. It was recognised there is **an absence of a credible health and annoyance impact evidence base**. Of overriding importance, the DPs and resulting approach do not address the **key concentration issue**.	The airspace design team recognise that PBN routes can result in concentration of traffic along a route, and we are therefore looking at various ways of providing respite from noise for those overflown by the new flight paths. Potential

	The Heathrow (HR) flight path design team recognised that concentration using PBN would have significant adverse effects, which based on international experience will lead to blighted neighbourhoods. The HR team considered managed dispersion, based on previous flight path patterns, would not be achievable under PBN. They did not see ways a limited number of highly concentrated routes could be avoided using PBN and recognised this would cause significant effects in the crowded airspace and high-density population around Heathrow airport. Whilst the HR team was considering the potential to mitigate the impact of PBN through respite they acknowledged this had severe limitations due to airspace capacity constraints and given Heathrow's location in the middle of very highly populated areas. HR airspace design was not addressing the reduction of noise impacts on the ground, nor was it taking account of internationally recognised change impacts as metrics based solely on a static survey were being applied. It was noted ICAO advised the use of overall average LAeq metrics only accounted for one third of aviation noise impacts. Airspace redesign seems to be an exercise to investigate lower airmile routes and potentially at a cost of causing very significant adverse impacts over the high-density populations such as those around Heathrow.	approaches to delivering respite include runway alternation, flight path alternation and dispersion within a flight path. At this early stage of the design process, we are considering both shorter routes (to meet our design principle to reduce carbon where possible) and routes that reduce noise impact (to meet design principles 3, 6, 7, 8, 9 and 10 - which all relate to reducing noise impact).
TAG2	**Heathrow Business Case** HR confirmed that this ACP assumes 480,000 ATMs pa. Communities noted this conflicts with assumptions being used by the DfT and ACOG. DfT assumptions also conflict with CCC limitations on UK aviation growth. What is HR's position on this and how will this issue be resolved?	Our Expansion airspace change proposals are currently paused. However, the Airports National Policy Statement (ANPS) supporting a third runway at Heathrow remains up-to-date planning policy and we will ensure our local communities are kept informed should our plans for Expansion change. We are investigating whether assumptions used by DfT and ACOG are in conflict with Heathrow's own assumptions and will come back to you in due course.
TAG3	**Noise** No study has been undertaken in relation to the environmental/health outcomes of	We have taken note of the request for a health impact assessment, and we will consider how such an assessment could be undertaken at

	implementing PBN/NextGen and the absolute priority of avoiding the creation of blighted communities living in 'noise sewers' resulting from extreme concentration. This is despite evidence of international experience being provided to the HCNF on numerous occasions over many years. All parties accept that LAeq measures are not sufficient to describe annoyance. No metrics have been developed to describe impacts of concentration in the centre of PBN flight paths. HR confirmed that its ACP will apply ANG policies. However as noted elsewhere this is not underpinned by a robust evidence base and further some DPs conflict with ANG17. ANG specifically defines impacts by reference to health (including annoyance) and requires altitude priorities to be applied (noise the priority up to 7000 ft with balancing with carbon only after 4000ft if a clear case can be made). HR should advise how this will be applied in practice. No credible health study on the impact of aviation noise in relation to HR or the UK has been carried out. HR indicated at the meeting it was considering undertaking a local health impact study. HR should confirm whether it will be carrying out this work and if so the timing and how it will be taken forwards. DfT accepts that SoNA needs to be updated and is preparing for this work. This will entail a review of LOAEL, as well as a review of metrics, thresholds and presumably a recalibration of webTAG. HR should advise how this programme of work will be fed into its ACP option appraisal. In the absence of other evidence WHO Guidance should be used, in particular in relation to noise thresholds and the analysis of HR's ACP. HR agreed that the CAA's noise cones do not correspond to noise impacts, for example in relation to larger, heavier aircraft. HR will be undertaking its own analysis based on SELs. Communities proposed additional metrics – see analysis section below.	the various future stages of the ACP process. All relevant policy and guidance will be applied to our ACP as it becomes available. We engage frequently with CAA, DfT and ACOG to keep abreast of potential policy changes and emerging best practice. Our options are being developed and/or assessed using a range of noise metrics including SEL, LAeq, and N60/65 metrics to identify potential noise impacts. We are also using overflight cones, as required by CAP1616, to identify numbers of people further from the airport who may still experience the perception of being overflown.
TAG4	**Route usage assumptions** HR stated 2019 would be its 'Base Case' year. The impacts of ACP options will be assessed against this using a 10-year projection in relation to fleet and route usage. This 10-year	The CAA's CAP1616 guidance recognises that changes to noise impact can occur due to events outside the airport's control, such as changes to flight destinations; aircraft types used by airlines;

	projection should also be applied to the 2019 base case 'do nothing' scenario. It is also essential that HR compares actual noise conditions experienced in 2019 and how assumptions regarding route usage and fleet transition will be factored in. HR should clarify its projection methodologies. HR should also advise what control mechanisms and community protections will apply in future concerning increased noise impact resulting from changing commercial demand patterns and new technologies.	meteorological conditions; air traffic control practices, or slot transfers or sales (paras 504-508). CAP1616 places responsibility on the airport to share information on any identified changes with local communities.
TAG5	**Respite, dispersion, and the avoidance of creating blighted communities** The importance of avoiding the worst impacts of concentration given worldwide experience was discussed. No response has been given by HR in relation to the numerous HCNF presentations on the well documented outcomes of implementing PBN/NextGen in the US. HR should provide a statement of the technical constraints it is working within in relation to flight path design, particularly concerning noise sharing and dispersion concerning PBN. The treatment of important parks and open spaces, e.g., Richmond, Osterley, Windsor, Bushy and Home Parks needs to be clarified. HR has committed to providing respite through easterly departure runway alternation following the expiry of the Cranford Agreement. If departure flight paths combine after a few km, then communities will only see a small benefit close in and real respite for those on departure flight paths will not be provided. A note of what the possibilities will be needs to be produced by HR. HR confirmed it was investigating respite – however this seemed to be based on an assumption that a reduction of 9 dBLAeq was needed to create meaningful respite. This is not the communities' understanding of the outcome of the Anderson study, which identified 8-9 dBLmax to be needed to achieve 'valued respite'. This may create a very different set of route design parameters and HR should confirm the basis on which they are progressing their ACP. In their study of HR's 2014 PBN trials Anderson reported that the use of LAeq metrics could not explain or differentiate the impacts of concentration. The CAA advised the HCNF that	The airspace design team are aware of lessons learned from PBN implementation in the UK and around the world, and we are incorporating these lessons into our airspace modernisation programme wherever possible. The impacts of future airspace design options on parks and open spaces will be considered in line with policy. We will also share impacts on areas of specific interest at our Stage 3 public consultation. Our airspace design will include easterly departures from our northern runway (following the expiry of the Cranford Agreement). We expect that runway alternation on easterly operations will provide greater respite for overflown communities than they receive today. We have confirmed with Anderson Acoustics that a 9dB difference in LAeq can be used to describe valued respite. We are aware of the Airports Commission's findings and of other studies that have considered health benefits of respite and respite will be a consideration of this ACP.

	health benefits of £640m over 10 years could be achieved by splitting a single PBN route. In addition, the CAA found as part of their work for the Airports Commission that 'maximum respite' created the lowest health impacts, compared to alternative flight path strategies (such as minimise total or minimise newly affected).	
TAG6	**Operations** • The design team said they would use CCO/CDOs for departures and arrivals. • The communities said this needed further definition if they were to be considered noise efficient (for example higher ascent rates for departures). The design team said they would use the 2019 averages, the implication being 'no change with modernisation'. Achieving higher altitudes is a vital component of AM highlighted by the CAA to minimise aviation's noise impact. Communities noted that level flight at 6000ft under stacks requires lower thrust so causing lower noise over communities. Further down the flight path (after passing under the stacks) over lowly populated countryside wider dispersion is possible once climb thrust has to be reapplied HR confirmed that the work undertaken by TO70 in relation to departure procedures/climb rates would be considered in designing flight path and system options. HR needs to confirm the timing and how this will be factored in. Designing in noise abatement procedures is vital to communities for both departures and arrivals and should be part of modernisation	At this early stage of the design process, we have made an assumption that Continuous Climb Operations & Continuous Descent Operations will be possible to/from an altitude of around 9000 feet. This will become much clearer as designs for Heathrow and for other FASI sponsors mature. Additionally, there is technical work (which NATS is currently leading) to be completed to facilitate CCO & CDO through the Transition altitude. Average climb rates for 2019 are being used in the initial analysis of tracks to inform our comprehensive list of options. Further detail around climb gradients will form a major part of the design work in Stage 3 as we develop and assess system options. The work undertaken by To70 will also be considered at Stage 3, together with any other relevant analysis.
TAG7	**Design Principles** HR was advised that DPs referred on slides 17 and 18 (which were based on notional cones and numbers of people) conflicted with ANG17, which requires the avoidance and minimisation of significant adverse impacts (assessed by health and wellbeing effects).	The need to design airspace in accordance with the Government's Air Navigation Guidance is covered by Design Principle 2. The other design principles address other issues raised by our stakeholders and CAP1616 recognises that some of the principles may contradict one another.
TAG8	**Option Appraisal and metrics** • The deficiencies of SoNA14 and webTAG were discussed. ICAO advises that only approx. One third of aviation noise impact is attributable to overall average noise metrics. This needs to be addressed – along with WHO guidance – in the forthcoming reviews of SoNA, LOAEL and Night Noise.	We recognise community groups have some concerns regarding SoNA, comparisons with WHO, and the setting of LOAELs. These are issues for Government and whilst these remain Government Policy, Heathrow needs to take account of them in this ACP.

	• HR needs to confirm how updated SoNA and LOAEL advice will be applied in the flight path option appraisal process. It is clear that adverse impacts occur at levels below 51dBLeq. • Communities advised that notwithstanding CAP1616 reporting requirements, average metrics (whether Leq or SEL) do not reflect annoyance. • Communities proposed the use of noise event N>60/65/70 and 70 dB Lmax contours and single mode metrics reflecting the impacts when communities were actually overflown (by day and hourly equivalent) making explicit assumed respite and time of day assumptions. Change diagrams based on single mode events should be provided. Although these metrics are required as a minimum it is not clear if even these measures pick up all the impacts of concentration as no research has been done in this area. • HR should use 'gate analysis comparisons' (employed in previous work by PA Knowledge and Anderson) to explain and illustrate the changes that will be caused by concentration along with associated noise modelling. • It is likely that the loudness and sound energy across a dispersed and concentrated flight path needs to be considered to understand changes and increased annoyance. These factors are concentrated beneath a plane so effects will be most severe under the centre of a flight path, more so if it is concentrated. As loudness and sound energy is logarithmic in nature these effects are not taken account of by looking at the edges of a SEL contour as suggested at 70dB for a single event (or around 60dB LAmax). In fact, by looking at the edges they are more likely to hide real impacts of concentration at the centre. • All metrics being proposed are static. Whereas change (whether experienced by newly affected communities or residential areas who are more intensely overflown) is known to increase annoyance over many years. Average LAeq are not sensitive to describe these affects (e.g., Andersen report on PBN trials). A number of the issues identified are summarised in the following diagram [see diagram within email below]	We will look to use NX metrics and event contours where appropriate to help articulate particular impacts from airspace options. We plan to share our approach to using these metrics and other potential tools for comparison during Stage 2. We are using the 70dB contour to help assemble our options, but not to appraise them. We will be using other metrics to identify the consequences of concentration caused by PBN. We are also investigating options and feasibility for dispersal of traffic.
TAG_9	If planes are required to hold level at 6000ft under stacks then thrust levels are reduced so	See response to TAG_6

	will actually reduce noise levels. We had a quick look at this when To70 was helping communities and this shows planes can fly producing less noise while under stacks	
TAG_10	I thought it would be useful to run x-plane – using a Cobham post code. The results are quite interesting; This shows that many planes do not even reach 6000ft by this stage in the flight path. In fact, many heavies and super heavies are still climbing and will be noisy. On this basis it seems likely complaints, if they are due to departures, will be more due to concentration and noisy heavies not achieving 6000ft at this stage (in addition to other factors such as time of day). Does this make sense or do you have different views? My concern is that airspace modernisation - by avoiding holds under stacks - will not produce any noise benefit in this respect, other factors are more important (concentration, height, time of day, respite etc). Of cause a detailed analysis may show complaints are also linked to arrivals noise (from stacks) but this could be addressed by exiting the stacks at a higher altitude. It feels worthwhile to look at the noise complaints under stacks in more detail, if you have this information already it would be good if you could share this.	Future mechanisms for arrivals, including the use of stacks/holds, are the responsibility of NATS and are not currently known. We anticipate, as a minimum, the base level of any future arrival mechanism will be increased to a higher altitude than today. The factors and impacts associated with corresponding departing traffic will also be considered as part of this work.
RHC1	We look forward to receiving Heathrow's draft Plan for Stage 2/Engagement Strategy as soon as possible. We have seen a summary timetable but we believe a comprehensive Plan is required, in which a grid sets out the gathering of evidence and the decisions, their inter-relationship and critical-path timing.	We will continue to share regular updates on our stakeholder engagement plans for this ACP. We found our workshop on Methods & Metrics to be valuable and we will continue to offer opportunities for technical engagement where appropriate. We will also include a body of evidence for decisions taken on the ACP at each CAA Gateway, and this will be available on the CAA's Airspace Change Portal.
RHC2	It would help to extend the grid to the 'Full Appraisal' in Stage 3a, ahead of the Public Consultation and to include a Needs analysis in the form of a 'Do-Nothing' scenario and an upfront Project Scoping Study to establish the potential costs and benefits from modernisation.	Our Stage 3 engagement plan and proposed timeline will be shared with you when available, but we need to confirm the process for Stage 3 public consultations with surrounding airports before we can provide a more detailed longer-

		term timeline. This is being coordinated by ACOG through their Masterplan. The costs and benefits of Airspace Modernisation across the UK are set out in the Government's Airspace Modernisation Strategy. Heathrow's Statement of Need sets out our rationale for the project. We are required to modernise our airspace so "do nothing" is not a viable option. However, in accordance with CAP1616, we will compare airspace design options with a 2019 baseline to show the impacts of the proposed changes at Heathrow.
RHC3	Communities around Heathrow approach Airspace Modernisation with great concern. We already experience very significant adverse health impacts from noise and air pollution from the airport's operations (increasingly so with incremental concentration of flight paths and lower flying). We believe there is a very real possibility of conditions worsening significantly for many communities around Heathrow and the wider area as a result of this process and we seek to engage with Heathrow in avoiding environmental harm. We would like to engage constructively in a process that is transparent, open (i.e. not pre-determined), is evidence based, with time allowed for our consideration and with our contribution being given due consideration by Heathrow. We trust that Heathrow will be open to our raising concerns and differences (both residual and new) during option development and evaluation and that we can work together constructively through Stage 2.	Heathrow is keen to engage constructively with interested stakeholder representatives throughout the airspace design process. We have developed a comprehensive programme of engagement, including the recent Methods & Metrics workshop which was set up to ensure constructive and collaborative engagement with our most technically-minded community stakeholders. We have also set up a dedicated email address (airspace@heathrow.com) for stakeholders to share feedback, suggestions and concerns with us.
RHC4	The CAA's CAP 1616 Guidance (CAP 1616) and the DfT's Air Navigation Guidance 17 (ANG 17), et al, encompass issues that are essential to the Plan and Engagement Process. Communities have collectively expressed concerns regarding both the Design Principles and the initial Engagement Process leading up to the Design Principles submission to the CAA in Stage 1. These concerns are significant because some of the Design Principles are capable of different interpretation and inherent conflicts, which	Our 12 design principles for airspace modernisation were developed to address the varied objectives and priorities of our broad range of stakeholders. CAP1616 recognises that some of the principles may contradict with one another, and at Stage 2A we are developing a comprehensive list of options to meet each of the varied design principles. Later in

	could impact on how they will be applied during Stage 2 of option development. (The Communities' letter of 24 January 2022 sets out these concerns). In places, several relevant policies and guidelines overlap, which raises issues of primacy. Also, roles and responsibilities for the evidence and decisions sometimes overlap. We would welcome assistance from Heathrow in mapping the overlaps so that we are better able to engage with the CAA, DfT, NATS and ACOG, as well as with Heathrow. This should also help identify gaps in policies and guidelines and ownership of the decisions. Having regard to this, we would welcome responses from Heathrow on the Stage 2 Plan and Engagement Process.	Stage 2 we will undertake a Design Principle Evaluation and we will engage with key stakeholders at this point. We will be explicit about how the design principles have been interpreted and the metrics we have used to assess design options against them. The full results of the Design Principle Evaluation will be shared on the CAA's Airspace Change Portal and there will be an opportunity for interested stakeholders to give feedback. Design principles 1-5 have primacy over the other principles since these are requirements that our airspace design "must" meet, including all relevant policy. We will seek to develop options that meet all of the design principles as far as possible.
RHC5	We appreciate that Heathrow has already provided some material to the CAA on the Need for airspace modernisation around Heathrow, including at Stage 1a of CAP 1616, as has the Airspace Change Organising Group (ACOG) in its UK Airspace Modernisation Masterplan. However, at the current stage we would like a greater understanding of the existing problems that modernisation may help to solve and the opportunities for improvement. Heathrow's letter of 14 January 2022 to the CNG states 'There would be a separate process required if Heathrow were to introduce mixed mode or to increase capacity above 480,000 flights (ATMs) per year.' Can Heathrow therefore share information (based on the no expansion scenario) on the following specific and wider issues, for example: i. What are the projections of lost time and cost due to lack of punctuality and resilience? ii. To what extent do existing flight paths deviate from operationally efficient paths from start to finish? iii. What specific conflicts and constraints are there with flights from other airports, General Aviation and new entrants such as drones and air taxis?	Heathrow is introducing airspace modernisation in line with Government Policy and the primary objective of this ACP is to meet our commitments to the Airspace Modernisation Strategy (AMS). We recognise the benefits set out in the AMS and we are required to undertake this ACP as part of our commitment to the AMS. We have not therefore undertaken our own assessment of specific benefits to Heathrow at this stage. We will assess airspace design options against a 2019 baseline at the Initial Options Appraisal. Where possible we will share information on how the potential design options compare to today's operation from an operational perspective as well as from community and environmental perspectives.

	iv. What are the issues with Air Traffic Control and how can technology help? v. What are the opportunities for noise, air pollution and CO2 emission reductions that could be delivered by airspace change at Heathrow? Practically, it would assist to have these issues expressed in the context of a Base Year (say 2019) and a 'Do-Nothing' (Baseline) scenario.	
RHC6	We assume that Heathrow will return to pre-covid numbers of flights which were near to the planning limit of 480,000 ATMs a year. The scheduling of these flights varies according to the summer and winter seasons and time of day. In responding to point (i) above on resilience, it would help to understand what airspace headroom capacity there is above the scheduled usage (a) for resilience and (b) for additional flights. Also, it would be helpful to see the projections for passenger numbers in the light of trends for larger aircraft and higher load factors.	Future traffic forecasts will be shared at public consultation at Stage 3 and will inform the assessment of impacts of the proposed airspace change. Forecasts will take account of anticipated technological change as well as trends in aircraft types and passenger load factors.
RHC7	Can Heathrow assist in seeking an update to NATS' (2017) estimated UK Need in its feasibility study supporting the Airspace Modernisation Strategy. We are concerned that based on an average 2.0% pa demand growth by UK aviation this is now significantly overstated compared to the Climate Change Committee's 6th Carbon Budget, which in turn leads to a significantly overstated 'Do-Nothing' scenario.	We are investigating this and will come back to you in due course.
RHC8	We also believe a normal requirement of any option appraisal process, would be the establishment at the outset of targets and a framework for evaluating the potential costs and benefits, measured against the 'Do-Nothing' scenario (such a scoping study should reflect the update referred to in para 12 above). We realise final conclusions and decisions can only be arrived at the end of the design process when flight paths have been finalised, but this does not obviate the need for an upfront project scoping study. If this is to be left to the 'Initial Appraisal' at the end of Stage 2 or the 'Full Appraisal' in Stage 3, it will be far too late for meaningful community engagement. We believe that as part of an outline business case it is essential to understand the range of cost-benefit estimates that Heathrow expect as outcomes of modernisation, as this will be fundamental to the identification and	Heathrow is introducing airspace modernisation in line with Government Policy and the primary objective of this ACP is to meet our commitments to the Airspace Modernisation Strategy (AMS). We recognise the benefits set out in the AMS but, given we are required to undertake this ACP, we have not undertaken our own assessment of specific costs or benefits to Heathrow. All options will be compared against a 2019 baseline at the Initial Options Appraisal stage. The public consultation at Stage 3 is intended to allow for meaningful community engagement on the proposed flight path options and

	assessment of options. The sharing of extant or newly prepared cost-benefit estimates will be invaluable to all stakeholders so that they can understand better how these expectations inform the modelling and other processes needed to develop modernisation proposals.	the relative costs and benefits of them.
RHC9	As part of the Scoping Study can Heathrow also assist in reconciling and co-ordinating ACOG's Airspace Modernisation Masterplan and Heathrow's Business Plan that include Heathrow expansion with the Heathrow's Airspace Change Proposal that excludes expansion? The process of integration with the ACOG Masterplan is not clear at the moment and we would welcome an early discussion on the subject. If Heathrow's proposal includes adding airspace capacity for resilience or potentially additional flights (notwithstanding the proposal is based on usage by 480,000 ATMs a year) it would help for these capacity changes to be identified. Also, we are not clear whether it is Heathrow's intention to follow the recommendation in the policies for the 6th Carbon Budget that 'there should be no net expansion of UK airport capacity unless the sector is assessed as being on track to sufficiently outperform a net emissions trajectory that is compatible with achieving Net Zero'. Can Heathrow explain their position on this, please.	This airspace modernisation ACP will propose a new airspace design for the current cap of 480,000 ATMs. Any plans to increase the ATM cap at Heathrow would require planning permission via a separate process. A lot has happened since we were last working on Expansion, however, we still have the policy framework of the ANPS in place. It's been a challenging couple of years for the business with the pandemic, so we are currently going through a process to make sure that we've got everything lined up before we move forward again. The pandemic has demonstrated that there is significant pent-up demand from passengers and new airlines to operate out of Heathrow. Meeting that demand at the UK's hub airport will be essential to a country that has global and levelling up ambitions. This must be achieved within strict environmental limits and the industry is committed to decarbonisation. We appreciate uncertainty about Heathrow expansion is difficult for the communities around the airport and we will keep local communities informed and engaged as and when any plans change.
RHC10	In a project of this scale and impact it is fundamental that the appraisal and project decisions are supported by a robust evidence base. We believe an early audit of the evidence needed to make rational design decisions is essential and that steps are then taken to address knowledge gaps in a timely manner so as to properly feed into the relevant decisions.	Where possible we will consider each of the matters raised here and will undertake sensitivity tests where appropriate. We recognise community groups have some concerns regarding SoNA and comparisons with WHO. However, these are issues for

	In particular, the following will be essential to inform accurate flight path appraisals: i. A new social survey of day and night noise, to remedy the acknowledged deficiencies of the previous SoNA survey. ii. A decision on the application of WHO Guidance values on noise and/or the rationale behind the choice of other metrics or thresholds. iii. Impact evidence on PBN use (in the light of Heathrow's 2014 PBN trials, London City Airport and US experience) and related solutions for the inherent concentration of noise impact. iv. Evidence on the mitigation of concentrated noise by use of multiple flight paths and/or respite. v. Up-to-date air pollution evidence (NOX and particulates) of the impact of the proposed changes, as increasingly the harm on peoples' health and life expectancy is shown to be more serious than previously thought. vi. Current population density and projected growth across the Heathrow Study Area. vii. Location of noise sensitive hospitals, schools and parks. viii. Assumptions regarding potential aviation fleet change (and the economic, operational and environmental consequences) and its timing. ix. Evidence on the reduction of CO2 and timely pathway to Net Zero.	Government and whilst these remain Government Policy, Heathrow needs to take account of them in this ACP.
RHC11	We would like to understand how uncertainty and risk and sensitivity analysis will be addressed and factored into the project appraisal and decisions, and what risk assessment, management and mitigation steps Heathrow might take. We note that in the US the AM 'NextGen' project has failed to deliver the projected benefits as well as causing very adverse environmental impacts on some communities and it will be important to understand how these outcomes will be avoided in the case of Heathrow.	As part of the CAA's airspace change process the CAA will conduct a post-implementation review (PIR), usually 12 months after implementation. The purpose of the review is to evaluate whether the anticipated impacts and benefits in the original proposal and published decision are as expected. Where there are differences, the review would identify the reasons for these and any steps required to be taken. The PIR is intended to give confidence to local communities that the airspace change will not deliver unanticipated impacts.
RHC12	Heathrow will need to employ design tools in its project decisions and appraisal, such as the ANCON, AEDT and INM noise models and the	We recognise that some of our community stakeholders are highly engaged and technically-minded

	government's TAG transport model (presumably updated to reflect the latest evidence). We would welcome early engagement with Heathrow on the use of these tools and models and the decision criteria, as well as the use of Environment and Economic Impact Assessments. We would like to understand what factors can be controlled by Heathrow and those that cannot, and which ones can be quantified and monetised and those where decisions will need to be based on qualitative assessment. We suggest that the Eurocontrol Standard Inputs for Economic Analyses, Edition 9.0, December 2020 (and updates and the Aviation Intelligence portal) could be a useful data sources for modelling.	and we are keen to work collaboratively with you. Our recent Methods & Metrics workshop was set up to initiate constructive engagement on the approach we will take to Stage 2 of the ACP and further technical workshops will be held if appropriate. Our intention at Stage 2 is to use a model developed for AEDT. This model will be the subject of a validation exercise in line with CAA CAP2091 guidance which sets out the parameters and describes the various inputs and their origin. In addition to the validation exercise, we will undertake comparative work with the ANCON model. This work will be reported at the end of Stage 2 to establish relative uncertainty in the modelling at this stage. The outputs from the modelling will be fed into the Government's TAG models.
RHC13	**Generating options.** We would like to continue the process started with the 5 July workshop of understanding how flight paths will be modelled in terms of lateral, vertical and time descriptors (4D) and how they will be operated in future in terms of frequency of flights, aircraft types and passenger loads and passenger kms including periods of respite. We seek to understand the efficiency rating and the noise, air pollution and CO2 emissions and the environmental impact of each flight path option as well for the system as a whole.	Where available, this information will be shared at either Stage 2 or at Stage 3 public consultation, in accordance with the CAP1616 process. We will share more detailed technical information, and seek feedback on it, at a future Methods & Metrics session if appropriate.
RHC14	**Short-listing options.** We would like to understand the process of elimination of flight paths in short listing and the choice of a final set of flight paths and how the options will be assessed against the Design Principles and Policies. It will be important to show how ANG 17 has been applied in relation to noise, altitude-based priorities, CO2, and air pollution and to other factors while ensuring safety. It will be important to extend the population numbers affected to the health impacts and to assess the impact of PBN and concentration versus dispersion.	This information will be presented when we engage with you on the Initial Options Appraisal during Stage 2 engagement sessions.

RHC15	**Fairness.** We would anticipate the option design process to be one of re-allocating legacy flight paths to improve efficiency and environmental impact. Fairness will be an important consideration and we hope the impact of change (recognised by ICAO) can be addressed.	"Fairness" is subjective and previous engagement on airspace topics has clearly demonstrated that one person's idea of a "fair" airspace design can be very different to another person's view. We are not aware of an ICAO position on "impact of change" so please could you share any source with us.
RHC16	**On-going proposals by communities and others.** Over time a number of proposals have been made to reduce noise and air pollution by the CNGs, Heathrow and others - for example: take-off procedures, reducing night flights and solutions for particular noise hot spots. We would like to see how these improvements and ICAO's Balanced Approach have been incorporated in the Airspace Change Proposal and the Stage 2 Plan.	ICAO's balanced approach is considered in the development of our Noise Action Plan, which is reviewed every 5 years. Our ACP will need to deliver outcomes that align with our Noise Action Plan.
RHC17	To help ensure the engagement process for Stage 2 is robust we would welcome assurances from Heathrow regarding the following: i. Timely Information. Heathrow should circulate reports an appropriate and reasonable period ahead of meetings to discuss the documents and well ahead of deadlines for community responses. ii. Hierarchy of decisions. As part of a grid for the Stage 2 Plan we wish to understand the hierarchy of decisions which influence route options and what criteria and evidence underpins them. iii. Stakeholder Input. We also wish to understand how stakeholder input will be used and what genuine influence it may have in the formation of the new airspace design. We seek to avoid pre-determined decisions. iv. Consultations. When Heathrow gathers evidence from consultations and focus groups we would like to be advised how these groups have been chosen, what briefing material has been provided and have access to the response data, where necessary in redacted or statistical form. Differences in interpretation may arise but it is important for Heathrow, ourselves and others to understand where we differ. v. Views of other Stakeholders. Clearly, there are other stakeholders and it is appreciated they	Our plans for engagement have been developed to ensure we share information with, and collect feedback from, stakeholders at key points throughout the airspace change process. Our engagement plans go beyond the requirements of the CAP1616 process to include opportunities for more collaborative technical discussions with our most highly engaged community representatives, such as at the recent Methods & Metrics workshop.

	may have different views to ourselves; it will be important to us to understand these and how they have influenced the design outcomes. vi. Monitoring the Plan. It will be important for communities to engage with Heathrow as the Stage 2 Plan progresses and for there to be the opportunity to identify gaps in the process and engagement and the remedial action needed to ensure the process and engagement are working to Plan.	

RE: Methods and Metrics workshop

DD - Airspace <airspace@heathrow.com>

Wed 02/11/2022 16:43

To: DD - Airspace <airspace@heathrow.com>

Cc: [redacted]

Bcc: [redacted]

1 attachments (599 KB)

TAG_Heathrow Airspace Modernisation - Notes arising from 5 July 22 workshop (final) copy.pdf;

Dear All,

Teddington Action Group have asked me to forward you their post-Methods & Metrics workshop submission in its original format. The content of this document was included at the bottom of the table in the “Further Stakeholder Feedback” document but it is attached in its original format.

Many thanks,

[redacted]

Re: Methods and Metrics workshop

[redacted]

Fri 04/11/2022 10:27

To: DD - Airspace <airspace@heathrow.com>

Cc: [redacted]

2 attachments (2 MB)

Heathrow Airspace Modernisation - Notes arising from 5 July 22 workshop - Elaboration points - 4 November 2022.docx;
Heathrow Airspace Modernisation - Notes arising from 5 July 22 workshop - Elaboration points - 4 November 2022.pdf;

Dear [redacted]

Thank you for circulating TAG's submission in its original format to DD Airspace members (we assume this includes the attendees of the 5 July workshop).

As agreed we have produced a note of elaboration issues based on our original document and this is attached.

For ease of future discussions (and in the interests of brevity) we suggest grouping the points together into key subject areas. We hope you find this useful.

- **status and interpretation of ANG 17** altitude based priorities and bases of assessment of flight path options (including potential conflict with DPs)
- the **absence of a robust evidence base** in relation to health and annoyance, in particular in the light of the review of SoNA and LOAEL (as well as the conclusion of the SoNA night consultation), and how this will be factored within the AM programme
- the **need for credible, transparent and accepted metrics and thresholds** in order to assess different flight path options on a meaningful basis - also how the known shortcomings of webTAG/TAG can be addressed - this includes establishment of the Base Case.
- an **absence of research on the adverse outcomes associated with change and highly concentrated flight paths** - based on international experience and HR's 2014 PBN trials and how these will be avoided by Heathrow
- how **respite, increased flight heights and flight management strategies** (managed dispersion?) will/can be applied in practice to achieve an optimal outcome
- **governance**, responsibilities, duties of care and option assessment framework generally

We would be happy to meet with the Heathrow team and if it would be helpful other communities to run through the above - a written response to the elaboration points would also be much appreciated.

With kind regards

[redacted] and [redacted]
(on behalf of TAG)

Heathrow Airspace Modernisation

Methods and Metrics workshop – 5 July 2022

Elaboration points – 4 November 2022

Introduction

This document sets out a record of elaboration issues which we consider HR has not provided an adequate response to within its composite document circulated on 19 October.

These areas are of key concern as it cannot be reasonable to progress flight path design development, and option assessment in the absence of a reliable and accepted evidence base.

Whilst a number of HR's initial responses were deflected to the DfT, the CAA and ACOG in the composite document, it is important that the airport, in its capacity as option generator, sets out its own views on these matters, which should be shared with communities and other stakeholders. The elaboration issues referred to in this note have been raised with HR at numerous meetings of the Community Noise Forum over a number of years. On this basis it is expected that the airport should be able to respond in its own right at this stage of the airspace redesign process. If necessary, in order to achieve common ground, HR should highlight unresolved issues to the DfT, CAA and ACOG and arrange for a meeting between these organisations and representatives of Heathrow communities, as they will have a material impact on public health and wellbeing for millions living within the airport's noise footprint.

Heathrow is situated uniquely as a hub airport in the middle of densely populated and long established residential areas. It already accounts for a third of all recognised aviation noise impacts across Europe. Given its role as principal applicant for its flight paths, Heathrow must take responsibility for the outcomes of all changes it promotes with a duty of care concerning matters that have implications for public health and wellbeing.

Against this background HR should clarify its position in relation to the elaboration points highlighted in red in the annotated document below.

Methods and Metrics workshop

TAG Community Feedback

Summary of major points arising

- The Design Principles (DP) and the proposed approach in some cases conflict with each other and ANG 17. It was recognised there is an absence of a credible health and annoyance impact evidence base. Of overriding importance, the DPs and resulting approach do not address the key concentration issue. Substantive point not addressed in HR's response. ANG sets out clear altitude-based priorities and the need for impacts to be assessed by reference to health. Unfortunately, there is an absence of a current and robust evidence base. HR's response recognises that PBN can lead to extreme concentration of flight paths but has not established the health and annoyance impact of these, despite knowing that many very highly populated residential communities will be overflown within its hinterland. This issue has been drawn to the attention of the HCNF on numerous occasions, with extensive reference to adverse international experience as well as its own 2014 PBN trials (which had to be abandoned early in the face of widespread public protest).

- The Heathrow (HR) flight path design team recognised that concentration using PBN would have significant adverse effects, which based on international experience will lead to blighted neighbourhoods. Whilst previously HR has commissioned research relating to the comparative process of airspace change, successful solutions to concentration over residential areas have not been identified (nor addressed so far). Does HR agree the premise that significant adverse impacts are likely to arise from highly concentrated flight paths (including blighted areas)? What active steps are being taken to prevent these?
- The HR team considered managed dispersion, based on previous flight path patterns, would not be achievable under PBN. Does HR agree with this understanding of what was said at the meeting concerning managed dispersion? They did not see ways a limited number of highly concentrated routes could be avoided using PBN and recognised this would cause significant effects in the crowded airspace and high-density population around Heathrow airport. Does HR disagree that this statement reflects the discussion at the meeting?
- Whilst the HR team was considering the potential to mitigate the impact of PBN through respite they acknowledged this had severe limitations due to airspace capacity constraints and given Heathrow's location in the middle of very highly populated areas. Again, does HR disagree with this understanding of what was said at the meeting regarding constraints?
- HR airspace design was not addressing the reduction of noise impacts on the ground, nor was it taking account of internationally recognised change impacts as metrics based solely on a static survey were being applied. It was noted ICAO advised the use of overall average LAeq metrics only accounted for one third of aviation noise impacts. Not addressed in HR's comments. Does HR disagree with the above? How will alternative metrics be factored into decision making and option appraisal under CAA CAP guidance?
- Airspace redesign seems to be an exercise to investigate lower airmile routes and potentially at a cost of causing very significant adverse impacts over the high-density populations such as those around Heathrow. HR does not comment – does HR accept unequivocally the primacy and constraints set by ANG 17 regarding altitude priorities and health impacts?

Heathrow Business Case

- HR confirmed that this ACP assumes 480,000 ATMs pa. Communities noted this conflicts with assumptions being used by the DfT and ACOG.
- DfT assumptions also conflict with CCC limitations on UK aviation growth. What is HR's position on this and how will this issue be resolved?

Noise

- No study has been undertaken in relation to the environmental/health outcomes of implementing PBN/NextGen and the absolute priority of avoiding the creation of blighted communities living in 'noise sewers' resulting from extreme concentration. HR's agreement to consider the need for a health impact assessment in its response is appreciated, but this needs to be undertaken before flight path design development can be advanced and options appraised. When will a decision be made on undertaking a Heathrow related health impact assessment? This is despite evidence of international experience being provided to the HCNF on numerous occasions over many years.
- All parties accept that LAeq measures are not sufficient to describe annoyance. No metrics have been developed to describe impacts of concentration in the centre of PBN flight paths. HR seems to accept the point but deflects the issue back to the CAA, DfT and ACOG. Deficiencies of the current environmental noise evidence base (i.e., SoNA 14) are well known (and accepted by ICCAN). The DfT also implicitly accepts this as it has agreed the need for a new SoNA and LOAEL review. As sponsor of an ACP of the magnitude currently under consideration does HR accept that it has responsibility for its decisions and a duty of care in relation to the outcomes of its AM proposals to people living within its noise catchment?
- HR confirmed that its ACP will apply ANG policies. However as noted elsewhere this is not underpinned by a robust evidence base and further some DPs conflict with ANG17. See above

- ANG specifically defines impacts by reference to health (including annoyance) and requires altitude priorities to be applied (noise the priority up to 7000 ft with balancing with carbon only after 4000ft if a clear case can be made). HR should advise how this will be applied in practice. This point still needs to be answered as it sets parameters for the next stages of flight path design, option development and the appraisal process.
- No credible health study on the impact of aviation noise in relation to HR or the UK has been carried out. HR indicated at the meeting it was considering undertaking a local health impact study. HR should confirm whether it will be carrying out this work and if so the timing and how it will be taken forwards. This point also needs to be answered and in particular how it will be factored into the flight path design and option appraisal programme and process.
- DfT accepts that SoNA needs to be updated and is preparing for this work. This will entail a review of LOAEL, as well as a review of metrics, thresholds and presumably a recalibration of webTAG. HR should advise how this programme of work will be fed into its ACP option appraisal. In the absence of other evidence WHO Guidance should be used, in particular in relation to noise thresholds and the analysis of HR's ACP. It is understood that under CAA guidance the DfT TAG model (formerly webTAG) will not account for day noise impacts below the current LOAEL (51 dBLAeq) or at night below 45dBLAeq. As Airspace Change sponsor what is HR's view on whether noise impacts occur at lower levels (for example in the light of complaints data and its experience of the 2014 Heathrow PBN trials)? What is HR's view on the applicability of WHO guidance in the light criticisms of SoNA and the absence of an appropriate local study? If SoNA and LOAEL are to be reviewed how will the outcomes be factored into HR's flight path design development and decision-making programme?
- HR agreed that the CAA's noise cones do not correspond to noise impacts, for example in relation to larger, heavier aircraft. HR will be undertaking its own analysis based on SELs. Communities proposed additional metrics – see analysis section below. HR should clarify and confirm how it proposes to address this point.

Route usage assumptions

- HR stated 2019 would be its 'Base Case' year.
- The impacts of ACP options will be assessed against this using a 10-year projection in relation to fleet and route usage. This 10-year projection should also be applied to the 2019 base case 'do nothing' scenario.
- It is also essential that HR compares actual noise conditions experienced in 2019 and how assumptions regarding route usage and fleet transition will be factored in. HR should clarify its projection methodologies. As well as confirming projection methodologies HR should confirm the basis on which its option appraisal will include a 2019 'do nothing' Base Case scenario?
- HR should also advise what control mechanisms and community protections will apply in future concerning increased noise impact resulting from changing commercial demand patterns and new technologies. HR's response does not directly address the point about future control mechanisms and community protections – HR should advise precisely what mechanisms will apply and how communities will be protected in future regarding significant changes in route usage, operational procedures, or new technologies under the CAA's framework? If future changes in flight path usage are permissible under the governance system is there not a danger that decisions regarding this ACP will become invalid?

Respite, dispersion, and the avoidance of creating blighted communities

- The importance of avoiding the worst impacts of concentration given worldwide experience was discussed. No response has been given by HR in relation to the numerous HCNF presentations on the well documented outcomes of implementing PBN/NextGen in the US. HR's response advises it will be incorporating lessons learned from international experience into its ACP process – can it be specific when and how will this be done?
- HR should provide a statement of the technical constraints it is working within in relation to flight path design, particularly concerning noise sharing and dispersion concerning PBN. Not

covered in HR's response yet this is an essential consideration in relation to option development and appraisal.

- The treatment of important parks and open spaces, e.g., Richmond, Osterley, Windsor, Bushy and Home Parks needs to be clarified. HR's response refers to policy generalities – how in practice will this be applied to open spaces around HR used for recreation by millions of Londoners as well as visitors to the area?
- HR has committed to providing respite through easterly departure runway alternation following the expiry of the Cranford Agreement. If departure flight paths combine after a few km, then communities will only see a small benefit close in and real respite for those on departure flight paths will not be provided. A note of what the possibilities will be needs to be produced by HR. HR's response is appreciated although more information on what is achievable and how it will be incorporated in option development is needed.
- HR confirmed it was investigating respite – however this seemed to be based on an assumption that a reduction of 9 dBLAeq was needed to create meaningful respite. This is not the communities' understanding of the outcome of the Anderson study, which identified 8-9 dBLmax to be needed to achieve 'valued respite'. This may create a very different set of route design parameters and HR should confirm the basis on which they are progressing their ACP. 9 dBLAeq is a huge noise differential and self-evidently impossible to achieve in practice around HR. Andersen's confirmation of their advice on the metrics and thresholds should be supplied?
- In their study of HR's 2014 PBN trials Anderson reported that the use of LAeq metrics could not explain or differentiate the impacts of concentration. The CAA advised the HCNF that health benefits of £640m over 10 years could be achieved by splitting a single PBN route. In addition, the CAA found as part of their work for the Airports Commission that 'maximum respite' created the lowest health impacts, compared to alternative flight path strategies (such as minimise total or minimise newly affected). Is any of this paragraph disputed?

Operations

- The design team said they would use CCO/CDOs for departures and arrivals.
- The communities said this needed further definition if they were to be considered noise efficient (for example higher ascent rates for departures). The design team said they would use the 2019 averages, the implication being 'no change with modernisation'. Achieving higher altitudes is a vital component of AM highlighted by the CAA to minimise aviation's noise impact. HR should confirm its position on this – one of the claimed noise benefits of AM was the ability to depart and land at higher gradients and generally fly higher?
- Communities noted that level flight at 6000ft under stacks requires lower thrust so causing lower noise over communities. Further down the flight path (after passing under the stacks) over lowly populated countryside wider dispersion is possible once climb thrust has to be reapplied
- HR confirmed that the work undertaken by TO70 in relation to departure procedures/climb rates would be considered in designing flight path and system options. HR needs to confirm the timing and how this will be factored in. Thank you for the clarifications and confirming that the TO 70 work will be addressed in HR's option development. It would be helpful if greater detail can be provided on the timing and how the findings will be applied as part of the ACP option development.
- Designing in noise abatement procedures is vital to communities for both departures and arrivals and should be part of modernisation

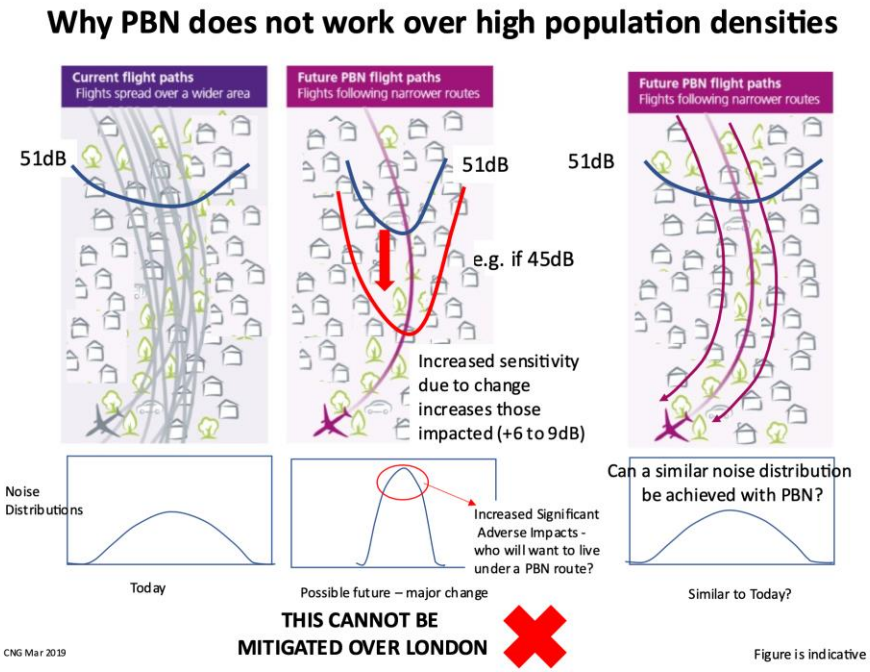
Design Principles

- HR was advised that DPs referred on slides 17 and 18 (which were based on notional cones and numbers of people) conflicted with ANG17, which requires the avoidance and minimisation of significant adverse impacts (assessed by health and wellbeing effects). Please confirm that ANG 17 altitude-based priorities and minimisation of health-based impacts will take priority over other DPs if these conflict.

Option Appraisal and metrics

- The deficiencies of SoNA14 and webTAG were discussed. ICAO advises that only approx. one third of aviation noise impact is attributable to overall average noise metrics. This needs to be addressed – along with WHO guidance – in the forthcoming reviews of SoNA, LOAEL and Night Noise. In its capacity as Airspace Change promotor has HR considered ICAO noise guidance (including change and non-acoustic factors)? Is it in agreement concerning the limitations of LAeq and the importance of including a comprehensive range of additional metrics/considerations?
- HR needs to confirm how updated SoNA and LOAEL advice will be applied in the flight path option appraisal process. It is clear that adverse impacts occur at levels below 51dBLeq. Can HR advise how the timing of the planned review of SoNA/LOAEL will be factored into the ACP flight path design programme and option appraisal?
- Communities advised that notwithstanding CAP1616 reporting requirements, average metrics (whether Leq or SEL) do not reflect annoyance. HR to comment.
- Communities proposed the use of noise event N>60/65/70 and 70 dB Lmax contours and single mode metrics reflecting the impacts when communities were actually overflown (by day and hourly equivalent) making explicit assumed respite and time of day assumptions. Change diagrams based on single mode events should be provided. Although these metrics are required as a minimum it is not clear if even these measures pick up all the impacts of concentration as no research has been done in this area. HR to comment.
- HR should use 'gate analysis comparisons' (employed in previous work by PA Knowledge and Anderson) to explain and illustrate the changes that will be caused by concentration along with associated noise modelling. Is it agreed to use gate analysis comparisons as part of the assessment of concentration impacts?
- It is likely that the loudness and sound energy across a dispersed and concentrated flight path needs to be considered to understand changes and increased annoyance. These factors are concentrated beneath a plane so effects will be most severe under the centre of a flight path, more so if it is concentrated. As loudness and sound energy is logarithmic in nature these effects are not taken account of by looking at the edges of a SEL contour as suggested at 70dB for a single event (or around 60dB LAmax). In fact, by looking at the edges they are more likely to hide real impacts of concentration at the centre.
- All metrics being proposed are static. Whereas change (whether experienced by newly affected communities or residential areas who are more intensely overflown) is known to increase annoyance over many years. Average LAeq are not sensitive to describe these affects (e.g., Andersen report on PBN trials). Does HR as Airspace Change Sponsor accept the impact of change (including increased concentration? If so, how will this be assessed and factored into the appraisal of options?

A number of the issues identified are summarised in the following diagram;



[redacted] and [redacted], TAG, 12/07/22

Appendix

TAG's original covering email following the methods and metrics workshop

Dear [redacted]

Last Tuesday's workshop covered a range of key areas going to the heart of implementation of Airspace Modernisation, noise impacts and community concerns. As discussed with you, in order that the points we raised are not lost we have produced a note, which is attached. It would be appreciated if the **Heathrow Design Team could provide a response indicating whether they disagree with the matters raised.** As part of the ongoing engagement process, we believe it would be helpful to meet again to explore further these concerns, along with other issues community groups may wish to raise.

Kind regards

[redacted]

[redacted] and [redacted], TAG, 4 November 2022

From: DD - Airspace
Sent: 22 November 2022 16:33
To: [redacted]; DD - Airspace
Cc: [redacted]
Subject: RE: Methods and Metrics workshop
Attachments: 2211_M&M Workshop_TAG elaboration_vF.pdf

Dear [redacted],

I can confirm that your previous submission to us (from 12 July) was emailed to all attendees of the Methods & Metrics workshop.

I have now attached a written response to each of the elaboration points from your note of 4 November. I hope this provides further clarity, particularly on the points in your note that will be addressed by Heathrow at later stages of the airspace change process.

Kind regards,
[redacted]

[redacted] | **Airspace Modernisation Programme**

Methods & Metrics Workshop: Further Feedback from TAG

	TAG Comment / Question:	Heathrow Response:	TAG Elaboration:	Heathrow Response:
TAG1(a)	The Design Principles (DP) and the proposed approach in some cases conflict with each other and ANG 17. It was recognised there is **an absence of a credible health and annoyance impact evidence base**. Of overriding importance, the DPs and resulting approach do not address the **key concentration issue**.	The airspace design team recognise that PBN routes can result in concentration of traffic along a route, and we are therefore looking at various ways of providing respite from noise for those overflown by the new flight paths. Potential approaches to delivering respite include runway alternation, flight path alternation and dispersion within a flight path. At this early stage of the design process, we are considering both shorter routes (to meet our design principle to reduce carbon where possible) and routes that reduce noise impact (to meet design principles 3, 6, 7, 8, 9 and 10 - which all relate to reducing noise impact).	Substantive point not addressed in HR's response. ANG sets out clear altitude-based priorities and the need for impacts to be assessed by reference to health. Unfortunately, there is an absence of a current and robust evidence base. HR's response recognises that PBN can lead to extreme concentration of flight paths but has not established the health and annoyance impact of these, despite knowing that many very highly populated residential communities will be overflown within its hinterland. This issue has been drawn to the attention of the HCNF on numerous occasions, with extensive reference to adverse international experience as well as its own 2014 PBN trials (which had to be abandoned early in the face of widespread public protest).	At Stage 3 consultation we will be able to share more information and detail about the impacts of the proposed routes. In terms of understanding the potential impacts of PBN, one of our options in the Comprehensive List is to deliver a PBN equivalent of today's routes. We will compare the impacts of this option ("PBN replication") to the base case so we will be able to assess the impact of introducing PBN over a given population.
(b)	The Heathrow (HR) flight path design team recognised that concentration using PBN would have significant adverse effects,		Whilst previously HR has commissioned research relating to the comparative	The airspace design team recognise that PBN routes can result in concentration of

	which based on international experience will lead to blighted neighbourhoods.		process of airspace change, successful solutions to concentration over residential areas have not been identified (nor addressed so far). Does HR agree the premise that significant adverse impacts are likely to arise from highly concentrated flight paths (including blighted areas)? What active steps are being taken to prevent these?	traffic along a route, and we are therefore looking at various ways of providing respite from noise for those overflown by the new flight paths. We set out some of the ways that relief and respite from noise could potentially be delivered at our recent CLOO Engagement Workshops (further work is needed to better understand the relative impacts, costs and benefits of these). The IOA will indicate whether any of our options may lead to an increase in *adverse impacts* and if so, we will take steps to mitigate and minimise adverse impacts in a sustainable manner.
(c)	The HR team considered managed dispersion, based on previous flight path patterns, would not be achievable under PBN.		Does HR agree with this understanding of what was said at the meeting concerning managed dispersion?	As discussed at the CLOO workshops, Heathrow is looking at the feasibility of using techniques to enable dispersion within a PBN environment, in collaboration with other airports.
(d)	They did not see ways a limited number of highly concentrated routes could be avoided using PBN and recognised this		Does HR disagree that this statement reflects the discussion at the meeting?	Heathrow recognises that some local communities are concerned about the

	would cause significant effects in the crowded airspace and high-density population around Heathrow airport.			narrower flight paths that PBN achieves. We are therefore looking at ways to mitigate the impacts of concentration, including the feasibility and impacts of methods to introduce respite and/or relief from noise for those overflown.
(e)	Whilst the HR team was considering the potential to mitigate the impact of PBN through respite they acknowledged this had severe limitations due to airspace capacity constraints and given Heathrow's location in the middle of very highly populated areas.		Again, does HR disagree with this understanding of what was said at the meeting regarding constraints?	We shared a number of potential concepts for respite at the CLOO workshops. We do not expect local population density will have an impact on our ability to deliver respite for those overflown. As discussed at the recent CLOO workshops, we are investigating a number of concepts for providing respite, and further investigation of these concepts will consider airspace capacity constraints.
(f)	HR airspace design was not addressing the reduction of noise impacts on the ground, nor was it taking account of internationally recognised change impacts as metrics based solely on a static survey were being applied. It was noted ICAO advised the use of overall average LAeq metrics only accounted for one third of aviation noise impacts.		Not addressed in HR's comments. Does HR disagree with the above? How will alternative metrics be factored into decision making and option appraisal under CAA CAP guidance?	The IOA at Stage 2B will consider metrics including N65 and N60, and overflight as well as LAeq. However, it should be noted that under current airspace noise policy, the LAeq is the primary metric for assessing adverse impacts.

(g)	Airspace redesign seems to be an exercise to investigate lower airmile routes and potentially at a cost of causing very significant adverse impacts over the high-density populations such as those around Heathrow.		HR does not comment – does HR accept unequivocally the primacy and constraints set by ANG 17 regarding altitude priorities and health impacts?	We fully understand the requirements set out in ANG to limit the adverse effects of noise, and we will also seek to address the expectations of the Airspace Modernisation Strategy including the UK's commitment to reduce aviation's contribution to CO2. Our future airspace design must be in accordance with ANG, as set out in DP2. We will investigate options to reduce track mileage (as required by DP4) and we will also investigate options to reduce impacts on local population (as required by DP6, DP7, DP8, DP9 and DP10). An assessment of the benefits and adverse impacts of all options will be undertaken as part of the Initial Options Appraisal (Stage 2) and the Full Options Appraisal (Stage 3).
TAG2	**Heathrow Business Case** HR confirmed that this ACP assumes 480,000 ATMs pa. Communities noted this conflicts with assumptions being used by the DfT and ACOG.	Our Expansion airspace change proposals are currently paused. However, the Airports National Policy Statement (ANPS) supporting a third runway at		

	DfT assumptions also conflict with CCC limitations on UK aviation growth. What is HR's position on this and how will this issue be resolved?	Heathrow remains up-to-date planning policy and we will ensure our local communities are kept informed should our plans for Expansion change. We are investigating whether assumptions used by DfT and ACOG are in conflict with Heathrow's own assumptions and will come back to you in due course.		
TAG3(a)	**Noise** No study has been undertaken in relation to the environmental/health outcomes of implementing PBN/NextGen and the absolute priority of avoiding the creation of blighted communities living in 'noise sewers' resulting from extreme concentration. This is despite evidence of international experience being provided to the HCNF on numerous occasions over many years.	We have taken note of the request for a health impact assessment, and we will consider how such an assessment could be undertaken at the various future stages of the ACP process. All relevant policy and guidance will be applied to our ACP as it becomes available. We engage frequently with CAA, DfT and ACOG to keep abreast of potential policy changes and emerging best practice. Our options are being developed and/or assessed using a range of noise metrics including SEL, LAeq, and N60/65	HR's agreement to consider the need for a health impact assessment in its response is appreciated, but this needs to be undertaken before flight path design development can be advanced and options appraised. When will a decision be made on undertaking a Heathrow related health impact assessment?	A health impact assessment can only be considered once we have a clear understanding of the impacts of an airspace design option. This will require us to have a full system option (arrivals + departures, westerlies + easterlies) which we will have at Stage 3 of the CAP1616 process. However, for the IOA at Stage 2B we are exploring whether it is possible to use annoyance and sleep disturbance calculations to help indicate potential performance of our options in terms of health impacts.
(b)	All parties accept that LAeq measures are not sufficient to describe annoyance. No		HR seems to accept the point but deflects the issue back to	We are delivering airspace modernisation at Heathrow

	metrics have been developed to describe impacts of concentration in the centre of PBN flight paths. HR confirmed that its ACP will apply ANG policies. However as noted elsewhere this is not underpinned by a robust evidence base and further some DPs conflict with ANG17.	metrics to identify potential noise impacts. We are also using overflight cones, as required by CAP1616, to identify numbers of people further from the airport who may still experience the perception of being overflown.	the CAA, DfT and ACOG. Deficiencies of the current environmental noise evidence base (i.e., SoNA 14) are well known (and accepted by ICCAN). The DfT also implicitly accepts this as it has agreed the need for a new SoNA and LOAEL review. As sponsor of an ACP of the magnitude currently under consideration does HR accept that it has responsibility for its decisions and a duty of care in relation to the outcomes of its AM proposals to people living within its noise catchment?	in accordance with the Government's Airspace Modernisation Strategy, which is co-sponsored by CAA and DfT, and coordinated across ACP Sponsors by ACOG. CAA and DfT are responsible for setting policy and guidance relating to airspace change. These policies do not rely solely upon the LAeq, and other metrics such as the N65, N60 and overflight are also used within policy as secondary metrics.
(c)	ANG specifically defines impacts by reference to health (including annoyance) and requires altitude priorities to be applied (noise the priority up to 7000 ft with balancing with carbon only after 4000ft if a clear case can be made). HR should advise how this will be applied in practice.		This point still needs to be answered as it sets parameters for the next stages of flight path design, option development and the appraisal process.	We shared our approach to the altitude-based priorities at the CLOO workshops. We have designed most flight paths to prioritise noise up to 7000ft, but we have also designed some flight paths which prioritise noise to 4000ft and then prioritise carbon from 4000-7000ft so that we can assess whether any of the options would "disproportionately increase CO2 emissions" in accordance with ANG2017. The noise and carbon impacts of each option will

				be considered further at the Design Principle Evaluation and IOA (Stage 2) and at the FOA (Stage 3).
(d)	No credible health study on the impact of aviation noise in relation to HR or the UK has been carried out. HR indicated at the meeting it was considering undertaking a local health impact study. HR should confirm whether it will be carrying out this work and if so the timing and how it will be taken forwards.		This point also needs to be answered and in particular how it will be factored into the flight path design and option appraisal programme and process.	(see TAG3(a) above)
(e)	DfT accepts that SoNA needs to be updated and is preparing for this work. This will entail a review of LOAEL, as well as a review of metrics, thresholds and presumably a recalibration of webTAG. HR should advise how this programme of work will be fed into its ACP option appraisal. In the absence of other evidence WHO Guidance should be used, in particular in relation to noise thresholds and the analysis of HR's ACP.		It is understood that under CAA guidance the DfT TAG model (formerly webTAG) will not account for day noise impacts below the current LOAEL (51 dBLAeq) or at night below 45dBLAeq. As Airspace Change sponsor what is HR's view on whether noise impacts occur at lower levels (for example in the light of complaints data and its experience of the 2014 Heathrow PBN trials)? What is HR's view on the applicability of WHO guidance in the light criticisms of SoNA and the absence of an appropriate local study? If SoNA and LOAEL are to be reviewed how will the outcomes be factored into HR's flight path design	We need to work within current policy when developing and assessing flight path options for an airspace change. If there is an update to noise policy or guidance during Stage 2 or Stage 3 of this ACP, we will seek to incorporate new policy into options appraisal work we are undertaking at that time. As discussed at the Methods & Metrics workshop, we will apply sensitivity tests where appropriate to show assessment results in metrics that are most meaningful to local communities.

			development and decision-making programme?	
(f)	HR agreed that the CAA's noise cones do not correspond to noise impacts, for example in relation to larger, heavier aircraft. HR will be undertaking its own analysis based on SELs. Communities proposed additional metrics – see analysis section below.		HR should clarify and confirm how it proposes to address this point.	The analysis which has been undertaken to date has used a combination of SEL and overflight cones. It is agreed that an overflight cone is not a complete measure of noise, but it can help identify areas which may experience the perception of aircraft noise for a relative assessment, particularly beyond the LOAEL.
TAG4(a)	**Route usage assumptions** HR stated 2019 would be its 'Base Case' year. The impacts of ACP options will be assessed against this using a 10-year projection in relation to fleet and route usage. This 10-year projection should also be applied to the 2019 base case 'do nothing' scenario. It is also essential that HR compares actual noise conditions experienced in 2019 and how assumptions regarding route usage and fleet transition will be factored in. HR should clarify its projection methodologies.	The CAA's CAP1616 guidance recognises that changes to noise impact can occur due to events outside the airport's control, such as changes to flight destinations; aircraft types used by airlines; meteorological conditions; air traffic control practices, or slot transfers or sales (paras 504-508). CAP1616 places responsibility on the airport to share information on any identified changes with local communities.	As well as confirming projection methodologies HR should confirm the basis on which its option appraisal will include a 2019 'do nothing' Base Case scenario?	All options will be compared against a Base Case year, currently planned to be 2019. The 2019 Base Case assumes 2019 traffic and the 2019 (current) airspace design. This will be based on actual track data obtained from the airport's noise and track keeping system. Our projection methodologies will be reported within our technical submissions and shared with all stakeholders. At Stage 3, CAP1616 requires us to forecast the baseline (do nothing) scenario 10 years ahead and compare it

				against the proposed new airspace design scenario.
(b)	HR should also advise what control mechanisms and community protections will apply in future concerning increased noise impact resulting from changing commercial demand patterns and new technologies.		HR's response does not directly address the point about future control mechanisms and community protections – HR should advise precisely what mechanisms will apply and how communities will be protected in future regarding significant changes in route usage, operational procedures, or new technologies under the CAA's framework? If future changes in flight path usage are permissible under the governance system is there not a danger that decisions regarding this ACP will become invalid?	Requirements for transparency around airspace use and aircraft movements are set out in CAP1616 Part 3. These are the mechanisms that CAA has put in place to protect communities from significant changes to route usage, operational procedures or new technologies.
TAG5(a)	**Respite, dispersion, and the avoidance of creating blighted communities** The importance of avoiding the worst impacts of concentration given worldwide experience was discussed. No response has been given by HR in relation to the numerous HCNF presentations on the well documented outcomes of implementing PBN/NextGen in the US.	The airspace design team are aware of lessons learned from PBN implementation in the UK and around the world, and we are incorporating these lessons into our airspace modernisation programme wherever possible. The impacts of future airspace design options on parks and open spaces will be considered in line with policy. We will also	HR's response advises it will be incorporating lessons learned from international experience into its ACP process – can it be specific when and how will this be done?	We are incorporating lessons learned from our own previous ACPs and from airspace changes around the world whenever they are applicable. Earlier this year we published the findings of an independent study into PBN Lessons Learned to help inform our approach to introducing PBN at Heathrow.

(b)	HR should provide a statement of the technical constraints it is working within in relation to flight path design, particularly concerning noise sharing and dispersion concerning PBN.	share impacts on areas of specific interest at our Stage 3 public consultation. Our airspace design will include easterly departures from our northern runway (following the expiry of the Cranford Agreement). We expect that runway alternation on easterly operations will provide greater respite for overflown communities than they receive today. We have confirmed with Anderson Acoustics that a 9dB difference in LAeq can be used to describe valued respite. We are aware of the Airports Commission's findings and of other studies that have considered health benefits of respite and respite will be a consideration of this ACP.	Not covered in HR's response yet this is an essential consideration in relation to option development and appraisal.	Our recent CLOO workshops set out our approach to investigating a variety of different concepts for noise sharing and dispersion that might be applied to flight path options.
(c)	The treatment of important parks and open spaces, e.g., Richmond, Osterley, Windsor, Bushy and Home Parks needs to be clarified.		HR's response refers to policy generalities – how in practice will this be applied to open spaces around HR used for recreation by millions of Londoners as well as visitors to the area?	Parks and open spaces will be considered at the IOA (Stage 2B) and FOA (Stage 3). We can only reference policy at this stage since we have not yet reached Stage 2B and therefore not appraised impacts of flight path options over these areas yet.
(d)	HR has committed to providing respite through easterly departure runway alternation following the expiry of the Cranford Agreement. If departure flight paths combine after a few km, then communities will only see a small benefit close in and real respite for those on departure flight paths will not be provided. A note of what the possibilities will be needs to be produced by HR.		HR's response is appreciated although more information on what is achievable and how it will be incorporated in option development is needed.	As part of the development of a comprehensive list of options, we have designed easterly departure routes from our northern runway. This, along with changes required on the ground, will enable runway alternation when on easterly operations. At our recent CLOO workshops we shared a number of concepts for providing respite, including the potential to keep departure routes from adjacent runways following different tracks for longer to

				increase the number of people who benefit from runway alternation.
(e)	HR confirmed it was investigating respite – however this seemed to be based on an assumption that a reduction of 9 dBLAeq was needed to create meaningful respite. This is not the communities' understanding of the outcome of the Anderson study, which identified 8-9 dBLmax to be needed to achieve 'valued respite'. This may create a very different set of route design parameters and HR should confirm the basis on which they are progressing their ACP.		9 dBLAeq is a huge noise differential and self-evidently impossible to achieve in practice around HR. Andersen's confirmation of their advice on the metrics and thresholds should be supplied?	The respite work being undertaken by Anderson Acoustics was paused due to the Covid pandemic. Work has since re-started and Andersons have been able to share headline findings with us. We expect the report to be shared with NACF in early 2023.
(f)	In their study of HR's 2014 PBN trials Anderson reported that the use of LAeq metrics could not explain or differentiate the impacts of concentration. The CAA advised the HCNF that health benefits of £640m over 10 years could be achieved by splitting a single PBN route. In addition, the CAA found as part of their work for the Airports Commission that 'maximum respite' created the lowest health impacts, compared to alternative flight path strategies (such as minimise total or minimise newly affected).		Is any of this paragraph disputed?	Our assessments at Stage 2B and Stage 3 will describe noise impacts using LAeq in accordance with policy. However, we plan that other metrics will also be used (such as Nx and overflight contours) to recognise and measure the wider impacts of new flight paths to local communities.
TAG6(a)	**Operations** • The design team said they would use CCO/CDOs for departures and arrivals. • The communities said this needed further definition if they were to be considered	At this early stage of the design process, we have made an assumption that Continuous Climb Operations & Continuous Descent Operations will be	HR should confirm its position on this – one of the claimed noise benefits of AM was the ability to depart and land at	At Stage 2 we are assuming that CCO and CDO will be possible to/from 9000ft. Our Stage 2 industry engagement on the CLOO

	noise efficient (for example higher ascent rates for departures). The design team said they would use the 2019 averages, the implication being 'no change with modernisation'. Achieving higher altitudes is a vital component of AM highlighted by the CAA to minimise aviation's noise impact.	possible to/from an altitude of around 9000 feet. This will become much clearer as designs for Heathrow and for other FASI sponsors mature. Additionally, there is technical work (which NATS is currently leading) to be completed to facilitate CCO & CDO through the Transition altitude. Average climb rates for 2019 are being used in the initial analysis of tracks to inform our comprehensive list of options. Further detail around climb gradients will form a major part of the design work in Stage 3 as we develop and assess system options. The work undertaken by To70 will also be considered at Stage 3, together with any other relevant analysis.	higher gradients and generally fly higher?	includes "testing" potential climb gradients with airlines. At Stage 3 we will further investigate what climb and descent rates are possible as we develop and assess system options.
(b)	Communities noted that level flight at 6000ft under stacks requires lower thrust so causing lower noise over communities. Further down the flight path (after passing under the stacks) over lowly populated countryside wider dispersion is possible once climb thrust has to be reapplied HR confirmed that the work undertaken by TO70 in relation to departure procedures/climb rates would be considered in designing flight path and system options. HR needs to confirm the timing and how this will be factored in. Designing in noise abatement procedures is vital to communities for both departures and arrivals and should be part of modernisation		Thank you for the clarifications and confirming that the TO 70 work will be addressed in HR's option development. It would be helpful if greater detail can be provided on the timing and how the findings will be applied as part of the ACP option development.	The work undertaken by To70 will also be considered at Stage 3, together with any other relevant analysis.
TAG7	**Design Principles** HR was advised that DPs referred on slides 17 and 18 (which were based on notional cones and numbers of people) conflicted with ANG17, which requires the avoidance and minimisation of significant adverse impacts (assessed by health and wellbeing effects).	The need to design airspace in accordance with the Government's Air Navigation Guidance is covered by Design Principle 2. The other design principles address other issues raised by our stakeholders and CAP1616 recognises that some	Please confirm that ANG 17 altitude-based priorities and minimisation of health-based impacts will take priority over other DPs if these conflict.	The need to design airspace in accordance with the Government's Air Navigation Guidance is covered by Design Principle 2. Design Principle 2 is a "must" principle so we will need to

		of the principles may contradict one another.		meet ANG requirements through our airspace design.
TAG8(a)	**Option Appraisal and metrics** • The deficiencies of SoNA14 and webTAG were discussed. ICAO advises that only approx. one third of aviation noise impact is attributable to overall average noise metrics. This needs to be addressed – along with WHO guidance – in the forthcoming reviews of SoNA, LOAEL and Night Noise.	We recognise community groups have some concerns regarding SoNA, comparisons with WHO, and the setting of LOAELs. These are issues for Government and whilst these remain Government Policy, Heathrow needs to take account of them in this ACP. We will look to use NX metrics and event contours where appropriate to help articulate particular impacts from airspace options. We plan to share our approach to using these metrics and other potential tools for comparison during Stage 2. We are using the 70dB contour to help assemble our options, but not to appraise them. We will be using other metrics to identify the consequences of concentration caused by PBN. We are also investigating options and feasibility for dispersal of traffic.	In its capacity as Airspace Change promotor has HR considered ICAO noise guidance (including change and non-acoustic factors)? Is it in agreement concerning the limitations of LAeq and the importance of including a comprehensive range of additional metrics/considerations?	It is acknowledged that noise exposure is just one aspect of how a person may be annoyed and that other aspects, such as non-acoustic factors, also contribute. Almost all annoyance relationships are noise exposure based, including those in WHO guidance. The development and setting of these relationships is a matter for researchers and Government. We have committed to providing more than just LAeq metrics to support appraisals and articulate the potential impacts of our options, and we will, where appropriate, prepare sensitivity tests.
(b)	• HR needs to confirm how updated SoNA and LOAEL advice will be applied in the flight path option appraisal process. It is clear that adverse impacts occur at levels below 51dBLeq.		Can HR advise how the timing of the planned review of SoNA/LOAEL will be factored into the ACP flight path design programme and option appraisal?	(see TAG3(e) above)
(c)	• Communities advised that notwithstanding CAP1616 reporting		HR to comment.	Our previous response already states that we will look to use NX metrics where

	requirements, average metrics (whether Leq or SEL) do not reflect annoyance. • Communities proposed the use of noise event N>60/65/70 and 70 dB Lmax contours and single mode metrics reflecting the impacts when communities were actually overflown (by day and hourly equivalent) making explicit assumed respite and time of day assumptions. Change diagrams based on single mode events should be provided. Although these metrics are required as a minimum it is not clear if even these measures pick up all the impacts of concentration as no research has been done in this area.			appropriate, and that we plan to use other metrics to identify the consequences of concentration caused by PBN. We currently plan that this will include changes to the numbers of people experiencing Nx events at different rates.
(d)	• HR should use 'gate analysis comparisons' (employed in previous work by PA Knowledge and Anderson) to explain and illustrate the changes that will be caused by concentration along with associated noise modelling.		Is it agreed to use gate analysis comparisons as part of the assessment of concentration impacts?	"Gate analysis" has been used previously to investigate overflight of specific geographical locations. At the Stage 3 public consultation we will seek to share information on the potential impacts across the proposed flight paths and we will consider the use of a variety of graphical tools for this purpose.
(e)	• It is likely that the loudness and sound energy across a dispersed and concentrated flight path needs to be considered to understand changes and increased annoyance. These factors are		Does HR as Airspace Change Sponsor accept the impact of change (including increased concentration? If so, how will this be assessed and factored into the appraisal of options?	Our DP9 is to "keep the number of people who experience an increase in noise…to a minimum". This DP recognises that a change to noise levels can increase

	concentrated beneath a plane so effects will be most severe under the centre of a flight path, more so if it is concentrated. As loudness and sound energy is logarithmic in nature these effects are not taken account of by looking at the edges of a SEL contour as suggested at 70dB for a single event (or around 60dB LAmax). In fact, by looking at the edges they are more likely to hide real impacts of concentration at the centre. • All metrics being proposed are static. Whereas change (whether experienced by newly affected communities or residential areas who are more intensely overflown) is known to increase annoyance over many years. Average LAeq are not sensitive to describe these affects (e.g., Andersen report on PBN trials			annoyance. We will assess how well each option performs against this DP during the Design Principle Evaluation later in Stage 2. Some indication of the impact of concentration will be considered in the IOA at Stage 2B of the CAP1616 process.

From: [redacted]
Sent: 07 December 2022 14:45
To: DD - Airspace
Cc: [redacted]

Subject: Fwd: Methods and Metrics workshop
Attachments: 2207 Heathrow MM workshop_Meeting Note_vF.pdf; 2207_M&M Workshop_further stakeholder feedback_vF.pdf

Dear [redacted],
towards the end of the FRP-HAL meeting on 23-Nov-22, we informed you that we also had significant concerns about Heathrow's responses as provided in the '2207_M&M Workshop_further stakeholder feedback_vF' record attached to your email of 19-Oct-22 (below).

We said we would write to you setting out our concerns.

FRP1 Biodiversity. Our comment, as set out at length in our email of 10-Jul-22 and as shown in the attached record, was about biodiversity metrics (metrics being a primary point of the M&M workshop). Heathrow's response was completely about Biodiversity Net Gain (BNG). It did not address any of the issues in our comment.
Heathrow's response also refers to "… *significant consideration and assessment of the baseline at Richmond Park undertaken to support the Heathrow Expansion project*". This is at odds with our consultation response at the time: 'Heathrow Airport Expansion Consultation's Preliminary Environmental Information Report (PEIR)' 12-Sep-2019.

FRP14 Air Quality. Our FRP14 comments were about DP2 metrics (CAA compliance etc.), and half of them were specifically about air quality impacts and metrics. However, the bulk of Heathrow's response is about "… *a national objective to protect vegetation and ecosystems from nitrogen oxides (NOx)*' and goes on to explain why, based on this un-referenced source, "*The NOx objective does not apply at most ecological receptors in the Heathrow study area*". This is an astonishing statement:

- it is based on an un-referenced 'national objective';
- it does not define 'the Heathrow study area';
- it appears to rule-out any assessment of the NOx effects of the CLOOs anywhere; and
- it appears to conflict with CAP1616 B12.

In any event, is irrelevant. Acid grassland and veteran trees constitute "*ecological receptors ...sensitive to pollutants*" so it follows that Richmond Park contains "*habitats [that] may be sensitive to changes in level of nutrient or acid deposition*". Therefore NOx assessment is appropriate.

Finally we note that Heathrow's responses under **FRP2, FRP11 and FRP13** refer to the scope of **Environmental Assessments** required in Stage 2B. We discussed this at length in our meeting with yourselves on 23-Nov-22, and we will address this in our Stage 2A Feedback due on 9-Dec-22. In summary, to comply with CAP1616 B8 the sponsor must carry out a proper Environmental Assessment (EA) at Stage 2B for green spaces of high environmental value

(including Richmond Park), to at least the level illustrated in the preliminary Environmental Assessment for Richmond Park (pEA) that FRP submitted on 12-Sep-2022.

Best regards,

[redacted]

Trustee
The Friends of Richmond Park

From: [redacted]
Sent: 17 December 2022 11:21
To: DD - Airspace
Cc: [redacted]
Subject: Re: Final Reminder for feedback on Heathrow's Stage 2A Engagement: Deadline this Friday

Dear [redacted]

Thank you for your email and confirming safe receipt of our CLOO responses.

I confirm receipt of your 22 November response to our elaboration points (which related to the Methods and Metrics workshop). We believe that a number of highly important points are still unresolved and therefore we included the elaboration note as an appendix to our submission for CLOO engagement purposes.

It would be helpful if you could provide a formal response to our CLOO submissions (and those of other community groups). Given the nature and importance of the engagement process, we believe it would be very beneficial to clarify misunderstandings, and establish what common ground there may be and what major points of differences exist in relation to developing flight path strategies, particularly at this point in the process.

We would be happy to meet to discuss these issues.

With kind regards and best wishes for Christmas and the New Year

[redacted] and [redacted]

On Tuesday, 13 December 2022, 17:56:42 GMT, DD - Airspace <airspace@heathrow.com> wrote:

Dear [redacted],

Thank you for your email. We have included both of your attached documents as supplementary information to your response via the feedback form. These documents will therefore be included in the stakeholder engagement evidence trail that we submit to the CAA for the Stage 2 Gateway.

Please note that we provided a written response to your elaboration points on 22 November. I have attached the email and the document that we sent you then.

Thanks,

[redacted]

From: [redacted]
Sent: 13 July 2023 17:06
To: [redacted]
Cc: DD - Airspace; [redacted]
Subject: RE: M&M Workshop

Dear [redacted],

I hope you're well. In compiling our material for the Stage 2 submission we realised that, whilst we discussed your suggested methodology for the DPE in person, we had not responded in writing.

We reviewed the electronic copy of the DP scoring and weighting spreadsheet that FRP provided. You mentioned in the workshop that this approach suggests initially scoring how well each option meets a DP (using a percentage), rather than going directly to 'Met, Partially Met, Not Met' as set out in CAP1616 Appendix E. You proposed that this might ensure the CAP1616 requirement of consistency is achieved, e.g. consistency in what it takes for 'Met' to be achieved as opposed to 'Partially Met'.

We considered the attached table when developing our approach to the Design Principle Evaluation. However, we felt that a qualitative approach to the assessment was more appropriate at this stage, as it would be difficult to allocate a numerical value to the performance of an option against a design principle in "a fair and consistent manner" (CAP1616, para 128). Our approach was also consistent with CAP1616 para D6, which states that design principles are to "be a shortlist of principles to inform the development of airspace design options and against which they can be *qualitatively* evaluated". Similarly, we did not wish to allocate any weightings (numerical or otherwise) to the design principles, beyond the fact that some are principles that Heathrow "must" deliver and some are principles that Heathrow "should" deliver through this ACP. If we were going to apply weightings to the design principles then we would have engaged stakeholders on this at Stage 1 and we feel it is more appropriate to allow policy to guide any decisions required regarding trade-offs between the various priorities that the design principles seek to address.

We appreciate your time and engagement in this ACP and look forward to working with you as we develop approaches to appraisal of the options at Stage 3.

Many thanks,
[redacted]

July 2022

Airspace Modernisation: Airspace Change Proposal

Methods & Metrics Workshop

Heathrow

Workshop Agenda

1. **Purpose of the workshop**
2. **Method:** Options Development
3. **Recap:** Design Principles
4. **Break**
5. **Metrics:** Evaluating options against the Design Principles

Heathrow

Purpose of this workshop:

- Heathrow to share our **proposed** methodology for developing, and assessing, a comprehensive list of options
- Heathrow to share the metrics we intend to use to evaluate options against the design principles
- Stakeholders to share their views on Heathrow's proposed metrics

Rules of Engagement:

- All ideas are welcome
- Heathrow will consider all suggestions, but might not be able to make commitments today
- We need to remain focussed on discussing methods and metrics relevant to Stage 2 of the ACP – other topics can be noted in the room for later consideration

Method: Preparing for Options Development

In preparation for developing the options we have flooded the entire geographical area with approx. 650,000 notional tracks for arrivals and departures.

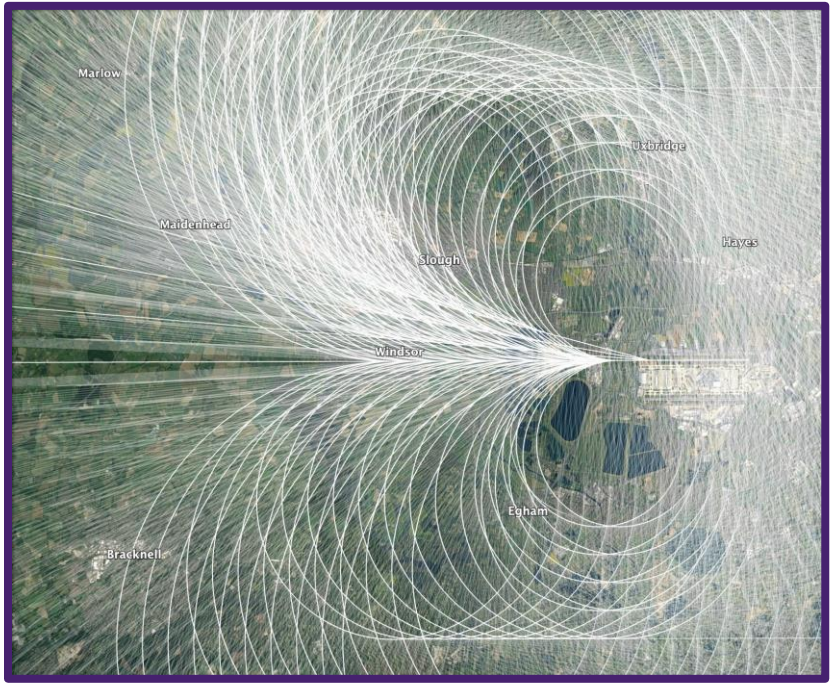
These consider existing flight paths and many, many different combinations of departure and arrivals tracks including:

- track adjustments on departure,
- earliest first turns at 0.6 nautical miles (nm) from end of runway,
- unconstrained speed turns,
- turns that would require speed constraints, and
- arrival profiles joining final approach at distances from 16nm to 3nm from touchdown.

These tracks are **not** airspace design options. They are used to generate data only, to help inform option creation, in line with the Design Principles.

For every individual track, we have generated data that will help inform options creation in accordance with the design principles.

Data alone cannot be used to generate airspace options: data will inform in conjunction with ATM knowledge.

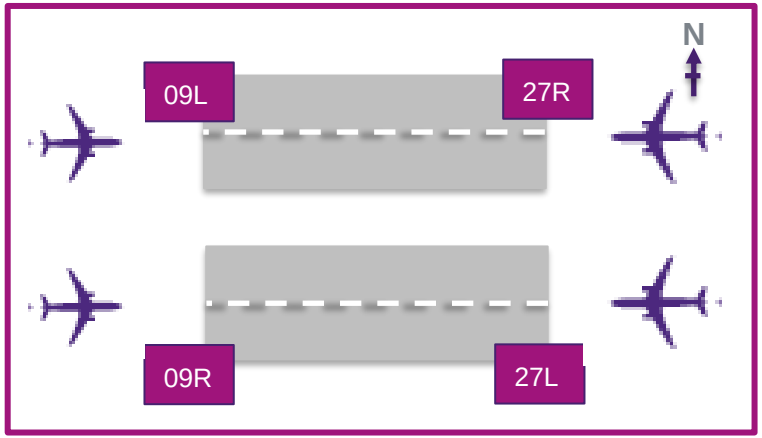


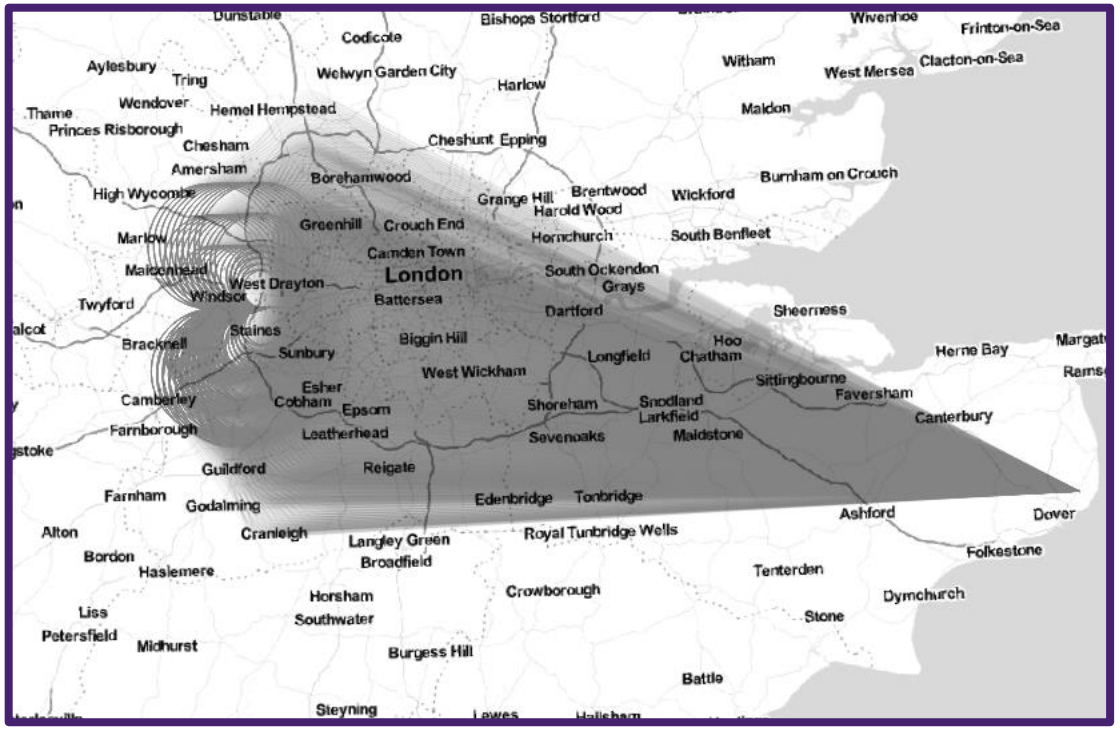
Example of some of the 27R Departure "flooding"

Method: Grouping the Tracks

We grouped all the flooded tracks into clusters which could conceivably be used to service a particular geographic direction.

The example to the right shows 8,625 different notional tracks that will be used to generate data to inform designs for westerly departures from our northern runway to Dover (runway 27R).





27R = aircraft departing the northern runway to the west

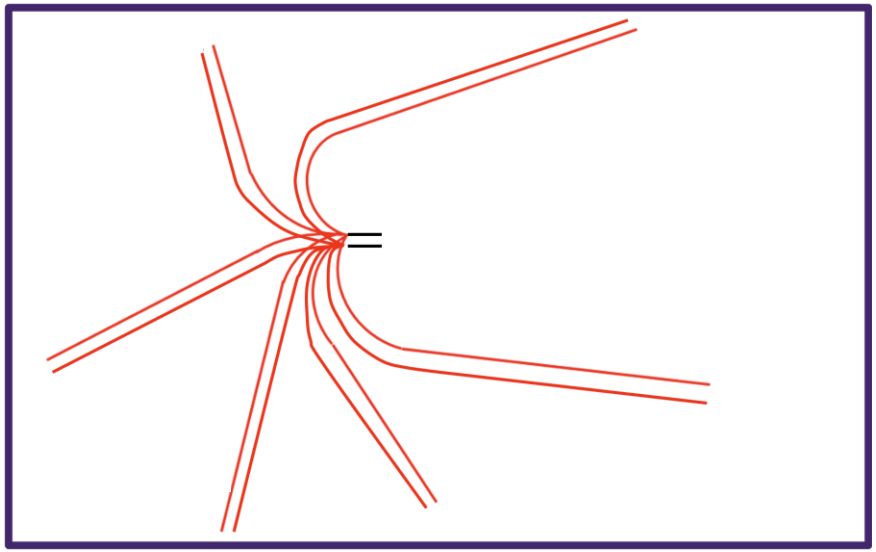
Method: Creation of Options

Options will be generated for the following groups of routes:

- **Westerly departures (27L & 27R)**
- **Westerly arrivals (27L & 27R)**
- **Easterly arrivals (09L & 09R)**
- **Easterly departures (09L & 09R)**

These are groups of routes than can safely work together. For example: A option would be a group of Westerly departure routes from 27R that can operate at the same time, and those routes could work in combination with a set of departure routes from 27L.

There wouldn't be departures off both 27R and 27L at the same time, but we would want to see how each of those route configurations perform to understand combined benefits and impacts when the runways alternate.



Westerly Departure Group Illustration (27L+27R)

Method: Developing Groups of Routes

Groups of Routes

A set of arrival OR departure flight paths that can safely operate together. Not all Groups of flight paths will work with all other Groups of flight paths. For this, they need to be combined together into System Options

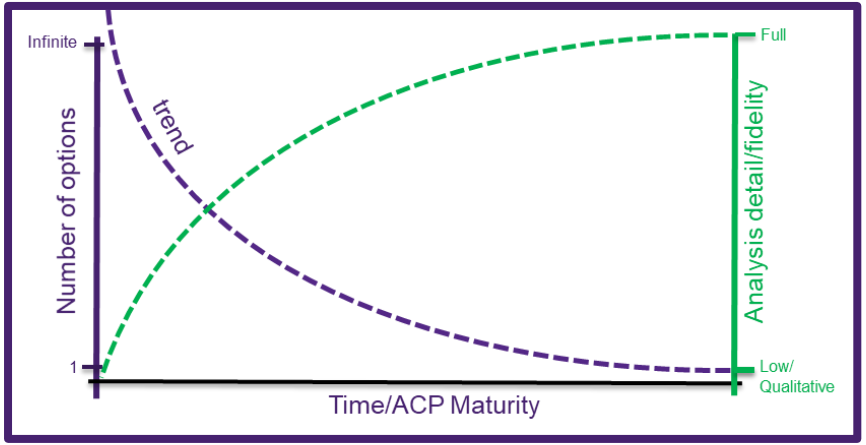
System Options

A group of Westerly arrival and departure flight paths that can safely operate together, which also work with a group of Easterly arrival and departure flight paths, These groups of flight paths together form a system

At Stage 2, we will generate groups of routes ***not*** systems.

- We don't know how many options we will generate yet, but even a relatively small number of options for each group would very quickly multiply into 1000's of system options.
- Certain metrics can only be generated once you have a system option (e.g. LOAEL contours). However, developing systems at this stage would heavily limit the number of route options we generate.

➢ Generating and evaluating **groups** of routes gives us the flexibility to consider plenty of route options at this early stage. We therefore consider many more options but in slightly less detail. This is the ethos of CAP1616 options development.



Method: Creation of Options

Once we generate options, we will share them with you (and other stakeholders) for comment.

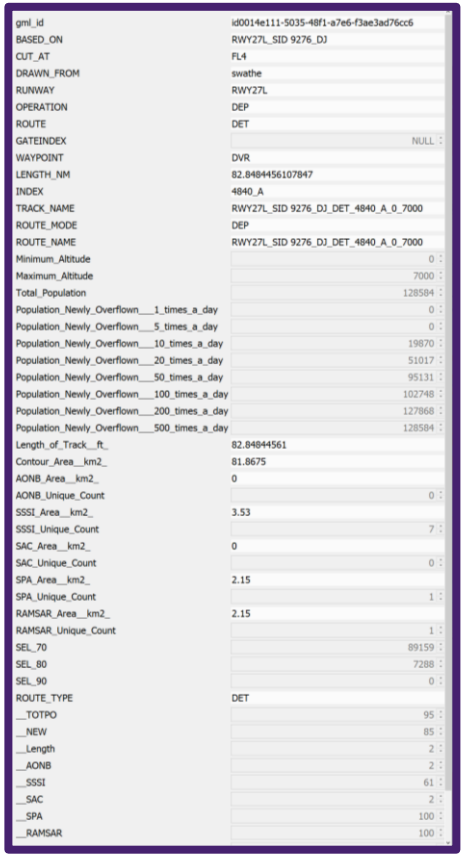
We will then evaluate each of the options against each of the Design Principles to understand the extent to which each option meets each Principle.

The evaluation against Design Principles will need to be qualitative as well as quantitative, but we will aim to use data as much as possible.

The methods of how we develop options is not the core topic for today:

- **The focus of today's discussion is to discuss the data generated and metrics used to help us assemble options and evaluate these options against the Design Principles**.

We will share the metrics we intend to use to evaluate the Design Principles and you can propose different metrics that we should use and/or generate to help inform decision making or stakeholder understanding of benefits and impacts.



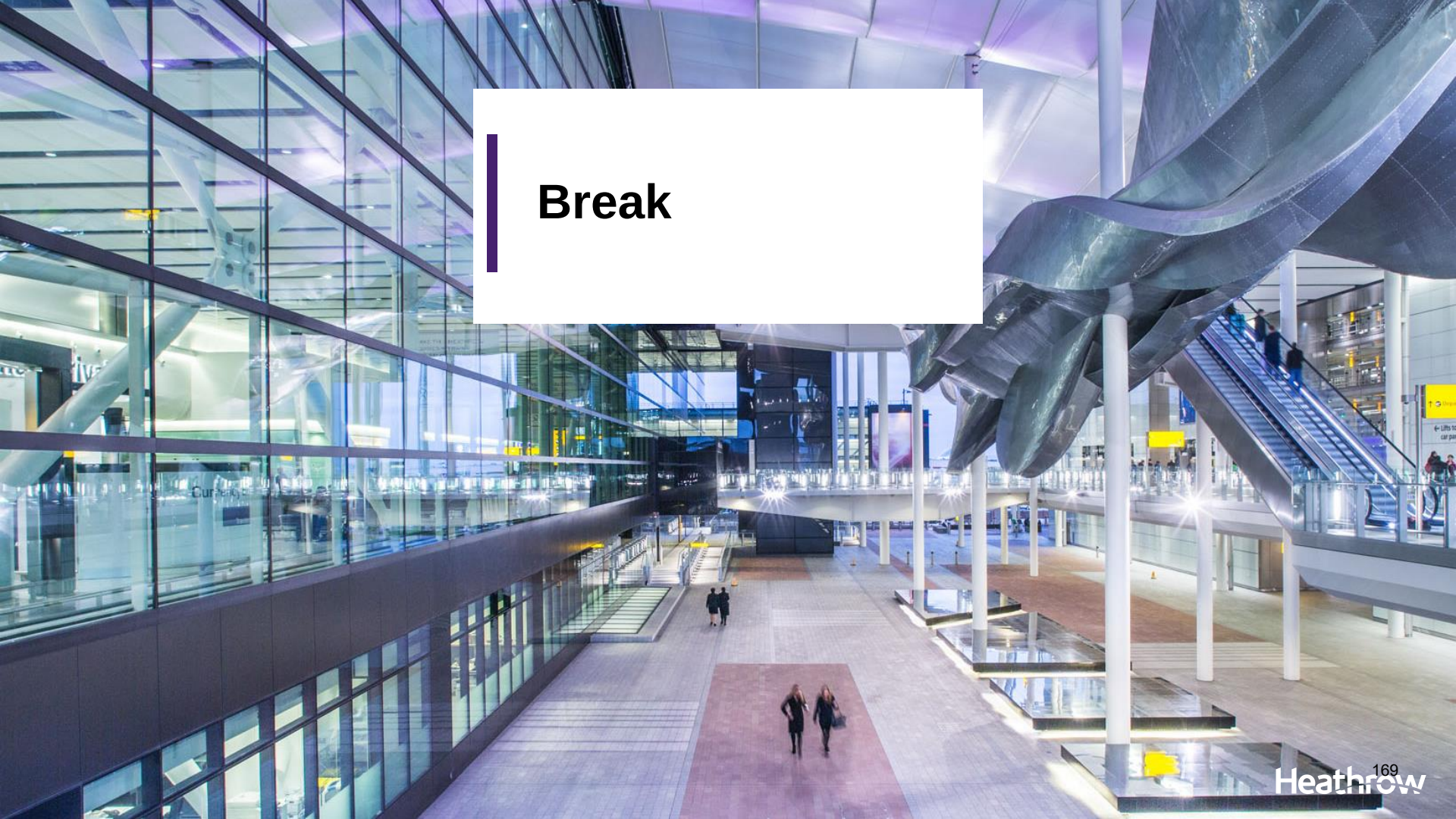
gml_id	id0014e111-5035-48f1-a7e6-f3ae3ad76cc6
BASED_ON	RWY27L_SID 9276_DJ
CUT_AT	FL4
DRAWN_FROM	swathe
RUNWAY	RWY27L
OPERATION	DEP
ROUTE	DET
GATEINDEX	NULL
WAYPOINT	DVR
LENGTH_NM	82.8484456107847
INDEX	4840_A
TRACK_NAME	RWY27L_SID 9276_DJ_DET_4840_A_0_7000
ROUTE_MODE	DEP
ROUTE_NAME	RWY27L_SID 9276_DJ_DET_4840_A_0_7000
Minimum_Altitude	0
Maximum_Altitude	7000
Total_Population	128584
Population_Newly_Overflown___1_times_a_day	0
Population_Newly_Overflown___5_times_a_day	0
Population_Newly_Overflown___10_times_a_day	19870
Population_Newly_Overflown___20_times_a_day	51017
Population_Newly_Overflown___50_times_a_day	95131
Population_Newly_Overflown___100_times_a_day	102748
Population_Newly_Overflown___200_times_a_day	127868
Population_Newly_Overflown___500_times_a_day	128584
Length_of_Track__ft_	82.84844561
Contour_Area__km2_	81.8675
AONB_Area__km2_	0
AONB_Unique_Count	0
SSSI_Area__km2_	3.53
SSSI_Unique_Count	7
SAC_Area__km2_	0
SAC_Unique_Count	0
SPA_Area__km2_	2.15
SPA_Unique_Count	1
RAMSAR_Area__km2_	2.15
RAMSAR_Unique_Count	1
SEL_70	89159
SEL_80	7288
SEL_90	0
ROUTE_TYPE	DET
__TOTPO	95
__NEW	85
__Length	2
__AONB	2
__SSSI	61
__SAC	2
__SPA	100
__RAMSAR	100

Example of metrics generated on each notional track

Heathrow

Recap: Design Principles

Our new airspace design **must**	Be safe
	Remain in accordance with the CAA's published Airspace Modernisation Strategy and any current or future plans associated with it and all other relevant UK policy, legislation and regulatory standards (for example, Air Navigation Guidance). This includes preventing any worsening of local air quality due to emissions from Heathrow's aircraft movements, to remain within local authorities' limits
	Use noise efficient operational practices to limit and, where possible, reduce adverse impacts from aircraft noise
	Reduce the contribution to climate change from CO_2 emissions and other greenhouse gas emissions arising from Heathrow's aircraft activities
	Enable Heathrow to make the most operationally efficient and resilient use of its existing two runways, to maximise benefits to the airport, airlines and cargo handlers, passengers, and local communities
And **should** also	Provide predictable and meaningful respite to those affected by noise from Heathrow's movements
	Seek to avoid overflying the same communities with multiple routes including those to/from other airports
	Contribute to minimising the negative impacts of night flights
	Keep the number of people who experience an increase in noise from the future airspace design to a minimum
	Keep the total number of people who experience noise from the future airspace design to a minimum
	Enable the efficiency of other airspace users' operations
	Minimise the impact to all stakeholders from future changes to Heathrow's airspace



Break

Discussion

The following slides set out the metrics we are proposing to use to evaluate each of the design principles.

There are some metrics that we must use in Stage 3 and 4 of the ACP, as dictated by CAP1616 and other relevant policies. We are planning to use some of these earlier, in Stage 2, as well as some additional metrics. We will explain these metrics in more detail on the next few slides.

We would also like to discuss any additional suggestions you may have, especially relating to metrics that we could consider as we progress through Stage 2 of this airspace change proposal.

Design Principles and Proposed Metrics

Our new airspace design must be safe

Full safety assessments and risk analysis will be undertaken for the final option(s), but there are no metrics for determining safety at this time.

Subject Matter Experts will highlight where they consider a design is likely to require safety assurances that do not feel attainable within the lifetime of the ACP.

For example, if an option required safety assurances that could only be delivered through novel tools/systems that do not exist, this would be highlighted within the Design Principle Evaluation.

Heathrow

Design Principles and Proposed Metrics

Use noise efficient operational practices to limit and where possible, reduce adverse impacts from aircraft noise

Noise efficient operational practices are considered to be:

- Continuous Climb Operations (CCO)
- Continuous Descent Operations (CDO)
- Noise Abatement Departure Procedures (NADPs)
- Steeper Approaches
- Landing Gear Deployment
- Low Power Low Drag

CCO/CDO will form the basis of all design options. The rest are enhancements/requirements that can be added to every option, which will be investigated in Stage 3.

If we think we have generated an option that would inhibit these enhancements, we will say so in the Design Principle Evaluation

Are there any other Noise Efficient Operational Practices you would suggest we consider?

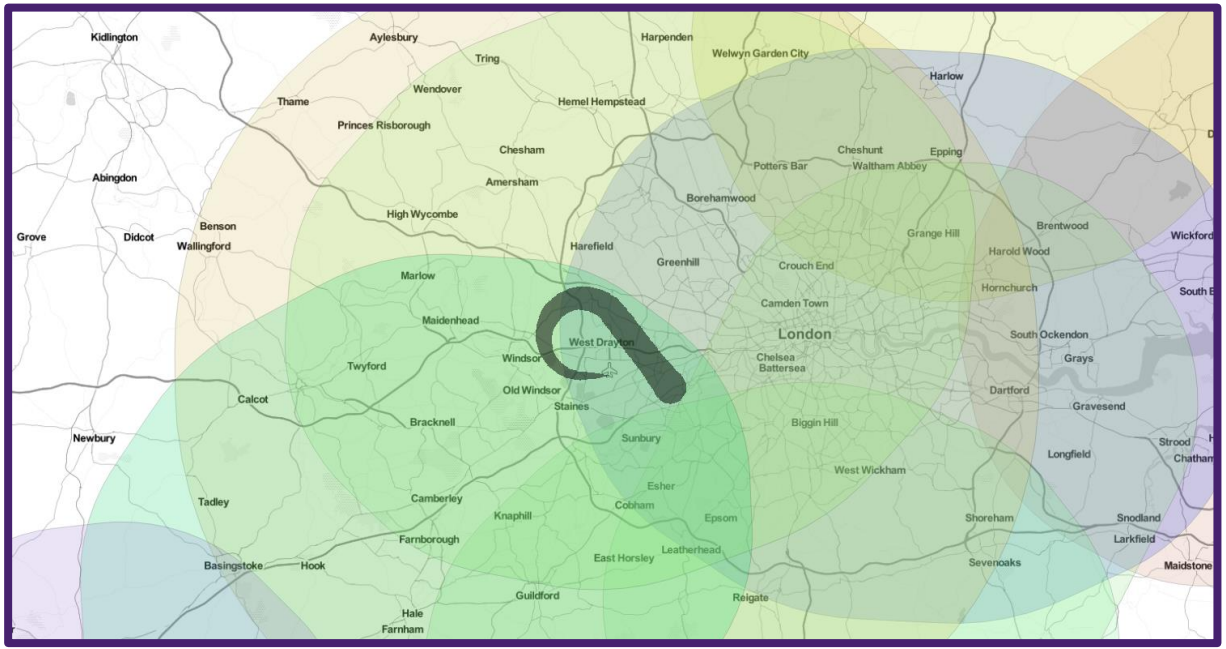
Design Principles and Proposed Metrics

Seek to avoid overflying the same communities with multiple routes including those to/from other airports

In evaluating the options, we will consider:

- Area overflight cones to 7,000ft showing areas potentially overflown for Heathrow and other airports
- Overflight cones for other airports will be based on their current options (where available) or the regions indicated in Masterplan Iteration 2
- We have options for Luton, Stansted and City, with Gatwick and Northolt expected soon.

We can also consider different rates of overflight.



Is there anything additional you would suggest at this stage?

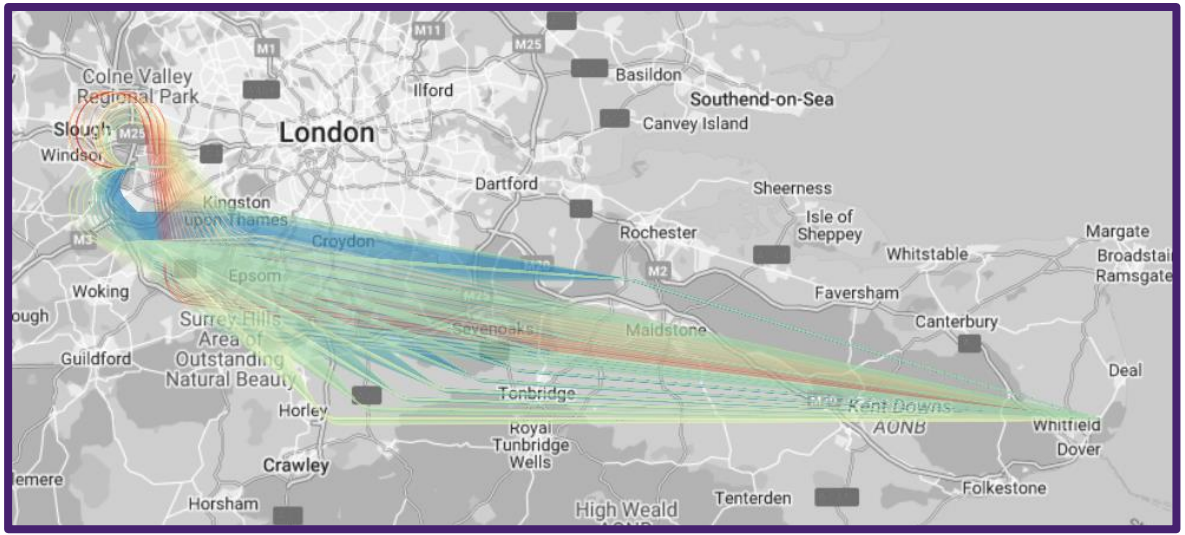
Design Principles and Proposed Metrics

Reduce the contribution to climate change from CO_2 emissions and other greenhouse gas emissions arising from Heathrow's aircraft activities

We will measure Track Mileage between runways and points within the network

For each option, we will then evaluate*:

- Relative estimate of CO_2 emissions
- Partial (Web)TAG Comparison (£)
- Fuel Burn (tonnes)



Forecast schedule is used to allocate number of aircraft to routes with regard for origin and destination. Aircraft type specific BADA data is used to calculate fuel burn per unit mile. This is then multiplied by the track mileage to estimate CO_2 emissions.

Is there anything additional you would suggest?

Design Principles and Proposed Metrics

Enable Heathrow to make the most operationally efficient and resilient use of its existing two runways, to maximise benefits to the airport, airlines and cargo handlers, passengers, and local communities

Qualitative assessment of whether each option can deliver the schedule and whether it would maintain, enhance or degrade:

- The predictability of the operation
- Operational resilience

Enhancing Heathrow's performance and resilience will improve punctuality and predictability for ***all*** stakeholders, including the provision of respite through runway alternation (including easterly alternation) and fewer late running departures.

Is there anything additional you would suggest?

Design Principles and Proposed Metrics

Keep the total number of people who experience noise from the future airspace design to a minimum

In developing our options, we will consider:

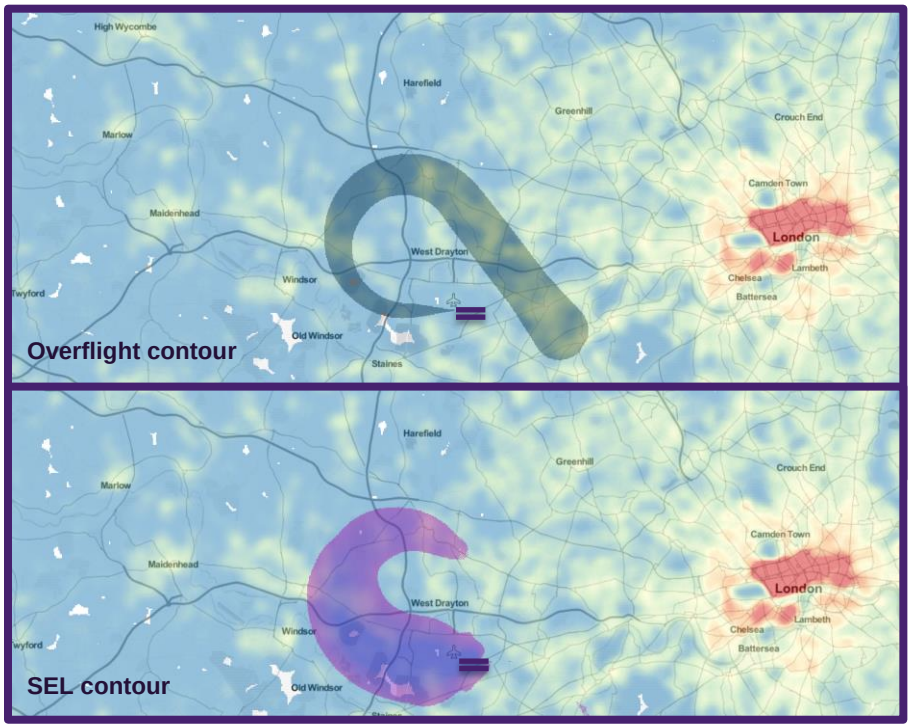
- Population overflown (0 - 7,000ft)
- Population exposed to 70 dB SEL (based on a G0 A320-series aircraft).

We will use forecast schedules to allocate traffic and aircraft types to each route option.

We will also consider frequency of overflight:

- Population overflown (0 - 7,000ft)*
- Total Population in partial $L_{Aeq, 8hr}$ and N60*
- Partial (Web)TAG comparison*

** Modelled in AEDT and taking into account forecast population growth and future noise sensitive developments identified through analysis of local plans and planning permissions*



Is there anything additional you would suggest?

Heathrow

Design Principles and Proposed Metrics

Keep the number of people who experience an increase in noise from the future airspace design to a minimum

In developing our options, we will consider:

- Population newly overflown (0-7000ft), where they are considered “overflown” if they are currently overflown at least 10 / 20 / 50 times per day on average.

For the options we develop, we will consider:

- Population experiencing a change in noise exposure compared to the 2019 baseline
- Population experiencing a >1dB and >3dB change in noise exposure above the Partial day and night LOAEL compared to the 2019 baseline

Is there anything additional you would suggest regarding determining an increase in noise?

Design Principles and Proposed Metrics

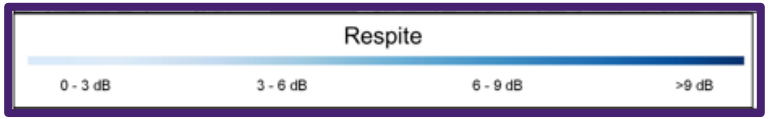
Provide predictable and meaningful respite to those affected by noise from Heathrow's movements

For the options we develop, we will consider:

- Population experiencing a Change of >9dB during the day and night within the Partial LOAEL due to changes in runway alternation mode (e.g. use of left/right runway for arrivals).
- Percentage of population within Partial LOAEL experiencing a 9dB change due to changes in mode.

This will be delivered using:

- Verified Aviation Environmental Design Tool (AEDT) to model noise in a forecast year for each option. Modelling is undertaken in compliance with Category A of CAP2091. Models are prepared by runway mode and, if necessary, by route used where routes are to be alternated.
- $L_{Aeq, 16hr}$ and $L_{Aeq, 8hr}$ partial noise exposure data for each direction option, runway and route mode. Noise level differences are calculated alongside the Partial LOAELs.
- Population within the Partial LOAELs and experiencing a 9dB change in noise between modes.



Heathrow's Respite Working Group found that a difference of at least 7 or 8 decibels may be needed between the average sound level of two sequences of aircraft sounds to provide a valuable break from aircraft noise

Is there anything additional you would suggest to help measure 'predictable and meaningful respite'?

Design Principles and Proposed Metrics

Contribute to minimising the negative impacts of night flights

In developing our options, we will consider:

- Population overflown (0 - 7,000ft)
- Population exposed to 70dB SEL from a G0 A320-series aircraft.

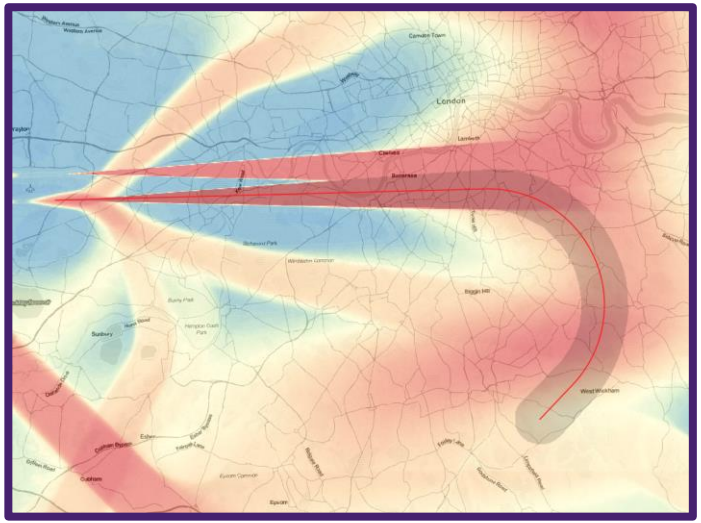
We will use forecast schedules to allocate traffic and aircraft types to each route option.

We will also consider frequency of overflight:

- Population overflown (0 - 7,000ft)*
- Total Population in partial $L_{Aeq, 8hr}$ and N60*
- Partial WebTAG comparison*

** Modelled in AEDT and taking into account forecast population growth and future noise sensitive development highlighted by an analysis of local plans and planning permissions*

We will develop options with PBN arrival flight paths that could be alternated (for example on different nights) to provide at least 9dB differential



Is there anything additional you would suggest with regards impact of night flights?

Heathrow

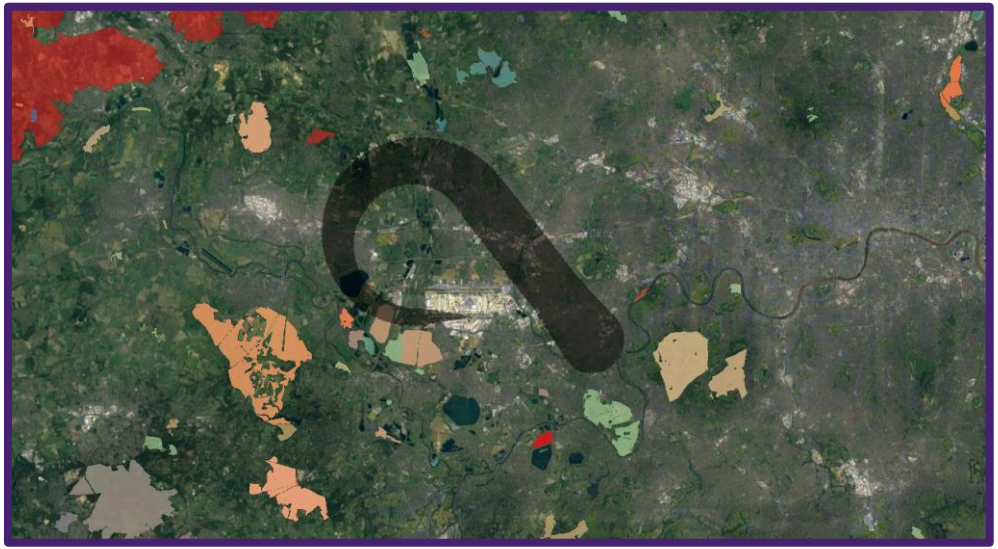
Design Principles and Proposed Metrics

Remain in accordance with the CAA's published Airspace Modernisation Strategy and any current or future plans associated with it and all other relevant UK policy, legislation and regulatory standards (for example, Air Navigation Guidance). This includes preventing any worsening of local air quality due to emissions from Heathrow's aircraft movements, to remain within local authorities' limits

In addition to the noise and carbon metrics covered in the previous slides, we will also generate metrics relating to biodiversity and tranquillity to develop and assess options in line with policy. Numbers of sites or area overflown of:

- Sites of Special Scientific Interest (England)
- Special Protection Areas (England)
- Special Areas of Conservation (England)
- Ramsar sites (England)
- Areas of Outstanding National Beauty (England)

Where routes change below 1,000 feet (e.g. track adjustments on departure) there will be a qualitative assessment of impact on air quality.



Is there anything additional you would suggest?

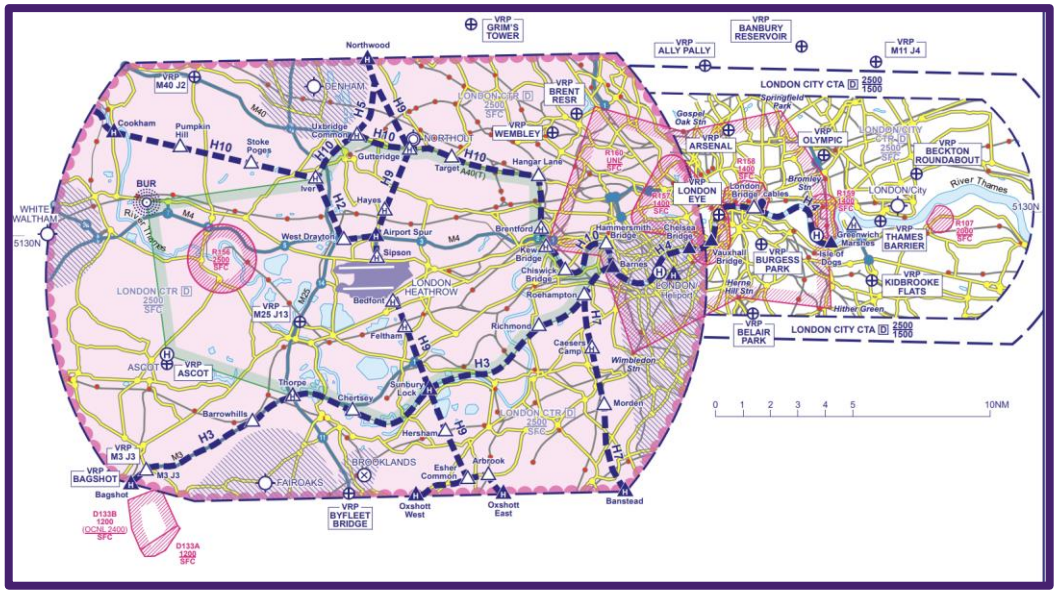
Heathrow

Design Principles and Proposed Metrics

Enable the efficiency of other airspace users' operations
Minimise the impact to all stakeholders from future changes to Heathrow's airspace

Qualitative assessment of whether each option could:

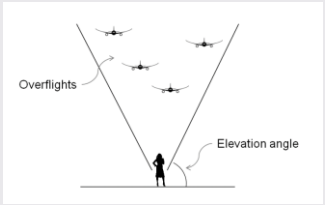
- Require more/less Controlled Airspace
- Enable/inhibit CCO/CDO for other airports' routes below 7000ft and generate trade-off analysis requirements
- Enable/inhibit NERL upper airspace design options
- Inhibit development of lower airspace for future Urban Air Mobility (UAM)
- Affect existing helicopter routes



Is there anything additional you would suggest?

Glossary of Terms

Term	Definition
WebTAG Summary	WebTAG is the Department for Transport's suite of guidance on how to assess the expected impacts of transport policy proposals and projects. As part of the CAP1616 process, Heathrow is required to provide specific noise metrics and quantify the benefits and impacts on an airspace change using the DfT WebTAG tool. The WebTAG tool workbook uses calculations and formulae that are provided by the Government. The CAAs airspace change process requires WebTAG analysis methods to be used for evaluation of quantified noise benefits and disbenefits. The WebTAG analysis uses LAeq average 92-day noise levels.
Partial WebTAG	A WebTAG calculation for a group of directional routes i.e. westerly departures.
CO2/kg Fuel Calculation	Carbon and fuel burn calculations that consider the track lengths and the use of routes. Aircraft type specific BADA data is used to calculate a fuel burn for unit mile for each aircraft type and their number. This is then multiplied by the track mileage to obtain an estimate of the CO2 emissions. Carbon emissions are estimated multiplying the calculated fuel burn in mass of kerosene by the 3.18 factor for Carbon Equivalent emissions.
Definition of overflight	The definition of overflight is in CAP1498. It is 'an aircraft in flight passing an observer at an elevation angle (approximately the angle between the horizon and the aircraft) that is greater than an agreed threshold, and at an altitude below 7000ft'.



Metric Definitions

Metric	Definition
LOAEL	Lowest Observed Adverse Effect Level: This is the level above which adverse effects on health and quality of life can be detected. For daytime periods it is set at 51 dB $L_{Aeq,16hr}$ and 45 dB $L_{Aeq,\ 8hr}$ night-time periods. The LOAEL and L_{Aeq} metrics which underpin it are based on average noise measured over the 92-day period taking into account arrival and departure operations in either operating direction.
Partial LOAEL	The LOAEL for a group of directional routes i.e. westerly departures only.
Laeq,16h and Laeq,8hr	L_{Aeq} is the most common international measure of noise and means 'equivalent continuous noise level'. 51dB $L_{Aeq\ 16hr}$ (day time noise) and 45dB $L_{Aeq\ 8hr}$ (night time noise) contours form part of the primary CAP16116 metrics used to evaluate the benefits and impacts on airspace change. These contours represent the daytime and night time lowest observable adverse effect level (LOAEL) contour defined in UK airspace policy. L_{Aeq} contours are the equivalent sound level of aircraft noise in dBA. This is based on the daily average movements that take place in the 16hr period (0700-2300L) or 8hr period (2300-0700) during the 92-day period, 16 June to 15 September. This metric is the measure of noise exposure adopted by the Government for the purposes of considering adverse effects from aircraft noise. To determine the size of forecast noise contours based on a new airspace design, requires noise modelling…..
Partial $L_{Aeq,16h}$ and partial $L_{Aeq,8h}$	$L_{Aeq,16h}$ and $L_{Aeq,8h}$ noise contours and data a group of directional routes i.e. westerly departures only.

Metric Definitions

Metric	Definition
SEL	The SEL is the total sound energy of an aircraft event compressed into one second.
N60/N65	A noise metric which described the number of aircraft noise events above resulting in maximum noise levels of 60/65 L_{Amax} the daytime and night-time periods. These are event-based metrics, which can be used to better understand the number of noise events that occur and where.
AEDT	The Aviation Environmental Design Tool (AEDT) is a software system that models aircraft performance in space and time to estimate fuel consumption, emissions, noise, and air quality consequences. This tool is used to generate the noise contours.
Group of routes	A set of arrival OR departure flight paths that can safely operate together. Not all Groups of flight paths may work with all other Groups of flight paths. For this, they need to be safely combined into System Options
System options	A group of Westerly arrival and departure flight paths that can safely operate together, which also work with a group of Easterly arrival and departure flight paths, that can safely operate together. Combined, these form a system which can be assessed in combination

Any Questions?


Heathrow
Making every journey better

Heathrow's ACP Stage 2 Engagement: Methods and Metrics 2 Workshop Invitation

DD - Airspace <airspace@heathrow.com>

Mon 09/01/2023 11:53

To: DD - Airspace <airspace@heathrow.com>

Bcc: [redacted]

Dear stakeholder,

Thank you for your recent engagement on our comprehensive list of options for airspace modernisation at Heathrow.

We are now planning to hold a workshop on Wednesday 25 January where we will share our approach to the Initial Options Appraisal that we are required to undertake at Stage 2B of the airspace change process. This workshop will follow on from a previous workshop on metrics that we held last July and will hopefully help to address and resolve any questions you might have regarding the approach that we will be taking to assess the longlist of flight path options.

This engagement is not formally required under the Government's airspace change process.

The information presented in this workshop will be technical and complex. We are therefore inviting a smaller, representative group made up of technically-minded members who have an interest and ability in discussing and analysing data.

Please could you respond to this email to let us know whether you would like to attend this workshop? As the group needs to remain small for this workshop, please consider that you will need to represent a balanced view of the wider community stakeholders who may be interested in airspace change.

The date of the workshop is Wednesday 25 January, 10:00am to 1:00pm. There will be a break for light refreshments. The workshop will be conducted in person and will not be online. **It will take place at Holiday Inn, Bath Road, UB7 0DQ.**

Please let us know by Wednesday 18 January if you would like to attend by replying to this email or emailing airspace@heathrow.com.

We will send you confirmation of your place at the workshop. Please note that parking is available free of charge at the Holiday Inn.

Many thanks,

[redacted]

From: [redacted]
Sent: 09 January 2023 12:30
To: DD - Airspace
Subject: Re: Heathrow's ACP Stage 2 Engagement: Methods and Metrics 2 Workshop Invitation

Caution: external email. Unless you recognise the sender and know the content is safe, do not click links or open attachments.

[redacted];
Thank you for your note regarding the follow up workshop.

I confirm that I would like to attend on Wednesday 25th January and would be grateful if you could add me to the list of community attendees.

Thank you;

[redacted]

From: [redacted]
Sent: 09 January 2023 13:06
To: DD - Airspace
Cc: [redacted]
Subject: Re: Heathrow's ACP Stage 2 Engagement: Methods and Metrics 2 Workshop Invitation

Thankyou, I would like to attend.

From: [redacted]
Sent: 09 January 2023 15:43
To: DD - Airspace
Subject: Re: Heathrow's ACP Stage 2 Engagement: Methods and Metrics 2 Workshop Invitation

Caution: external email. Unless you recognise the sender and know the content is safe, do not click links or open attachments.

Hi,

I'd like to register my intent to attend the workshop on 25th January.

Kind regards

[redacted]
Coordinator

E: [redacted]
M: [redacted]

www.hacan.org.uk

From: [redacted]
Sent: 09 January 2023 16:58
To: DD - Airspace
Subject: Re: Heathrow's ACP Stage 2 Engagement: Methods and Metrics 2 Workshop Invitation

Caution: external email. Unless you recognise the sender and know the content is safe, do not click links or open attachments.

Many thanks for the email below. I confirm I would like to attend the workshop on 25th January 2023.

Many thanks,

[redacted]

From: [redacted]
Sent: 10 January 2023 10:05
To: DD - Airspace
Subject: Re: Heathrow's ACP Stage 2 Engagement: Methods and Metrics 2 Workshop Invitation

Caution: external email. Unless you recognise the sender and know the content is safe, do not click links or open attachments.

Dear [redacted],
Many thanks for your email. I plan to attend the Stage 2 meting on the 25h January.

[redacted]

From: [redacted]
Sent: 10 January 2023 10:37
To: DD - Airspace
Subject: Re: Heathrow's ACP Stage 2 Engagement: Methods and Metrics 2 Workshop Invitation

Dear [redacted]

Thank you for your email. I confirm I would like to attend this workshop.

I look forward to receiving your confirmation and further details in due course.

With kind regards

[redacted]

From: [redacted]
Sent: 10 January 2023 11:52
To: DD - Airspace
Subject: RE: [EXTERNAL] Heathrow's ACP Stage 2 Engagement: Methods and Metrics 2 Workshop Invitation

Caution: external email. Unless you recognise the sender and know the content is safe, do not click links or open attachments.

Dear [redacted],

I would like to attend,

Kind regards,

[redacted]

[redacted]
Environmental Protection Team Leader
Housing and Regulatory Services
Planning, Growth and Sustainability Directorate
Buckinghamshire Council

[redacted]

From: [redacted]
Sent: 10 January 2023 20:44
To: DD - Airspace
Subject: Re: Heathrow's ACP Stage 2 Engagement: Methods and Metrics 2 Workshop Invitation

Caution: external email. Unless you recognise the sender and know the content is safe, do not click links or open attachments.

[redacted],

I would like to attend the workshop

Rgds
[redacted]

From: [redacted]
Sent: 12 January 2023 09:36
To: DD - Airspace
Cc: [redacted]
Subject: Re: Heathrow's ACP Stage 2 Engagement: Methods and Metrics 2 Workshop Invitation

Dear [redacted],
thanks for the invitation to the M&M2/IOA workshop on 25-Jan.

I will attend - with my colleague [redacted].

Best regards,
[redacted]
The Friends of Richmond Park

RE: Heathrow's ACP Stage 2 Engagement: Methods and Metrics 2 Workshop Invitation

[redacted]

Thu 12/01/2023 11:01

To: DD - Airspace <airspace@heathrow.com>

Cc: [redacted]

Caution: external email. Unless you recognise the sender and know the content is safe, do not click links or open attachments.

Dear Heathrow Airspace,

I didn't receive this invite but another local participant sent this to me. Thank you for this invite but it is quite short notice for two weeks time. I am unfortunately out of the country for this workshop. Most of our local participants have full time jobs so attending this in the middle of the day is quite difficult due to the extra transport time involved. It would help immensely if this session could be a hybrid online / live meeting and therefore make it more accessible to all those invited. The meeting venue can surely accommodate the Wi-Fi needed to do this. This is supposed to be an open process, so we kindly request that you make this meeting online as well.

We look forward to your reply.

Kind regards,

[redacted]

FW: Heathrow's ACP Stage 2 Engagement: Methods and Metrics 2 Workshop Invitation

DD - Airspace <airspace@heathrow.com>

Fri 13/01/2023 15:16

To: DD - Airspace <airspace@heathrow.com>; [redacted]

Dear [redacted],

Please could you share this invitation with [redacted], and let us know if [redacted] would like to attend the upcoming workshop.

Kind regards,

[redacted]

From: DD - Airspace <airspace@heathrow.com>
Sent: 09 January 2023 11:54
To: DD - Airspace <airspace@heathrow.com>
Subject: Heathrow's ACP Stage 2 Engagement: Methods and Metrics 2 Workshop Invitation

Dear stakeholder,

Thank you for your recent engagement on our comprehensive list of options for airspace modernisation at Heathrow.

We are now planning to hold a workshop on Wednesday 25 January where we will share our approach to the Initial Options Appraisal that we are required to undertake at Stage 2B of the airspace change process. This workshop will follow on from a previous workshop on metrics that we held last July and will hopefully help to address and resolve any questions you might have regarding the approach that we will be taking to assess the longlist of flight path options.

This engagement is not formally required under the Government's airspace change process.

The information presented in this workshop will be technical and complex. We are therefore inviting a smaller, representative group made up of technically-minded members who have an interest and ability in discussing and analysing data.

Please could you respond to this email to let us know whether you would like to attend this workshop? As the group needs to remain small for this workshop, please consider that you will need to represent a balanced view of the wider community stakeholders who may be interested in airspace change.

The date of the workshop is Wednesday 25 January, 10:00am to 1:00pm. There will be a break for light refreshments. The workshop will be conducted in person and will not be online. **It will take place at Holiday Inn, Bath Road, UB7 0DQ.**

Please let us know by Wednesday 18 January if you would like to attend by replying to this email or emailing airspace@heathrow.com.

We will send you confirmation of your place at the workshop. Please note that parking is available free of charge at the Holiday Inn.

Many thanks,

[redacted]

From: DD - Airspace
Sent: 16 January 2023 16:08
To: DD - Airspace; [redacted]
Subject: RE: Heathrow's ACP Stage 2 Engagement: Methods and Metrics 2 Workshop Invitation

Dear [redacted],

To clarify the workshop is taking place on **Wednesday 25th January,** 10:00am – 1:00pm at Holiday Inn, Bath Road, UB7 0DQ.

Apologies for any confusion caused.

Kind regards,

[redacted]

From: DD - Airspace <airspace@heathrow.com>
Sent: 16 January 2023 12:08
To: [redacted]; DD - Airspace <airspace@heathrow.com>
Subject: RE: Heathrow's ACP Stage 2 Engagement: Methods and Metrics 2 Workshop Invitation

Dear [redacted],

I am following up on the email below inviting you to Heathrow's Airspace Change Proposal Stage 2 Engagement: Methods and Metrics 2 Workshop taking place on Thursday 25th January at Holiday Inn, Bath Road, UB7 0DQ.

Please could you let us know whether you, or another representative from HSPG, would like to attend in person next week by responding to this email?

Once we have received your response, we will send an invitation to confirm your place.

Many thanks,
[redacted]

From: DD - Airspace <airspace@heathrow.com>
Sent: 09 January 2023 11:54
To: DD - Airspace <airspace@heathrow.com>
Subject: Heathrow's ACP Stage 2 Engagement: Methods and Metrics 2 Workshop Invitation

Dear stakeholder,

Thank you for your recent engagement on our comprehensive list of options for airspace modernisation at Heathrow.

We are now planning to hold a workshop on Wednesday 25 January where we will share our approach to the Initial Options Appraisal that we are required to undertake at Stage 2B of the airspace change process. This workshop will follow on from a previous workshop on metrics that we held last July and will hopefully help to address and resolve any questions you might have regarding the approach that we will be taking to assess the longlist of flight path options.

This engagement is not formally required under the Government's airspace change process.

The information presented in this workshop will be technical and complex. We are therefore inviting a smaller, representative group made up of technically-minded members who have an interest and ability in discussing and analysing data.

Please could you respond to this email to let us know whether you would like to attend this workshop? As the group needs to remain small for this workshop, please consider that you will need to represent a balanced view of the wider community stakeholders who may be interested in airspace change.

The date of the workshop is Wednesday 25 January, 10:00am to 1:00pm. There will be a break for light refreshments. The workshop will be conducted in person and will not be online. **It will take place at Holiday Inn, Bath Road, UB7 0DQ.**

Please let us know by Wednesday 18 January if you would like to attend by replying to this email or emailing airspace@heathrow.com.

We will send you confirmation of your place at the workshop. Please note that parking is available free of charge at the Holiday Inn.

Many thanks,

[redacted]

From: DD - Airspace
Sent: 16 January 2023 16:07
To: DD - Airspace; [redacted]
Subject: RE: Heathrow's ACP Stage 2 Engagement: Methods and Metrics 2 Workshop Invitation Follow Up

Dear [redacted],

To clarify the workshop is taking place on **Wednesday 25th January** 10:00am – 1:00pm at Holiday Inn, Bath Road UB7 0DQ.

Apologies for any confusion caused.

Kind regards,

[redacted]

From: DD - Airspace <airspace@heathrow.com>
Sent: 16 January 2023 16:04
To: DD - Airspace <airspace@heathrow.com>; [redacted] <[redacted]>
Subject: RE: Heathrow's ACP Stage 2 Engagement: Methods and Metrics 2 Workshop Invitation Follow Up

Dear [redacted],

I am following up on the email below inviting you to Heathrow's Airspace Change Proposal Stage 2 Engagement: Methods and Metrics 2 Workshop taking place on Thursday 25th January at Holiday Inn, Bath Road, UB7 0DQ.

Please could you let us know whether you would like to attend next week by responding to this email?

Once we have received your response, we will send an invitation to confirm your place.

Many thanks,

[redacted]

From: DD - Airspace <airspace@heathrow.com>
Sent: 09 January 2023 11:54
To: DD - Airspace <airspace@heathrow.com>
Subject: Heathrow's ACP Stage 2 Engagement: Methods and Metrics 2 Workshop Invitation

Dear stakeholder,

Thank you for your recent engagement on our comprehensive list of options for airspace modernisation at Heathrow.

We are now planning to hold a workshop on Wednesday 25 January where we will share our approach to the Initial Options Appraisal that we are required to undertake at Stage 2B of the airspace change process. This workshop will follow on from a previous workshop on metrics that we held last July and will hopefully help to address and resolve any questions you might have regarding the approach that we will be taking to assess the longlist of flight path options.

This engagement is not formally required under the Government's airspace change process.

The information presented in this workshop will be technical and complex. We are therefore inviting a smaller, representative group made up of technically-minded members who have an interest and ability in discussing and analysing data.

Please could you respond to this email to let us know whether you would like to attend this workshop? As the group needs to remain small for this workshop, please consider that you will need to represent a balanced view of the wider community stakeholders who may be interested in airspace change.

The date of the workshop is Wednesday 25 January, 10:00am to 1:00pm. There will be a break for light refreshments. The workshop will be conducted in person and will not be online. **It will take place at Holiday Inn, Bath Road, UB7 0DQ.**

Please let us know by Wednesday 18 January if you would like to attend by replying to this email or emailing airspace@heathrow.com.

We will send you confirmation of your place at the workshop. Please note that parking is available free of charge at the Holiday Inn.

Many thanks,

[redacted]

From: DD - Airspace
Sent: 16 January 2023 16:05
To: [redacted]; DD - Airspace
Subject: RE: Heathrow's ACP Stage 2 Engagement: Methods and Metrics 2 Workshop Invitation Follow Up

Dear [redacted],

I am following up on the email below inviting you to Heathrow's Airspace Change Proposal Stage 2 Engagement: Methods and Metrics 2 Workshop taking place on Wednesday 25th January at Holiday Inn, Bath Road, UB7 0DQ.

Please could you let us know whether you would like to attend next week by responding to this email?

Once we have received your response, we will send an invitation to confirm your place.

Many thanks,

[redacted]

From: DD - Airspace <airspace@heathrow.com>
Sent: 09 January 2023 11:54
To: DD - Airspace <airspace@heathrow.com>
Subject: Heathrow's ACP Stage 2 Engagement: Methods and Metrics 2 Workshop Invitation

Dear stakeholder,

Thank you for your recent engagement on our comprehensive list of options for airspace modernisation at Heathrow.

We are now planning to hold a workshop on Wednesday 25 January where we will share our approach to the Initial Options Appraisal that we are required to undertake at Stage 2B of the airspace change process. This workshop will follow on from a previous workshop on metrics that we held last July and will hopefully help to address and resolve any questions you might have regarding the approach that we will be taking to assess the longlist of flight path options.

This engagement is not formally required under the Government's airspace change process.

The information presented in this workshop will be technical and complex. We are therefore inviting a smaller, representative group made up of technically-minded members who have an interest and ability in discussing and analysing data.

Please could you respond to this email to let us know whether you would like to attend this workshop? As the group needs to remain small for this workshop, please consider that you will need to represent a balanced view of the wider community stakeholders who may be interested in airspace change.

The date of the workshop is Wednesday 25 January, 10:00am to 1:00pm. There will be a break for light refreshments. The workshop will be conducted in person and will not be online. **It will take place at Holiday Inn, Bath Road, UB7 0DQ.**

Please let us know by Wednesday 18 January if you would like to attend by replying to this email or emailing airspace@heathrow.com.

We will send you confirmation of your place at the workshop. Please note that parking is available free of charge at the Holiday Inn.

Many thanks,

[redacted]

From: [redacted]
Sent: 17 January 2023 09:26
To: DD - Airspace
Subject: Heathrow's ACP Stage 2 Engagement: Methods and Metrics 2 Workshop Invitation

Caution: external email. Unless you recognise the sender and know the content is safe, do not click links or open attachments.

Dear [redacted]

Please can I attend the above workshop on Wednesday 25th January 2023.

Kind Regards

[redacted]
Environmental Health Regulatory Officer
[redacted]

Spelthorne Borough Council,
Council Offices, Knowle Green, Staines-upon-Thames, TW18 1XB
Tel: [redacted]

From: DD - Airspace
Sent: 17 January 2023 16:02
To: [redacted]
Cc: [redacted]; DD - Airspace
Subject: RE: Heathrow's ACP Stage 2 Engagement: Methods and Metrics 2 Workshop Invitation

Dear [redacted],

Thank you for your email. The session has been organised as additional engagement for our technically minded stakeholders representing their community group or local authority and is not part of the statutory engagement requirement of the CAP1616 process.

Whilst we have had no other requests for an online meeting from invited stakeholders, we do recognise the difficulty in attending the workshop during the working the day. The facilities provided by the venue make it difficult to facilitate the workshop online and we would be concerned any online attendees would struggle to be involved in the conversations happening in the room. We are therefore unable to offer the workshop as a hybrid session.

However, we will be circulating the material to all invited stakeholders and we would be happy to offer a separate one hour online session in the next couple of weeks to stakeholders representing Clean Air Bayswater and Westbourne Park Road East Resident's Association to go through the material and answer any questions you might have.

Please let me know if this is something you want to arrange.

Kind regards,

[redacted]

[redacted]

Airspace & ATM Engagement Specialist

Heathrow

The Compass Centre, Nelson Road

Hounslow, Middlesex, TW6 2GW

m: [redacted]

w: heathrow.com t: twitter.com/heathrowairport

a: heathrow.com/apps

Heathrow ACP Engagement: Methods and Metrics 2 Workshop Confirmation

DD - Airspace <airspace@heathrow.com>

Thu 19/01/2023 11:32

To: DD - Airspace <airspace@heathrow.com>

Bcc: [redacted]

Dear Sir/Madam,

Thank you for agreeing to attend the Methods and Metrics 2 workshop for our Airspace Change Proposal (ACP) to introduce airspace modernisation at Heathrow.

We have confirmed your place at the workshop on Wednesday 25th January 2023, 10:00am to 1:00pm, at Holiday Inn, 276 Bath Road, UB7 0DQ. We look forward to seeing you there. Please aim to be at the hotel reception by 9:45am to allow us to start the workshop on time.

If driving, please park your car in the Holiday Inn car park, which will be free of charge.

If you have any questions on anything related to the workshop, please email us at airspace@heathrow.com. There will also be an opportunity to ask questions during the workshop.

Kind regards,

[redacted]

Heathrow Airspace Team

Heathrow ACP Engagement: Methods and Metrics 2 Workshop Material

DD - Airspace <airspace@heathrow.com>

Mon 23/01/2023 16:39

To: DD - Airspace <airspace@heathrow.com>

Bcc: [redacted]

1 attachments (2 MB)

Methods & Metrics2_workshop slides_vF.pdf;

Dear Sir/Madam,

Thank you again for your interest in attending our Methods and Metrics 2 workshop this week. We look forward to seeing you on Wednesday and I have attached the workshop slides for those who would appreciate the opportunity to read these before the workshop.

As mentioned previously, this workshop is an additional step in our engagement programme to allow our more technically-minded stakeholders to discuss our approach to assessing our Comprehensive List of Options (CLOO) at a more detailed level. Therefore, these slides are necessarily technical and complex, and will not be suitable or accessible for all stakeholders. The slides will be used in the workshop to aid us in sharing our proposed methodology and metrics for the Initial Options Appraisal that we will undertake at Stage 2B.

We will have time in the workshop to answer any questions that you have. We will the host workshops for our wider stakeholders in March, where will share the results of the Design Principle Evaluation and summarise the feedback received from the CLOO workshops last November.

We look forward to seeing you on Wednesday 25 January at Holiday Inn, 276 Bath Road, UB7 0DQ.

Kind regards,

[redacted]

RE: Heathrow's ACP Stage 2 Engagement: Methods and Metrics 2 Workshop Invitation

[redacted]

Mon 23/01/2023 11:42

To: DD - Airspace <airspace@heathrow.com>

Caution: external email. Unless you recognise the sender and know the content is safe, do not click links or open attachments.

Dear [redacted],

I'm sorry I wasn't emailed, so I couldn't confirm attendance at the above Workshop on 'Methods and Metrics 2', which I would like to attend, if?

Wonder if car Park is accessible, as before?

Best Regards

[redacted]
Environmental Protection Manager
Environmenal Protection, Safer Communities
London Borough of Ealing, 14-16 Uxbridge Road, London W5 2HL
[redacted]

Heathrow's ACP Stage 2 Engagement: Methods and Metrics 2 Workshop Confirmation and Materials

DD - Airspace <airspace@heathrow.com>
Mon 23/01/2023 16:43
To: [redacted];DD - Airspace <airspace@heathrow.com>
Dear [redacted],

Thank you for agreeing to attend the Methods and Metrics 2 workshop for our Airspace Change Proposal (ACP) to introduce airspace modernisation at Heathrow.

We have confirmed your place at the workshop on Wednesday 25th January 2023, 10:00am to 1:00pm, at Holiday Inn, 276 Bath Road, UB7 0DQ. We look forward to seeing you there. Please aim to be at the hotel reception by 9:45am to allow us to start the workshop on time.

If driving, please park your car in the Holiday Inn car park, which will be free of charge.

I have attached the workshop slides if you would like the opportunity to read these before the workshop.

As mentioned previously, this workshop is an additional step in our engagement programme to allow our more technically-minded stakeholders to discuss our approach to assessing our Comprehensive List of Options (CLOO) at a more detailed level. Therefore, these slides are necessarily technical and complex, and will not be suitable or accessible for all stakeholders. The slides will be used in the workshop to aid us in sharing our proposed methodology and metrics for the Initial Options Appraisal that we will undertake at Stage 2B.

We will have time in the workshop to answer any questions that you have. We will the host workshops for our wider stakeholders in March, where will share the results of the Design Principle Evaluation and summarise the feedback received from the CLOO workshops last November.

We look forward to seeing you on Wednesday 25 January at Holiday Inn, 276 Bath Road, UB7 0DQ. If you have any questions on anything related to the workshop, please email us at airspace@heathrow.com.

Kind regards,
[redacted]

Re: Heathrow's ACP Stage 2 Engagement: Methods and Metrics 2 Workshop Invitation Follow Up

[redacted]

Mon 16/01/2023 19:37

To: DD - Airspace <airspace@heathrow.com>

Caution: external email. Unless you recognise the sender and know the content is safe, do not click links or open attachments.

Dear [redacted]

Thanks for email. If I may I would like to respond before this weekend. Just at this very moment it is a little difficult and if I am unable to attend I would like to propose another member of Richmond Heathrow Campaign.

Kind regards

[redacted]

Richmond Heathrow Campaign

RE: Heathrow's ACP Stage 2 Engagement: Methods and Metrics 2 Workshop Invitation Follow Up

DD - Airspace <airspace@heathrow.com>

Tue 17/01/2023 15:58

To: [redacted];DD - Airspace <airspace@heathrow.com>

Dear [redacted],

That's no problem. Please let us know when you can who will be representing the Richmond Heathrow Campaign group at the workshop next week.

Best wishes,

[redacted]

From: [redacted]
Sent: 24 January 2023 13:06
To: DD - Airspace
Cc: [redacted]
Subject: Re: Heathrow's ACP Stage 2 Engagement: Methods and Metrics 2 Workshop Invitation Follow Up

Dear [redacted]

[redacted] is able to join the Workshop tomorrow (Wed 25 Jan) on behalf of Richmond Heathrow Campaign. [redacted] is a long time member of RHC. Apologies for taking a bit of time to confirm. I hope the meeting goes well. I will forward [redacted] pre-meeting material you have circulated to date but grateful if there is additional material you could include [redacted] in the distribution. I am copying [redacted] with this email.

Grateful if you could just confirm receipt of this and that all is okay for [redacted] attendance.

Kind regards

[redacted]

[redacted]

Chair, Richmond Heathrow Campaign

From: DD - Airspace
Sent: 24 January 2023 14:44
To: [redacted]; DD - Airspace; [redacted]
Cc:
Subject: RE: Heathrow's ACP Stage 2 Engagement: Methods and Metrics 2 Workshop Invitation Follow Up
Attachments: Methods & Metrics2_workshop slides_vF.pdf

Dear [redacted],

Your colleague [redacted] emailed to let us know that you will be attending the Methods and Metrics 2 workshop tomorrow to represent Richmond Heathrow Campaign on his behalf. We have confirmed your place at the workshop on Wednesday 25th January 2023, 10:00am to 1:00pm, at Holiday Inn, 276 Bath Road, UB7 0DQ. We look forward to seeing you there. Please aim to be at the hotel reception by 9:45am to allow us to start the workshop on time.

If driving, please park your car in the Holiday Inn car park, which will be free of charge.

I have attached the workshop slides if you would like the opportunity to read these before the workshop.

As mentioned previously, this workshop is an additional step in our engagement programme to allow our more technically-minded stakeholders to discuss our approach to assessing our Comprehensive List of Options (CLOO) at a more detailed level. Therefore, these slides are necessarily technical and complex, and will not be suitable or accessible for all stakeholders. The slides will be used in the workshop to aid us in sharing our proposed methodology and metrics for the Initial Options Appraisal that we will undertake at Stage 2B.

We will have time in the workshop to answer any questions that you have. We will the host workshops for our wider stakeholders in March, where will share the results of the Design Principle Evaluation and summarise the feedback received from the CLOO workshops last November.

We look forward to seeing you tomorrow morning at Holiday Inn, 276 Bath Road, UB7 0DQ. If you have any questions on anything related to the workshop, please email us at airspace@heathrow.com.

Kind regards,
[redacted]

From: [redacted]
Sent: 24 January 2023 13:20
To: DD - Airspace
Cc: [redacted]
Subject: Re: Heathrow ACP Engagement: Methods and Metrics 2 Workshop Material
Attachments: Heathrow Airspace Modernisation IOA - Community concerns and observations (24.01.23).pdf; Airspace Navigation Guidance 2017 - key extracts and questions for Heathrow 24.01.23.pdf

Dear [redacted]

Thank you for your email and the slide pack.

I attach two documents concerning methods, metrics and in particular ANG 17.

The first is an introduction that looks at the context for Heathrow AM. The second examines the environmental requirements set out in ANG 17.

It may be helpful to refer to these at tomorrow's workshop. They have been copied to NACF community groups and [redacted]. A formal response to the questions raised would be appreciated in due course.

Kind regards

[redacted]
(on behalf of TAG)

Heathrow Airspace Modernisation – ANG and the Initial Options Appraisal

Health and Quality of Life considerations

Introduction

In approaching the Airspace Modernisation process, Heathrow should consider that the vast majority of people within its current noise catchment have taken decisions on where to live having regard to historic noise conditions. In many cases this has determined how they have made some of the most significant decisions in their lives, including house purchase, choices of schools, networks of friends and family, etc. Resulting from this very important family and community links have been established. For many relocation due to significantly changing Heathrow flight path patterns is not an option. Any radical changes in flight path routes or usage which cause significant adverse changes to living conditions in neighbourhoods around Heathrow will have severe consequences for long standing and extremely well-established communities and should be ruled out at this stage.

Context

Air Navigation Guidance 2017 (ANG) is legally binding on both the CAA and Airspace Modernisation (AM) sponsors.

Communities have raised concerns that both Heathrow's Design Principles (DP) and Comprehensive List of Options (CLOOs) do not reflect ANG requirements in relation to noise.

In the case of the DPs there are conflicting principles and in a number of cases they are indicative of a simplistic 'numbers within contour-based approach' rather than consideration of causation or assessment of significant adverse impacts to health and quality of life.

A number of the CLOOs are based on inappropriate metrics and analytical approach. The methodologies in arriving at the CLOOs are not transparent and Heathrow's initial analysis has resulted in a list mainly consisting of radical flight path options.

Crucially, Heathrow has not addressed key criteria mandated in ANG, and even ignored some of its own DPs (which are critical to reaching an acceptable final outcome) in producing the CLOOs. As a result, the airport is following an approach based on inappropriate evidence and potentially resulting in options that will cause a disastrous outcome.

The CAA is presently consulting on changes to CAP 1616 in its CAP 2492 consultation document. In particular it is proposed to **remove the requirement** to develop a comprehensive list of design options which includes **radical options**.

CAP 1616 has also been supplemented by CAP 2091, and this sets out **minimum requirements** for noise modelling. Given Heathrow's unique location, ATM numbers and the huge number of people potentially significantly adversely affected by new flight paths, the airport should go beyond the minimum requirements, and take great care in establishing an evidence base that identifies and minimises the potential impact of its decisions in relation to AM.

The appended document highlights the key sections of ANG and poses a number of questions and suggestions in relation to the CLOOs and Heathrow's IOA.

Appendix

Air Navigation Guidance 2017

Key extracts, comments and questions

Key comments and questions are included in the text, in italic and underlined

Introduction

Section 70(2) of the Transport Act 2000 requires the Civil Aviation Authority (CAA) to take account of any guidance on environmental objectives given to it by the Secretary of State (SofS) when carrying out its air navigation functions.

A number of operational trials across the UK and changes to procedures used by air traffic controllers, led to various calls for a significant reappraisal of the government's airspace and noise policies.

The Air Navigation Guidance 2017 is the result of this review of the government's airspace and noise policy. In addition to being statutory guidance to the CAA on environmental objectives in respect of its air navigation functions, the revised guidance also includes details on the SofS's role in the airspace change process.

Objectives of the Guidance

provide guidance to the CAA under section 70(2) of the Transport Act 2000 and which the aviation industry should take account of;

strengthen the UK's airspace change process and its transparency, particularly with respect to how local communities are involved within it

emphasise that the environmental impact of aviation must be mitigated as much as is practicable and realistic to do so

we are confident that by following this revised guidance the aviation industry and the CAA will ensure an appropriate balance is achieved as the UK embarks on a major programme of airspace modernisation.

Purpose and applicability of the Guidance

This document, excluding section 6, is statutory guidance to the CAA on environmental objectives relating to CAA's air navigation functions in accordance with section 70(2) of the Transport Act 2000 and the Air Navigation Directions issued under sections 66(1) and 68 of that Act. This information should also be noted and taken into consideration by the aviation industry.

ANG sets out legal requirements and priorities which apply to the CAA and airspace change sponsors, such as Heathrow.

The government's key environmental objectives

1.2 a. Limit and, where possible, reduce the number of people in the UK significantly affected by adverse impacts from aircraft noise

ANG sets out mandatory considerations in paras 3.2, 3.3 and 3.5 (see below). How has Heathrow reflected these in its DPs and the metrics used in arriving at its CLOOs? How will these be addressed in its Initial Options Appraisal (IOA)?

1.3 Options, and appraisal of the pros and cons, may include concentrating traffic on single routes, which normally reduce the number of people overflown, versus the use of multiple routes which can potentially provide relief or respite from noise if routes can be sufficiently separated

Detailed guidance on assessing the potential environmental impacts of airspace change options

3.1 When the CAA exercises its air navigation functions, it is required to apply consideration to the various factors listed within section 70(2) of the Transport Act 2000, with safety being the priority. If there is a conflict in the application of the provisions listed in section 70(2), the CAA must, according to section 70(3), apply them in a manner it thinks is reasonable having regard to those factors as a whole. To help ensure this is done correctly, sponsors should be required to demonstrate how they have assessed the different impacts and taken on board the views of different parties when developing options for airspace changes.

How will Heathrow as AC sponsor demonstrate it has satisfied this requirement? How have representations from communities been addressed substantively by Heathrow in relation to its DPs and CLOOs? How will the general public be engaged going forwards? What representations have been made by parties other than communities?

Altitude Based Priorities

3.2 To assist the CAA and sponsors, the government laid out the altitude-based priorities which should be taken into account when considering the potential environmental impact of airspace changes.

ANG states the altitude priorities (up to 7000 ft) and environmental considerations are mandatory. Does Heathrow consider these requirements were fully applied in arriving at the CLOOs? Can Heathrow confirm these will be reflected in undertaking its IOA?

3.3 Noise from aircraft flying at or above 4,000 feet is less likely to affect the key noise metrics used for determining adverse effects and as aircraft continue to climb above this altitude their noise impact reduces. Set against this, there is also a need to secure an efficient use of airspace and to ensure that aircraft operations emissions are minimised. So when considering requests to change the airspace design, the CAA should apply the following altitude-based priorities of the government:

a. In the airspace from the ground to below 4,000 feet the government's environmental priority is to limit and, where possible, reduce the total adverse effects on people;

   What does Heathrow understand by limiting/reducing total adverse effects on people? How far have these been assessed in the CLOOs and how will the reduction of total adverse effects be addressed in the IOA?

b. Where options for route design from the ground to below 4,000 feet are similar in terms of the number of people affected by total adverse noise effects, preference should be given to that option which is most consistent with existing published airspace arrangements;

   How does Heathrow interpret this and how will the preference for existing airspace arrangmets be applied in the IOA?

c. in the airspace at or above 4,000 feet to below 7,000 feet, the environmental priority should continue to be minimising the impact of aviation noise in a manner consistent with the government's overall policy on aviation noise, unless the CAA is satisfied that the evidence presented by the sponsor demonstrates this would disproportionately increase CO_2 emissions;

   *How has the requirement to demonstrate CO2 emissions are **disproportionally increased** in the CLOOs and **how will it** be applied in the IOA? What metrics and values have/will be applied in devising the CLOOs and developing the IOA?*

d. in the airspace at or above 7,000 feet, the CAA should prioritise the reduction of aircraft CO_2 emissions and the minimising of noise is no longer the priority;

e. where practicable, it is desirable that airspace routes below 7,000 feet should seek to avoid flying over Areas of Outstanding Natural Beauty (AONB) and National Parks; and
f. all changes below 7,000 feet should take into account local circumstances in the development of the airspace design, including the actual height of the ground level being overflown, and should not be agreed to by the CAA before appropriate community engagement has been conducted by the sponsor.

How will Heathrow take into account local circumstances and conduct community engagement in relation to the CLOOs and IOA?

Assessing the noise implications of proposed airspace changes

3.5 For the purpose of assessing airspace changes, the government wishes the CAA to interpret this objective to mean that the total adverse effects on people as a result of aviation noise should be limited and, where possible, reduced, rather than the absolute number of people in any particular noise contour.

Does Heathrow accept it should not rely on a simplistic analysis of numbers within noise contours in its IOA? Critically, how will 'total adverse effects' be assessed in a local context in the IOA (see para 3.6 below)?

Does Heathrow accept ICAO recognition, international research and local evidence (based on its 2014 PBN trials) that change itself will cause major significant adverse effects?

Does Heathrow believe that there is equivalence between numbers of people experiencing increased aviation noise from change compared to the benefit to those who receive a reduction in noise?

3.5 (contd.) Adverse effects are considered to be those related to health and quality of life.

Does Heathrow agree that for the purposes of its IOA adverse effects must relate to health and quality of life?

CAP 2091 sets out the minimum standards for reporting noise impacts but crucially does not preclude more detailed consideration. Given Heathrow's unique location and enormous noise impact, does it consider it should address these considerations by undertaking a local health and quality of life/annoyance study?

Given the radical nature and scale of the changes scoped within Heathrow's CLOOs does it disagree, as sponsor, that it is essential that these considerations must be fully understood and reflected in the IOA and subsequent stages? Communities have made numerous submissions to the HCNF on the impact of PBN (internationally) and the change effect which international research indicates can add 6-9 dB Leq in terms of adverse impact.

3.5 (contd.) As noise exposure increases above this level, so will the likelihood of experiencing an adverse effect. In line with this increase in risk, the proportion of the population likely to be significantly affected can be expected to grow as the noise level increases over the LOAEL.

Does Heathrow accept this premise? If so how will this be addressed within the IOA?

3.6 The Department for Transport's WebTAG includes a module for valuing the impacts of noise, including those from changes in aircraft noise, on health and quality of life.

3.6 (contd.) The CAA must ensure that adverse effects of airspace change proposals are estimated in accordance with this methodology. Additional noise metrics should be considered, as appropriate, as specified elsewhere in this guidance, advised by the CAA, or following engagement by the sponsor.

How will Heathrow reflect engagement to date?

What additional metrics and investigations does Heathrow consider are required in the context of the airport's location in the middle of densely populated areas, the experience of its 2014 PBN trials, evidence of the impact of PBN abroad (particularly the US) and the change effect, particularly having regard to the evidence presented to the HCNF/NACF by community groups and the reports by Taylor Airey and Andersen Acoustics which relate to these matters?

3.7 Below 4,000 feet, there is a strong likelihood that aircraft could create levels of noise exposure above the LOAELs identified above, which is reflected in the Altitude Based Priorities.

3.8 There may however be options which perform comparatively better in terms of minimising more serious impacts as opposed to annoyance, or certain options may be better for day noise than night noise, or vice versa. In these instances, the CAA should verify that sponsors have considered the relative trade-offs and taken into account any community views on what the objectives in terms of noise should be.

How does Heathrow propose to take into account community views and what weight will be placed on these? The CLOOs presented so far appear to bear little resemblance to the requirements of ANG. What evidence relating to community views has Heathrow used in arriving at these and how does it propose to comply with this requirement in the IOA and later stages?

3.9 At and above 4,000 feet, aircraft are unlikely to result in noise exposure above 51dB LAeq16hr for day time noise and 45dB LAeq8hr for night time noise, but where such exposure does occur the CAA should ensure that the focus remains on minimising these impacts. Generally however, at and above 4,000 feet to below 7,000 feet, the government expects the CAA to follow the altitude based priorities (as set out in section 3.2 to 3.3 above).

3.10 As well as overall impacts, the CAA should also verify that sponsors have adequately explained how communities will be affected as a result of the proposal, such as the expected change in noise exposure communities will experience.

How and when does Heathrow consider it should engage with the public, in the context of its CLOOs and IOA. At what stage does Heathrow consider it should engage, particularly in relation to the radical options in the CLOOs (which raise matters of public interest)?

3.11 For communities further away from airports that will not be affected by noise above the LOAELs identified above, it is important that other aspects of noise are also taken into account where the total adverse effects of noise on people between different options are similar. Metrics that must be considered for these purposes include the overall number of overflights[10] and number above metrics: N65 for daytime noise and N60 for night time noise.[11] The CAA's overflights metric is a means of portraying those locations where residents will experience being overflown. These supplementary metrics must also be used to inform communities about the likely impact of proposed changes.

It is apparent from this para that overflight metrics are less applicable to areas impacted by low altitude flight paths (as they do not reflect noise on the ground). How have overflight metrics been applied in devising the CLOOs and what weighting has been applied? What suite of metrics (intelligible to the general public) does Heathrow propose to use in the IOA? Will these include N>, single mode, time of day/night contours, respite periods (including operational mode) and impact of multiple routes?

3.12 The CAA should also verify that sponsors have used any other noise metrics that may be appropriate for allowing communities to understand the noise impacts that could result from the proposed change. This could include the use of 100% mode contours for average noise or frequency-based metrics, or consideration of the interaction with other sources of aircraft noise, such as those from other local airports.

Introduction of Performance Based Navigation

3.13 Perhaps the most significant change to airspace arrangements in the past 50 years has been the onset of the implementation of performance-based navigation (PBN), a process which is likely to take many years to complete.

Can Heathrow advise when it is expected the aviation fleet will be fully equipped with PBN technology and how the transition period will be addressed (particularly in the context of radical CLOOs) in the IOA? How will the safety and potential additional noise implications of sharp PBN enabled turns be addressed?

3.14 When considering the introduction of new PBN-based procedures intended to replicate existing conventional procedures, the CAA should ensure that the airspace change proposal contains options and uses options appraisal which will help the sponsor to determine whether a replication of existing procedures is the optimum approach for meeting both the government's environmental objectives and the sponsor's own objectives for the airspace change in question.

3.15 If, following the options appraisal, the sponsor considers that the best approach to be taken is to replicate the current conventional flightpath with the use of the new procedures, the implementation of this replication should seek to preserve the existing route alignments as far as possible. In such circumstances, the CAA should make the sponsor aware that experience has shown that modern aircraft and their on-board flight systems cannot always accommodate an exact replication.

3.17 In cases where airports wish to enhance the standard used on PBN flightpaths, for example from "RNAV1" to "RNP1", the government recognises that such changes are less likely to cause a significant redistribution of air traffic. In such cases, the government still expects the sponsor to consider using options appraisal, but the CAA is able to determine the precise approval process which sponsors need to follow, providing that any noise impacts have been assessed and there is full transparency with communities that may be affected.

This emphasises the importance of full transparency with the public. How will this be achieved? It needs to be remembered that over many years a huge number of people have established their lives based on the current flight path pattern; those that have found the current situation unacceptable will have made conscious decisions to move away because of Heathrow's noise impact. The social impact of Heathrow's more radical CLOOs (if implemented) will be enormous, potential extremely damaging and giving rise to blighted communities. How will Heathrow reflect legacy arrangments in its IOA (and subsequent stages) and what weighting will be applied to these?

Single and multiple routes

3.18 Single and multiple routes both have costs and benefits associated with them. In terms of noise, a single route will, generally, tend to affect fewer people overall compared to multiple routes. It may mean however that more people are exposed to higher levels of noise where there is a greater risk of adverse effects, than if noise was more dispersed

3.19 As stated in section 1.3 above, decisions on how aircraft noise is best shared should be informed by local circumstances and consideration of the different options that are deemed to be practicable. This consideration should include the pros and cons of concentrating traffic on single routes which normally reduce the number of people overflown, versus the use of multiple routes which can potentially provide relief or respite from noise but increase the number of people overflown overall.

3.20 This means there will be situations when multiple routes, that expose more people overall to noise but to a lesser extent, may be better from a noise perspective. Taking account of consultation and the objectives of the airspace change proposal, with regard to assessing and comparing environmental impacts of a proposed change, preferred options should normally be based on those which result in fewer total adverse effects on people.

Does Heathrow accept that this section reinforces the importance of understanding significant adverse impacts, rather than a simplistic approach based on noise contours that do not necessarily reflect 'the lived experience' of communities near Heathrow?

Heathrow will recall the CAA reported to the HCNF the impact of splitting a single PBN route, which monetised the benefit to be £640 miillion over a ten year period. Does Heathrow agree that noise sharing will reduce significant adverse effects rather than concentrating significantly greater noise over fewer people? If it disagrees what evidence base is being relied on and what data and research will be used to validate its approach in the IOA and subsequent stages?

3.21 For airspace changes where noise levels are expected to lead to fewer measurable impacts on health and the quality of life, greater consideration should be given to how the number of overflights is distributed, and consideration of how the current situation for those overflown will differ for any future options. However, it is important that all decisions are made in line with the altitude-based priorities and that impacts on wider airspace use are also considered.

3.22 Proposals by sponsors, and ultimately the CAA's decision, concerning single and multiple routes should be explained clearly and transparently.

M&M2 Workshop – Technically minded community stakeholder representatives

Wednesday 25 January 2023, 10:00 - 13:00, Holiday Inn

Name	Organisation
[redacted]	Heathrow
[redacted]	Heathrow
[redacted]	Heathrow
[redacted]	Heathrow
[redacted]	Heathrow
[redacted]	Heathrow
[redacted]	Heathrow
[redacted]	Heathrow
[redacted]	Heathrow
[redacted]	Heathrow
[redacted]	Headland
[redacted]	Buckinghamshire Council / Heathrow Strategic Planning Group
[redacted]	Spelthorne Borough Council / Heathrow Strategic Planning Group
[redacted]	Ealing Council / Heathrow Strategic Planning Group
[redacted]	Molesey Residents Association
[redacted]	Royal Borough of Windsor and Maidenhead Council
[redacted]	HACAN
[redacted]	Friends of Richmond Park
[redacted]	Friends of Richmond Park
[redacted]	Teddington Action Group
[redacted]	Teddington Action Group
[redacted]	Richmond Heathrow Campaign
[redacted]	Englefield Green Action Group
[redacted]	Englefield Green Action Group
[redacted]	Harmondsworth & Sipson Residents Association

From: [redacted]
Sent: 26 January 2023 16:05
To: DD - Airspace
Cc: [redacted]

Subject: Heathrow ACP - Stage 2A Design Principle Evaluation (DPE) methodology
Attachments: Heathrow ACP - DPE process - FRP vF.pdf

Dear [redacted],
The Friends of Richmond Park (FRP) are deeply concerned that the Heathrow ACP Stage 2 Design Principles Evaluation (DPE) will fail to treat correctly either public open spaces in general or Richmond Park in particular (given its special AONB-equivalent status according to ANG17 and CAP1616), and thereby be in material breach of ANG17 and CAP1616 requirements.

The Metrics & Methodology 2 (M&M2) workshop yesterday briefly touched on the DPE. Among other things, we noted that, though DPE metrics were discussed at the M&M1 workshop last July, DPE methodology was not. (We tried to redress this in part by setting out a proposal on DP scoring and weighting methodology to which you have not yet responded 6 months later). We are concerned that critical DP evaluation methodology will not be shared with stakeholders until the DPE is concluded – which is inconsistent with the CAA expectation expressed in CAP1616 "*A prime objective of the airspace change process is that it is as transparent as possible throughout*."

In an attempt to correct the above issues, we attach a paper setting out how the performance of each flight path option should be evaluated against each DP in the Heathrow ACP Stage 2 DPE. This would ensure that both the value of public open spaces in general and, in addition, the special status of Richmond Park in particular (as a specific area identified via community engagement to be treated on par with an AONB) would be properly taken into account in the DPE Stage 2A process in compliance with ANG17 and CAP1616 requirements. This approach is consistent with the precedents set by other major airports that have completed their DPEs and received CAA Stage 2 gateway approval.

The M&M2 workshop also reinforced our concern that the Heathrow sponsor's handling of the DPE process may be challengeable because it has not properly understood the function of the DPE process. We repeat that CAP1616 (at paragraph 125) is very clear that all the design options in the Comprehensive List of Options (CLOO) (which pass through to the Initial Option Appraisal at Stage 2B) must be "*aligned with the design principles*" and the function of the DPE is to demonstrate that that is the case.

We would be grateful for your early assurance that: (i) the DPE currently underway will properly take into account public open spaces in general and, in addition, the special status of Richmond Park in particular (AONB-equivalent) as set out in the attached paper; and (ii) all the design options in the CLOO that will be taken forward into Stage 2B are aligned with the DPs and how this assessment has been made will be set out in the DPE.

Yours sincerely,
[redacted],
Chairman, The Friends of Richmond Park

Heathrow ACP
Design Principle Evaluation (DPE) - Richmond Park

The Friends of Richmond Park (FRP) are concerned that the Heathrow ACP Stage 2 Design Principles Evaluation will fail to treat either public open spaces in general or Richmond Park in particular (given its special AONB-equivalent status according to ANG17 and CAP1616) correctly, and thereby be in material breach of ANG17 and CAP1616 requirements.

If it is to comply with ANG17 and CAP1616, the Design Principles Evaluation must respect the wording and intent of the Design Principles, taking proper account of the concerns expressed by stakeholders at Stage 1 regarding the value (in terms of both health and quality of life and the environment) of public open spaces such as Richmond Park, and pursue the legally binding environmental objectives set down by ANG17. This paper, and its specific proposals on each Design Principle, propose how that can be done while at the same time treating residential areas correctly.

<u>Context</u>
This paper is submitted in Jan-23, soon after Heathrow started on its Stage 2A Design Principle Evaluation (DPE). This is FRP's second attempt to engage in a dialogue with Heathrow on the methodology it intends to use in its DPE.

FRP first attempted to engage Heathrow in a discussion on DPE methodology at Heathrow's Methods and Methodology workshop (M&M1) on 5-Jul-22. Though DPE metrics were discussed at that workshop, DPE methodology was not. Nevertheless, at the M&M1 workshop FRP set out a proposal on DP scoring and weighting methodology, and reiterated it in an email on 10-Jul. A copy of that proposal is set out in the Appendix. On 22-Jul Heathrow's record of further stakeholder feedback from M&M1 recorded "*Our approach to weighting and scoring will be shared as part of Stage 2 engagement. FRP's proposed approach will be considered*." No further response was received. We now understand that a DPE workshop will take place in late-March 2023, towards the end of Heathrow's DPE process i.e. after all DPE processes are established and executed.

We note that, at this point, six of the 11 airports in the London TMA have completed Stage 2, as have major airports elsewhere in the UK notably Glasgow and Manchester. All these provide precedents and examples of how to accomplish DPEs in ways acceptable to the CAA. We note that:

- Many have chosen to sub-divide DPs in order to evaluate options properly;
- They stressed the importance of care in re-combining those evaluations, carefully setting out how it was done; and
- Even more importantly, they set out in detail how for each option, the individual DP evaluation results (Met, Partially Met, Not Met) were combined to get each final option verdict.

Correct treatment in DPE

The following pages set out how the performance of each flight path option should be evaluated against each DP in the Heathrow ACP Stage 2 Design Principles Evaluation in order to ensure both the value of public open spaces in general and, in addition, the special status of Richmond Park in particular (as an area identified via community engagement to be treated on par with an AONB) are properly taken into account in the DPE Stage 2A short-listing process in compliance with ANG17 and CAP1616 requirements.

This approach is consistent with the precedents set by other major airports that have completed their Stage 2A DPEs and received CAA Stage 2 gateway approval.

FRP
26-Jan-23

DP1: "*Be safe*"

To properly evaluate Heathrow's DP1, consistent with the precedents of other airports' Safety Design Principles' evaluation tests (as accepted by the CAA), make Met / Partially Met / Not Met tests:

Design Principle	How it is evaluated	Met	Partially Met	Not Met
1. Be Safe	To properly evaluate DP1, its evaluation must take account of whether, for each option, special navigation equipment is a requirement. I.e. whether each option cannot be generally utilised from commencement by the prevailing aircraft fleet mix because the option requires RNP1 or RNP-AR.	This option and its operation are as safe as or safer than today, based on airlines' current fleet mix.	This option and its operation requires use of RNP-AR if it is to be as safe as today	This option and its operation are less safe than today

DP2: "*Remain in accordance with the CAA's published Airspace Modernisation Strategy and any current or future plans associated with it and all other relevant UK policy, legislation and regulatory standards (for example, Air Navigation Guidance). This includes preventing any worsening of local air quality due to emissions from Heathrow's aircraft movements, to remain within local authorities' limits*".

Design Principle	How it is evaluated		Met	Partially Met	Not Met
2. Remain in accordance with the CAA's published Airspace Modernisation Strategy and any current or future plans associated with it and all other relevant UK policy, legislation and regulatory standards (for example, Air Navigation Guidance). This includes preventing any worsening of local air quality due to emissions from Heathrow's aircraft movements, to remain within local authorities' limits	To properly evaluate DP2, consistent with the requirements of ANG17, in line with the precedents set by other airports' Stage 2A DPEs (as approved by the CAA), and meeting the commitments made at the M&M1 workshop, the evaluation of DP2 should include all substantive items unless covered elsewhere in other DPs (CO2 emissions in DP4, elements of noise impacts in DP3, 6, 7, 8, 9, 10). Therefore, this DP should be evaluated via four sub-elements (taking into account, in respect of those options over or near Richmond Park, its special status as the most heavily protected urban park in the UK and equivalent to an AONB/NP): a) Noise: health and quality of life (NPSE) – other elements of noise	Health and quality of life: meet the three aims of the NSPE: (i) avoid significant adverse impacts on health and quality of life; (ii) mitigate and minimise adverse impacts on health and quality of life; and (iii) where possible, contribute to the improvement of health and quality of life	This option will make a positive contribution to the NSPE aims	This option is expected to be broadly neutral in terms of NSPE aims	This option has the potential to detract from NSPE aims
		Air quality: identify options that carry a risk that one of the following conditions is met: (i) there is likely to be a change in aviation emissions (by volume or location) below 1,000ft (ii) the location of the emissions is	This option carries no risk of either condition for a full local air quality assessment being met	This option carries a risk of only one of the two conditions for a full local air quality assessment being met	This option carries a risk of both conditions for a full local air quality assessment being met

	being addressed in DP3, 6, 7, 8, 9, 10; b) Air quality (ANG17 3.29); c) Tranquillity (ANG17 3.32, 3.34); CAP1616 B76 & footnote 73, CPRE Saving Tranquil Spaces Oct-06, Rural White Paper 2000); and d) Biodiversity (CAP1616 B80)	within or adjacent to an identified AQMA			
		Tranquillity: avoid Areas of Outstanding Natural Beauty (AONB) and National Parks and Richmond Park and any other *specific* local area with similar characteristics to a Quiet Area (such as Richmond Park) that has been identified via community engagement, weighted by reference to visitor nos. and accessibility (logistical and financial)	This option will reduce the number of visitors experiencing aircraft noise in AONBs, NPs, Richmond Park and other specific areas of tranquillity identified via community engagement (if any)	This option will be broadly neutral in terms of the number of visitors experiencing aircraft noise in AONBs, NPs, Richmond Park and other specific areas of tranquillity identified via community engagement (if any)	This option has the potential to increase the number of visitors experiencing aircraft noise in AONBs, NPs, Richmond Park and other specific areas of tranquillity identified via community engagement (if any)
		Biodiversity: (i) minimise cumulative (direct and indirect) long-term impact of sound exposure from aircraft up to 2000ft above ground on all protected and notable species and habitats (including but not limited to those referred to in	This option will reduce the cumulative long-term impact of sound exposure on biodiversity caused by aircraft and will improve local air quality and reduce pollution damage to	This option is expected to be neutral with regard to the cumulative long-term impact of sound exposure on biodiversity caused by aircraft and to maintain the same level of	This option has the potential to increase the cumulative long-term impact of sound exposure on biodiversity caused by aircraft or to degrade local air quality or have an adverse

		applicable environmental designations), and on other species and habitats identified by stakeholders and existing or newly commissioned biodiversity surveys; and (ii) Avoid significant SSSIs, SPAs, SACs, NNRs, Ramsar sites ; and (iii) Minimise the further degradation in local air quality and adverse *long-term* ecological impacts taking into consideration emissions from aircraft having the potential to contribute to overall pollution levels in the area at elevations up to 2000ft above ground	ecological health	local air quality and generate similar levels of pollution that may impact ecological health caused by aircraft	impact on the ecology as a result of increased pollution levels caused by aircraft

DP3: "*Use noise efficient operational practices to limit and, where possible, reduce adverse impacts from aircraft noise*"

Design Principle	**How it is evaluated**		**Met**	**Partially Met**	**Not Met**
3. Use noise efficient operational practices to limit and, where possible, reduce adverse impacts from aircraft noise	To properly evaluate DP3, the evaluation must recognise that some PBN Options require operational practices (e.g. tight turns into the technical minimum convergence point) are not as noise efficient as vector CCO/CDO or gentler PBN turns. Therefore, Options' performance against DP3 should be evaluated via two sub-elements.	Use noise efficient operational practices	This option is able to use all available noise efficient operational practices (CCO, CDO, NADPs, steeper approaches, landing gear deployment, low power low drag)	This option is able to partially use noise efficient operational practices	This option cannot use any or only a few noise efficient operational practices
		Operational practices limit and, where possible, reduce adverse impacts from aircraft noise	This Option's operational practices will reduce adverse impacts from aircraft noise compared with today	This Option's operational practices will be broadly neutral on impacts from aircraft noise compared with today	This Option's operational practices will increase impacts from aircraft noise compared with today

DP4: "*Reduce the contribution to climate change from CO2 emissions and other greenhouse gas emissions arising from Heathrow's aircraft activities*"

Design Principle	How it is evaluated		Met	Partially Met	Not Met
4. Reduce the contribution to climate change from CO2 emissions and other greenhouse gas emissions arising from Heathrow's aircraft activities	To properly evaluate DP4: the evaluation must: (a) estimate the CO2 savings compared with today, including the detrimental effect of flight manoeuvres; and (b) identify whether any options while below 4,000ft breach the Government's altitude-based priorities (ANG17 3.2 and 3.3) by reducing CO2 but increasing noise	Each option's estimated fuel burn should be estimated as a proxy for CO2 emissions, taking into account flight manoeuvres as well as track mileage	This option generates materially less CO2 than today	This option generates less CO2 than today but not by as much as similar nearby options	This option generates more CO2 compared with today
		For any option showing reduced CO2 determine whether, while below 4,000ft, that option's noise impact is greater or lesser than today.	While below 4,000ft this option reduces CO2 and does not increase total adverse impacts from noise.	While below 4,000ft this option reduces CO2 but is neutral on total adverse impacts from noise.	While below 4,000ft this option reduces CO2 but increases total adverse impacts from noise.

DP5: "*Enable Heathrow to make the most operationally efficient and resilient use of its existing two runways, to maximise benefits to the airport, airlines and cargo handlers, passengers, and local communities*"

Design Principle	How it is evaluated	Met	Partially Met	Not Met
5. Enable Heathrow to make the most operationally efficient and resilient use of its existing two runways, to maximise benefits to the airport, airlines and cargo handlers, passengers, and local communities	To properly evaluate DP5, the evaluation needs to take into account the different impacts of PBN vs. vector arrivals and alternation options on airport capacity, operational efficiency and resilience in the use of the existing two runways, and the evolution of these over at least 30 years as advanced PBN systems become established	This option would benefit all of: airport, airlines and cargo handlers, passengers, and local communities immediately upon implementation	This option would benefit some, but not all, of: airport, airlines and cargo handlers, passengers, and local communities, and/or such benefits would only emerge after, but within 5 years of, implementation	This option would not benefit the majority of: airport, airlines and cargo handlers, passengers, and local communities and/or such benefits would not emerge until over 5 years after implementation

DP6: "*Provide predictable and meaningful respite to those affected by noise from Heathrow's movements*"

Design Principle	How it is evaluated		Met	Partially Met	Not Met
6. *Provide predictable and meaningful respite to those affected by noise from Heathrow's movements*	To properly evaluate DP6, the evaluation needs to take into account: (a) the predictable and meaningful respite from the noise of Heathrow's movements currently provided to residents while away from their home/work by large quiet public open spaces; and (b) the different impacts of PBN vs. vector arrivals and alternation options on airport capacity, operational efficiency and resilience in the use of the existing two runways, and the evolution of these over years as advanced PBN systems become established	How does this Option affect the predictable and meaningful respite of the resident population	This option significantly improves the predictable and meaningful respite currently of the resident population	This option has broadly no change to the predictable and meaningful respite of the resident population	This option significantly reduces the predictable and meaningful respite of the resident population
		How does this Option affect the predictable and meaningful respite from the noise of Heathrow's movements currently provided by large quiet public open spaces?	This option improves the predictable and meaningful respite currently provided by large quiet public open spaces	This option has broadly no change to the predictable and meaningful respite currently provided by large quiet public open spaces	This option reduces the predictable and meaningful respite currently provided by large quiet public open spaces

DP7: "*Seek to avoid overflying the same communities with multiple routes including those to/from other airports*"

No proposal

DP8: "*Contribute to minimising the negative impacts of night flights"*

Design Principle	How it is evaluated		Met	Partially Met	Not Met
8. Contribute to minimising the negative impacts of night flights	To properly evaluate DP8, account must be taken not only of the impact of night flights on the resident population, but also of the impact of night flights on noise sensitive areas including Areas of Outstanding Natural Beauty (AONB) and National Parks and any specific local area with similar natural environmental characteristics that has been identified via community engagement as a specific area to be avoided. Therefore, Options' performance against DP8 should be evaluated via two sub-elements: residential areas and large open spaces -with different metrics.	Residential areas, using the population metrics discussed at the M&M1 workshop			
		Large open spaces* using LAmax and N65/N70. *Including Areas of Outstanding Natural Beauty (AONB) and National Parks and any specific local area with similar biodiversity characteristics that has been identified via community engagement as a specific area to be avoided	This option does not affect any such noise sensitive areas	This option has little effect on such noise sensitive areas	This option significantly affects such noise sensitive areas

DP9: "*Keep the number of people who experience an increase in noise from the future airspace design to a minimum*"

Design Principle	How it is evaluated		Met	Partially Met	Not Met
9. Keep the number of people who experience an increase in noise from the future airspace design to a minimum	To properly evaluate DP9, in addition to the use of population metrics as a proxy for "… *people who experience an increase in noise …"* in respect of residential areas, account must be taken of the very large numbers of people making use of large public open spaces having very low ambient noise and where the impact of new overflights would be short bursts of intense as measured by LAmax and N65/N70 Therefore, consistent with Luton and Glasgow Stage 2a DPEs, Options' performance against DP9 should be evaluated via two sub-elements: residential areas and large open spaces - with different metrics.	Residential areas, using the population metrics discussed at the M&M1 workshop			
		Large amenity and recreational open spaces having similar characteristics to a Quiet Area that have been identified via community engagement, using annual visitor numbers and LAmax and N65/N70 and elevation above ground level (rather than amsl) (consistent with ANG17 3.3(f))	This option does not increase the number of people who experience an increase in LAmax and N65/N70 noise from the future airspace design	This option slightly increases the number of people who experience an increase in LAmax and N65/N70 noise from the future airspace design	This option significantly increases the number of people who experience an increase in LAmax and N65/N70 noise from the future airspace design

DP10: "*Keep the total number of people who experience noise from the future airspace design to a minimum*"

Design Principle	How it is evaluated		Met	Partially Met	Not Met
10. Keep the total number of people who experience noise from the future airspace design to a minimum	To properly evaluate DP10, in addition to the use of population metrics as a proxy for "… *people who experience an increase in noise …"* in respect of residential areas, the metrics must reflect the fact that DP10 was intended to address stakeholder comments at Stage 1 opposing flights over open spaces/parks, with particular concern for lower income groups without private open space. Accordingly, account must be taken of the benefits to people's physical and mental health of any large readily accessible public open spaces that are known to be heavily visited and having very low ambient noise and where the impact of new overflights would be short bursts of intense LAmax. Also, account must be taken of noise sensitive areas including Areas of Outstanding Natural Beauty (AONB) and National Parks and any specific local area with similar characteristics to a Quiet Area that has been	Residential areas, using the population metrics discussed at the M&M1 workshop			
		Large public open spaces having similar characteristics to a Quiet Area that have been specifically identified via community engagement using annual visitor numbers and LAmax and N65/N70 using elevation above ground level (consistent with ANG17 3.3(f) and CAP1498)	This option does not increase the total number of people who experience LAmax and N65/N70 noise from the future airspace design	This option slightly increases the total number of people who experience LAmax and N65/N70 noise from the future airspace design	This option significantly increases the total number of people who experience LAmax and N65/N70 noise from the future airspace design

	identified via community engagement, and noise sensitive areas (including residential schools and educational facilities for children with special auditory needs). Therefore, consistent with Luton and Glasgow Stage 2a DPEs, Options' performance against DP10 should be evaluated via two sub- elements: residential areas and large open spaces - with different metrics.				

DP11: "*Enable the efficiency of other airspace users' operations*"

No proposal

DP12: "*Minimise the impact to all stakeholders from future changes to Heathrow's airspace*"

Design Principle	How it is evaluated	Met	Partially Met	Not Met
12. Minimise the impact to all stakeholders from future changes to Heathrow's airspace	To properly evaluate DP12 account should be taken of any option's vertical separation from helicopter flight path H3's maximum permitted altitude of 1,500ft and if less than the statutory minimum clearance all remedial measures should be included in that option's evaluation.	This option does not require helicopter flight path H3 to be changed in any way	This option requires helicopter flight path H3 to be changed significantly	This option requires helicopter flight path H3 to be suspended.

APPENDIX

FRP proposal on DP scoring and weighting methodology (email on 10-Jul-23)

It is critically important: (a) how the metrics will be added up to get a score for each DP on a specific option; and (b) how, for each option, each DP's score will be weighted to arrive at an overall score - which is then used for Stage 2's short-listing of options. Moreover how this is done should meet the CAP1616 test of "*evaluate ... the design options against the design principles in a fair and consistent manner*". To this end, FRP tabled a suggestion method of DP scoring and weighting.

Given that it is necessary, under CAP1616, for the options be evaluated in a 'fair and consistent manner', it is important that quantitative tests (e.g. scoring the table of metrics) rather than qualitative judgements, be used to short-list options

Please find attached an electronic copy of the DP scoring and weighting spreadsheet FRP tabled. As discussed briefly in the workshop, among other things this suggests initially scoring as a % how well each DP does for a given option, rather than going directly to 'Met, Partially Met, Not Met' as set out in CAP1616 Appendix E. The reasoning is that this ensures the CAP1616 requirement of consistency in options appraisal is achieved, e.g. consistency in what it takes for 'Met' to be achieved as opposed to 'Partially Met'.

HAL - Design Principles weighting

Version control: v1.0 5-Jul-22

		Design Principles requirements under CAP1616	Weighting		Option X		Option Y		Option Z	
					DP result	Weighted	DP result	Weighted	DP result	Weighted
Our new airspace design **must**	1	Be safe	Must	10	70%	7.0	90%	9.0	70%	7.0
	2	Remain in accordance with the CAA's published Airspace Modernisation Strategy and any current or future plans associated with it and all other relevant UK policy, legislation and regulatory standards (for example, Air Navigation Guidance). This includes preventing any worsening of local air quality due to emissions from Heathrow's aircraft movements, to remain within local authorities' limits	Must	9	90%	8.1	90%	8.1	70%	6.3
	3	Use noise efficient operational practices to limit and, where possible, reduce adverse impacts from aircraft noise	Must	8	60%	4.8	40%	3.2	55%	4.4
	4	Reduce the contribution to climate change from CO2 emissions and other greenhouse gas emissions arising from Heathrow's aircraft activities	Must	6	60%	3.6	60%	3.6	55%	3.3
	5	Enable Heathrow to make the most operationally efficient and resilient use of its existing two runways, to maximise benefits to the airport, airlines and cargo handlers, passengers, and local communities	Must	6	90%	5.4	90%	5.4	60%	3.6
And **should** also	6	Provide predictable and meaningful respite to those affected by noise from Heathrow's movements	Should	7	40%	2.8	60%	4.2	30%	2.1
	7	Seek to avoid overflying the same communities with multiple routes including those to/from other airports	Should	7	40%	2.8	60%	4.2	30%	2.1
	8	Contribute to minimising the negative impacts of night flights	Should	7	10%	0.7	40%	2.8	10%	0.7
	9	Keep the number of people who experience an increase in noise from the future airspace design to a minimum	Should	7	50%	3.5	20%	1.4	40%	2.8
	10	Keep the total number of people who experience noise from the future airspace design to a minimum	Should	7	60%	4.2	50%	3.5	40%	2.8
	11	Enable the efficiency of other airspace users' operations	Should	5	70%	3.5	70%	3.5	30%	1.5
	12	Minimise the impact to all stakeholders from future changes to Heathrow's airspace	Should	5	80%	4.0	80%	4.0	30%	1.5
		OPTION SCORE				**50.4**		**52.9**		**38.1**

Tabled by FRP at M&M workshop 5-Jul-22

Option X makes it to the Stage 2 short-list (as it passes all 'Must' tests and has high overall score)

Option Y rejected as it fails on a 'Must' DP

For each DP's % rating, there should be a brief rationale.
E.g. "*Main driver for DP3's 40% was impaired CDO usage*"

Option Z fails to make it to the short-list as its score is too low

CAP1616 Stage 2

(para 128): *"... that the change sponsor has in our view:*

- *identified all the possible options*
- *evaluated the design options against the design principles in a fair and consistent manner*

(para 135): "... This appraisal therefore needs to be objective, repeatable and consistent ..."

From: [redacted]
Sent: 31 January 2023 15:01
To: [redacted]
Cc: DD - Airspace; [redacted]
Subject: M&M2 Workshop
Attachments: Email to HAL re M&M2 - attachment.pdf

Dear [redacted],
Thanks again for hosting the M&M2 Workshop at the Holiday Inn last week.

I'm emailing you now to:

1. Expand on two fundamental issues touched upon in the workshop; and
2. Note briefly some of the points The Friends of Richmond Park (FRP) made in the meeting – in case it's helpful to [redacted] as he prepares his meeting record.

(1) Fundamental issues

First, the M&M2 workshop reinforced our concern that the Heathrow sponsor's handling of the DPE process may be challengeable because it has not properly understood the function of the DPE process. We repeat that CAP1616 (at paragraph 125) is very clear that all the design options in the Comprehensive List of Options (CLOO) (which pass through to the Initial Option Appraisal at Stage 2B) must be "*aligned with the design principles*" and the function of the DPE is to demonstrate that that is the case.

We would be grateful for your early assurance that: (i) all the design options in the CLOO that will be taken forward into Stage 2B are aligned with the DPs; and (ii) how this assessment has been made will be set out in the DPE.

We do not regard Luton's process as a precedent for disregarding (other than as a possible tiebreaker) the DPE results, in the manner suggested by the Heathrow sponsor at the M&M2 workshop. Although even options that scored poorly in the Luton DPE (below 60) may have been formally appraised under the IOA, there is a very strong correlation between the DP non-compliant options and the options that were dropped by the end of Stage 2. We would be grateful for your assurance that no option that is a relatively poor fit with the DPs will proceed through to Stage 3.

Second, CAP1616 (p156, B8) requires that environmental assessments be done in Stage 2B. In Sep-22 we set out in detail in our Preliminary Environmental Assessment (pEA) how this should be done to ensure that open spaces, and Richmond Park in particular, are properly treated in compliance with ANG17 and CAP1616.

In our Dec-22 Stage 2 Feedback (Box 10 paras 3-5) this was set out clearly. In summary:

- The "*scale of the change options*" for Richmond Park is enormous;
- The "*nature of the potential environmental impacts*" on Richmond Park is severe;
- Therefore, the sponsor should carry out a substantive EA at Stage 2B for Richmond Park (and any other area of similar extraordinary environmental importance potentially affected by the CLOO), covering all 5 elements listed in B12, quantitative as well as qualitative, along the lines of FRP's pEA. A few short unsupported comments would be inadequate. It is not compliant with CAP1616 to delay that level of assessment to Stage 3;
- We do not consider the Luton and Glasgow environmental analyses to be suitable templates or precedents for Heathrow Airport in relation to Richmond Park.

We see, from the M&M2 slide pack as confirmed in the workshop, that HAL are not planning on carrying out a proper EA for such open spaces and particularly Richmond Park in Stage 2B in respect of noise, air quality, and biodiversity. This is not acceptable. We welcome HAL's agreement, in the workshop, to accepting Richmond Park, in the Tranquillity element of the IOA, as a specific area identified through community engagement as equivalent to an AONB or National Park.

(2) Summary of points/suggestions FRP made in the meeting
Matt may have picked-up other points we made for FRP. But attached are particular ones we noted down.

Best regards,
[redacted]
The Friends of Richmond Park (FRP)

Summary of points/suggestions FRP made in the M&M2 meeting

DPE process:

- FRP referred to a quote from a stakeholder in the Luton equivalent of this group: "*The definition and relative weighting of suitable Design Principles is absolutely vital. However enticing the Options can be, a sponsor can then whip them away again when the scoring is done against Design Principles. These are the levers of power*."
- The Methods and Methodology workshop (M&M1) did not in fact set out this crucial methodology on the mechanics of evaluation. FRP made a proposal in the M&M1 workshop, reiterated in our email of 10-July-22, but has not yet received a response from HAL;
- In the scoring of each CLOO option against each DP (as Met, Partially Met, or Not Met), the relative weighting of DPs, exactly how all the DP scores for each option are added up, etc. are crucial to the outcome of whether a specific flight path option is scored in the DPE as Met, Partially Met, or Not Met; and
- FRP asked: how will the DPE be used? Will the DPE affect shortlisting? Manchester and Glasgow used DPE to sift options.

HAL responded that, among other things: (a) the DPs will not be weighted in the option evaluations (but did not share any other information about the DPE scoring process); (b) HAL does not expect to discount any options based on the DPE results; and (c) if 2 or 3 surviving options coming out of the IOA process are finely balanced as against policies, HAL may look back to DPs to choose the preferred option.

Public information:

Several stakeholders pointed out that the general public was completely unaware of the CLOOs. HAL stated that the general public will be able to see the CLOO long list of flight path options, the short list, and any preferred options on the CAA portal at the end of July-23. Also, HAL would inform stakeholders of the names of individual officials contacted at W&M & Richmond LAs (**Action: HAL**)

'Do nothing/minimum' option:

- CAP1616 requires CLOO to include "do nothing/minimum" as a standalone option, not merely a comparator. There is a clear distinction between the two: CAP1616 E12/13 makes plain that "do nothing/minimum" is a real option and not just a basis for comparing options. It has to be one of the options in the CLOO.
  HAL responded that 'Do nothing' options will be options in their own right in the DPE (evaluated using all same metrics) and in the IOA. And that 'Do nothing' will also go into Stage 3 as a comparator.

Initial Options Appraisal (IOA) ranking/selection:

- [At slide 9]. Where are the criteria for weighting and scoring? Are HAL open to suggestions and will HAL take such suggestions into account?
  HAL responded that the IOA weighting and scoring methodology/criteria are not set yet, but they are always open to suggestions.
- [At slide 12] FRP queried the purpose of secondary metrics and whether they will be used to shortlist options.

HAL said that the information generated by the secondary metrics will all be tabulated and shared but did not commit to using the information to select or prioritise options

- [At slide 14] FRP pointed out that this workshop was not addressing the large and very important area of the method of evaluating options in the IOA. Though about IOA method, this slide only covers the baseline and associated assumptions. This M&M2 workshop is missing an explanation of the proposed methodology, like the DPE in M&M1: i.e. whether any of the 15 IOA criteria are split for appraisal, if so how are they recombined, and then how are the criteria each scored for an option, whether weighting is used to come up with a total result for each option. I.e. exactly what it takes for an option to be ranked Met, Partially Met, or Not Met in the IOA. Stakeholders will only find out about this crucial topic after all work been done at the 'share and inform' (no consultation) workshop.
  [At slide 20] HAL said that it would not determine/disclose [unclear which] its methodology until after it had amassed all the data

<u>Flight modelling in the IOA</u>:

- Does [slide 14 last bullet point] mean only aircraft/crews using RNP-AR will operate 04:30-06:00, for precise positioning and sharp turns?
  HAL responded: No, not necessarily, some PBN arrival options don't require a tight joining point. For reasons of dispersion, respite, viability and aircraft mix, expect PBN in 04:30-06:00 period. 06:00 onwards, move to vectoring
- Does that mean the final bullet on slide 14 should read: "*When appraising our PBN arrivals options, we will only include operations between 0430 and 0600….*" ?
  HAL responded: vectored flights' joining point will be no closer than 8 nm; PBN could be 3-18 nm. For the purposes of the IOA, we are assuming PBN for early morning arrivals only. Not to say, won't ever use PBN during the day; e.g. might be used late evening
- Do you anticipate all-PBN in 10 years' time?
  HAL responded: at Full Option Appraisal stage (Stage 3) HAL will have to model its forecast movements
- So, at Stage 2B, the IOA won't be representative of future flights?
  HAL responded: HAL need to provide clarity as to whether future movements will be modelled for the purposes of the IOA and/or the FOA

<u>Noise</u>:

- FRP: All the noise metrics proposed for this IOA element refer to resident population. Richmond Park is the quietest place in London and visited by 6m people every year. We have provided extensive evidence, notably 6 pages in our Preliminary Environmental Assessment (pEA), setting out how to treat noise properly in respect of open spaces in the IOA. It is inconceivable that this should not be taken account of in the IOA's noise assessment. Will HAL take account of our evidence on Richmond Park in the IOA's noise element?

<u>CO2</u>:

- FRP: How will HAL respect legally binding altitude-based priorities, up to 4,000ft and between 4,000ft and 7,000ft?

HAL cited ANG17's qualification to the priority of noise over carbon where the increase in CO2 is "*disproportionate*" to the noise impacts [but did not state that this is only the case for airspace above 4,000ft and that below 4,000ft noise takes unqualified priority]

Air Quality:

- FRP note that the CAP1616a guidance in Slide 22 refers to two conditions, but the guidance is not absolute – it merely states that the impact on air quality is only "*likely*" to be necessary where the two conditions are met (allowing for the possibility of exceptions) and, in any case, the second condition is satisfied in respect of Richmond Park which is in an AQMA
- FRP have provided extensive evidence, notably 4 pages in our Preliminary Environmental Assessment (pEA), setting out how to treat air quality properly in respect of open spaces in the IOA. Richmond Park has large areas of sensitive acid grasslands that have been in a low NOx environment for centuries. CLOO arrivals will emit up to 44 tonnes pa of NOx over Richmond Park. It is not appropriate to restrict consideration to flights passing at less than 1,000ft agl. Will HAL take account of our evidence on Richmond Park in the IOA's air quality element?

Biodiversity:

- FRP: NNRs should be added to the sites.
- FRP have provided extensive evidence, notably 4 pages in our Preliminary Environmental Assessment (pEA), setting out how to treat biodiversity properly in respect of open spaces in the IOA. Will HAL take account of our evidence on Richmond Park in the IOA's biodiversity element?
- What are the criteria that will trigger a Habitats Regulation Assessment? Note that Richmond Park is most protected urban park in UK.
  HAL responded: I can't answer, need to ask experts. (**Action: HAL**)

Tranquility:

- It is incorrect to wrap RP into a group of hundreds of small parks and gardens (e.g. football pitches). RP is a specific local area identified via community engagement as meriting equivalent protection to an AONB under CAP1616 and ANG17. What other areas have actually been nominated by stakeholders?
  HAL responded: Only FRP and TRP have specifically identified such areas. FRP asked how many, a handful? HAL responded: yes, only a handful
- This is about the AONB-equivalence of specific parks. It is totally inappropriate to create a category called 'Parks and Gardens' and lump Richmond Park into that category along with hundreds of (not specifically identified by stakeholders) small general parks and gardens, and doing so would amount to dilution. Richmond Park must be included as an AONB-equivalent in the AONB category and the general Parks and Gardens metric should be deleted.
  HAL confirmed that they will assess Richmond Park in same way as an AONB.

FRP
31-Jan-23

From: DD - Airspace
Sent: 01 February 2023 17:21
To: [redacted];
Cc: DD - Airspace; [redacted]
Subject: RE: M&M2 Workshop

Dear [redacted] and [redacted],

Thank you for both emails containing feedback following our Methods and Metrics Workshop on the 25th January.

We are currently reviewing your comments and feedback received following the Comprehensive List of Options workshops held in November and will respond to this in line with the CAP1616 process. Please be assured your concerns have been and noted we will contact you in due course with a response and our plans for future engagement.

Kind regards,
[redacted]

[redacted]
Airspace & ATM Engagement Specialist

From: DD - Airspace
Sent: 06 February 2023 09:55
To: [redacted]; DD - Airspace
Cc:
Subject: RE: Heathrow ACP Engagement: Methods and Metrics 2 Workshop Material

Dear [redacted],

Thank you for your recent email containing your concerns and feedback.

We hope that any questions relevant to Heathrow's approach to the Stage 2B Initial Options Appraisal, including our metrics, were answered during the Methods and Metrics 2 workshop held on 25th January. For any questions related to stakeholder engagement, please refer to the timeline included in recent workshop materials and NACF updates where the purpose of all workshops and when stakeholders have the opportunity to provide feedback are detailed.

We are currently reviewing your comments and feedback received following the Comprehensive List of Options workshops held in November and will respond to this in line with the CAP1616 process. In addition, at the upcoming Feedback & Design Principle Evaluation workshops in March, we will provide a general summary of all feedback received and how this feedback has informed the process so far. There will be a 4 week feedback period following these workshops, where stakeholders will again have the opportunity to provide feedback on work undertaken for the Design Principle Evaluation.

Please be assured your concerns have been noted and we will contact you in due course with our plans for future engagement with Teddington Action Group.

Kind regards,
[redacted]

[redacted]
Airspace & ATM Engagement Specialist

Heathrow

The Compass Centre, Nelson Road
Hounslow, Middlesex, TW6 2GW

m: [redacted]
w: heathrow.com t: twitter.com/heathrowairport
a: heathrow.com/apps

From: [redacted]
Sent: 08 March 2023 09:49
To: [redacted]
Cc: [redacted]
Subject: M&M2 minutes - and LBRuT contact

You don't often get email from [redacted]. Learn why this is important

Caution: external email. Unless you recognise the sender and know the content is safe, do not click links or open attachments.

Hi [redacted],
we haven't seen any draft minutes of 25-Jan M&M2 meeting.

Just checking we didn't miss them somehow…

Also, I think there was an action on HAL to let us know who the Richmond Council rep(s) on airspace are. I guess one his [redacted]. Could you please confirm this, and tell us the name of the council official leading on airspace?

Best regards,
[redacted]
Friends of Richmond Park

From: [redacted]
Sent: 08 March 2023 12:03
To: [redacted]
Cc: [redacted]
Subject: RE: M&M2 minutes - and LBRuT contact

Hi [redacted],

Apologies for the delay on this – it is currently under review by Heathrow colleagues following [redacted] validation. We are aiming to circulate them in due course.

With regard to Richmond Council representatives, I can confirm we have engaged with a number of representatives, however we are unable to provide you with names without first seeking their permission.

Kind regards,

[redacted]
Airspace & ATM Engagement Specialist

Heathrow

The Compass Centre, Nelson Road
Hounslow, Middlesex, TW6 2GW

m: [redacted]
w: heathrow.com t: twitter.com/heathrowairport
a: heathrow.com/apps

Methods and Metrics 2 - Workshop Note

DD - Airspace <airspace@heathrow.com>

Thu 06/04/2023 16:35

To: DD - Airspace <airspace@heathrow.com>

Bcc: [redacted]

1 attachments (270 KB)

0604 Heathrow M&M 2 Workshop Note.pdf;

Dear Sir/Madam,

Thank you to those who attended our Methods and Metrics 2 workshop earlier this year on 25 January. We shared with you the workshop material, and I have attached the workshop note for your information that has since been produced by Heathrow and independently verified. The note captures the discussion that took place in the workshop, including key pieces of your feedback and Heathrow's response. Apologies for the delay in getting the note to you. It is a complex and technical area and we wanted to ensure we accurately captured every point raised in the workshop.

If you have any questions, please email us at: airspace@heathrow.com.

I hope you have a lovely Easter weekend.
Kind regards,

[redacted]

Airspace & ATM Engagement Specialist

Heathrow

The Compass Centre, Nelson Road
Hounslow, Middlesex, TW6 2GW

m: [redacted]
w: heathrow.com t: twitter.com/heathrowairport
a: heathrow.com/apps

From: DD - Airspace
Sent: 06 April 2023 16:47
To: [redacted]; DD - Airspace
Subject: FW: Methods and Metrics 2 - Workshop Note
Attachments: 0604 Heathrow M&M 2 Workshop Note.pdf

Dear [redacted],

Please could you share the email below and attached workshop note with [redacted].

Many thanks,
[redacted]

From: DD - Airspace <airspace@heathrow.com>
Sent: Thursday, April 6, 2023 4:36 PM
To: DD - Airspace <airspace@heathrow.com>
Subject: Methods and Metrics 2 - Workshop Note

Dear Sir/Madam,

Thank you to those who attended our Methods and Metrics 2 workshop earlier this year on 25 January. We shared with you the workshop material, and I have attached the workshop note for your information that has since been produced by Heathrow and independently verified. The note captures the discussion that took place in the workshop, including key pieces of your feedback and Heathrow's response. Apologies for the delay in getting the note to you. It is a complex and technical area and we wanted to ensure we accurately captured every point raised in the workshop.

If you have any questions, please email us at: airspace@heathrow.com.

I hope you have a lovely Easter weekend.

Kind regards,
[redacted]

[redacted]
Airspace & ATM Engagement Specialist

Heathrow

The Compass Centre, Nelson Road
Hounslow, Middlesex, TW6 2GW

m: [redacted]
w: heathrow.com t: twitter.com/heathrowairport
a: heathrow.com/apps

Methods and Metrics Workshop 2

Report of technical workshop between Heathrow Airspace Modernisation Team and "technically-minded" stakeholder group representatives (25 January 2023, 10:00–13:00, Holiday Inn, Bath Road).

Attendees:

Stakeholder Group / Organisation:	Heathrow Representatives:
Buckinghamshire Council / Heathrow Strategic Planning Group (HSPG) Englefield Green Action Group (EGAG) Friends of Richmond Park (FRP) Heathrow Association for the Control of Aircraft Noise (HACAN) Harmondsworth & Sipson Residents Association (HASRA) London Borough of Ealing / Heathrow Strategic Planning Group (HSPG) Molesey Residents Association (MRA) Richmond Heathrow Campaign (RHC) Royal Borough of Windsor and Maidenhead Council (RBWM) Spelthorne Borough Council / Heathrow Strategic Planning Group (HSPG) Teddington Action Group (TAG)	[redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] (Headland - independent chair)

Throughout this note comments and questions from the 14 attendees are attributed to the organisation they represent, rather than the individual.
A slide pack was shared with stakeholders prior to the session and presented during the discussion. The structure of the report reflects the agenda and order in which the slides were presented, but key discussion points have been grouped into sub-sections where appropriate.

Discussion Agenda:

1. Purpose of the workshop
2. Update on Heathrow's Plan for Stage 2
3. Update: Design Principle Evaluation (DPE)
4. CAP1616 Requirements: Initial Options Appraisal
5. Recap: Previous Methods & Metrics Workshop
6. Initial Options Appraisal (IOA): Overview of Approach
7. IOA: Noise
8. IOA: Carbon
9. IOA: Air Quality
10. IOA: Biodiversity
11. IOA: Tranquillity
12. IOA: Appraisal of Concepts
13. AOB
14. Closing Remarks

Notes from the Discussion:

1. Purpose of the workshop

1.1	Heathrow	Welcomed stakeholders and set out that the purpose of the meeting is to focus on the proposed approach ("method and metrics") to the Initial Options Appraisal (IOA). Invited all attendees to ask questions and comment on the content shared.

2. Update: Heathrow's Plan for Stage 2

Comprehensive List of Options (CLOO)

2.1	TAG	Noted their feedback provided in December 2022 that the Comprehensive List of Options (CLOO) does not reflect the Design Principles or the requirements in ANG17 and are concerned about the method for shortlisting options. Asked if Heathrow will provide a technical response justifying their approach. Stated that the CLOO includes "radical" options. Suggested that the independent arrival and departure route options shown in the CLOO will result in multiple routes overflying the same areas and increase noise disturbance in Molesey, Richmond and Teddington. Noted that the current Civil Aviation Authority (CAA) consultation on the ACP process (CAP1616) proposes the removal of any requirement to consider "radical" options and suggested that system options are more appropriate for evaluation at Stage 2.
2.2	Heathrow	Stated that questions around ANG17 will be addressed in this workshop. Feedback relating to Heathrow's Comprehensive List of Options will be addressed in the March DPE sessions and the Stage 2A submission, Stated that CAP1616 requires sponsors to develop a "list of options" but does not prescribe a set methodology, and that creating independent arrival and departure route options allows Heathrow to robustly test the boundaries of the airspace design. If we did not consider options overflying different areas to today, we would be challenged as to why not. The Design Principle Evaluation (DPE) and IOA will provide information on the costs and benefits of the options, and additional concepts such as respite and dispersion are being explored to mitigate any adverse impacts.

Engagement Timeline

2.3	EGAG	Repeated a previous request that Heathrow upload the GIS database used to produce the CLOO maps to a publicly accessible web server for sharing with wider members of the group. Concerned that local authorities are unaware of the Airspace Modernisation Strategy and likely changes to flight paths.
2.4	RBWM	Asked Heathrow to provide contact details for the RBWM officer on Heathrow's ACP correspondence list.
2.5	TAG	Requested the local authority contact information for the Teddington & Richmond area.
2.6	FRP	Asked when the CLOO will be made publicly available.

2.7	Heathrow	Stated that it is not reasonable to expect stakeholders who have not previously been engaged to understand the level of detail in the CLOO. Wider public engagement will come at a later stage. Reminded stakeholders that the CLOO routes will evolve and change. Stated that the CLOO, DPE methodology and output, and IOA output will be submitted to the CAA at the end of July 2023, in advance of the Stage 2 Gateway in August 2023. All Stage 2 material will be published on the CAA's Airspace Change Portal. Confirmed that airport sponsors, Department for Transport (DfT), CAA, and ACOG are considering approaches to increase awareness of airspace modernisation. Noted Heathrow's Stage 1 and Stage 2 public awareness campaigns using local newspapers, social media and radio.

3. Update: Design Principle Evaluation (DPE)

3.1	FRP	Noted that despite discussing the DPE methodology at the previous Methods and Metrics workshop in July 2022, FRP remain dissatisfied with Heathrow's approach towards evaluating the Design Principles to decide if they are met, partially met, or not met by the flight path options. Stated the necessity of using a weighting scheme to decide the appropriate importance to be given to each design principle in assessing an overall score of each flight path option. Noted how important this approach had been to decision-making for other UK airports. Noted that they had provided Heathrow with a suggested methodology and that no further correspondence had been received. Asked how Heathrow will use the DPE output and suggested that this is used to shortlist options ahead of the IOA. Noted that CAP1616 does not require sponsors to put the CLOO through an IOA.
3.2	TAG	Stated that only some of the Design Principles were used to create the CLOO.
3.3	Heathrow	Confirmed that the Design Principles will not be weighted in the Design Principle Evaluation. The Design Principles are only categorised as "must" do and "should" do considerations. Stated that the CAA requires sponsors to propose a DPE methodology for consistent scoring of options as "met", "partially met" or "not met" against the Design Principles, and noted that FRP's feedback had been considered in developing Heathrow's approach. Clarified that it is unlikely that any options will be discounted based on the DPE results alone, and that more rigorous assessment will occur in the IOA. Heathrow will then review the DPE output and IOA output together to assess how the options perform. Confirmed there is no requirement within CAP1616 to discontinue options as a result of the DPE results alone.

4. CAP1616 Requirements: Initial Options Appraisal

Creating Systems Options

4.1	TAG	Asked at what stage the departure options will be combined with the arrivals options to create system options and assess combined impacts.
4.2	HASRA	Asked if system options will be shown at the Stage 3 public consultation.

4.3	HACAN	Asked for clarity around the projected 2024-25 timeframe for the public consultation as previously 2024 was the target date.
4.4	Heathrow	Confirmed that system options (arrivals + departures, easterly + westerly operations) will be shared at the Stage 3 public consultation, which is likely to take place in 2025. Consultation material will also need to refer to ACPs for other airports in the London Area and this requires alignment between the London airports to ensure a coordinated public consultation with information from neighbouring airports. Noted that Stage 3 work will begin once Heathrow has received CAA approval at the Stage 2 Gateway. Stated that systems options will be assembled in Stage 3, with input provided from other airports. Noted that ongoing conceptual work around respite and dispersion to understand possible mitigations for the impact of flight paths would also be completed at Stage 3.
4.5	TAG	Responded that Heathrow does not have a satisfactory understanding of changes to overflight and that it is unreasonable to upload separate departure and arrivals options in the Stage 2 Gateway Submission. Recommends that system options are assembled alongside the conceptual work at Stage 2B to better understand the likely impact on overflown areas.
4.6	Heathrow	Stated that the decision was made to assemble arrival and departure options individually, as has been done by some other sponsors, to enable us to consider a significantly greater number of options at Stage 2. These will be built into systems options at Stage 3 and assessed at the Full Options Appraisal (FOA), with detailed information on impacts then shared at public consultation.

Expert input to the IOA

4.7	MRA	Asked which parties are involved in the IOA and if associated costs with introducing PBN technology, such as investment in training crew and upgrading existing aircraft capabilities, are taken into consideration and weighted. Asked about Heathrow's internal Board-level decision making process for the ACP. Asked for clarity around the criteria and boundary threshold for discounting options following the IOA.
4.8	FRP	Asked about the criteria for assessing options and whether Heathrow will be open to stakeholder suggestions on appropriate metrics for assessing options.
4.9	TAG	Thanked Heathrow for explaining the phases of appraisal required by CAP1616. Emphasised the importance of the IOA as the only stage where qualitative assessment takes place. Suggested that the IOA should include quality thresholds against each Design Principle to provide data to inform the creation of system options.
4.10	Heathrow	Stated that the qualitative assessment to appraise the CLOO is completed by the ACP Team, which is comprised of technical experts and air traffic controllers. The Team liaises with NATS on air navigation matters and, if necessary, with airlines on additional costs and crew training. Confirmed that it is too early to say how many options will be taken forward to Stage 3, but that Heathrow does not currently expect to discount any options at DPE. Stated that criteria for discounting options has not yet been

		established. Confirmed that Heathrow is always open to stakeholder suggestions. Noted that the IOA includes metrics to appraise respite and route alternation. Stated that the Full Options Appraisal at Stage 3 requires sponsors to quantify the metrics as much as possible but qualitative assessments will also inform the ACP Team's recommendations. This will pass through Heathrow's internal governance, reaching at least Director level for final sign-off on any decisions.

The 'do nothing' option

4.11	TAG	Asked if the CLOO 'do nothing' option includes Performance Based Navigation (PBN). Recommended that Heathrow examine an enhanced base case and a 'do minimum PBN scenario' during the IOA to help discount poorly performing options.
4.12	FRP	Asked why a 'do nothing' option is not included in the CLOO as a standalone option, as required by CAP1616. Stated that 'do nothing' is being used by Heathrow only as a baseline comparator.
4.13	Heathrow	Clarified that the CLOO contains a 'do nothing' option, to be evaluated in the DPE and IOA in its own right. If it is discounted as an option at this stage, it will move into Stage 3 as a comparator. Responded to TAG's query that the 'do nothing' option does not assume introduction of PBN. Option 9a is for PBN replication of existing flight paths and this option will help to assess effects of PBN against today's baseline.

5. Recap: Previous Methods & Metrics workshop

Queries on single mode of analysis (TAG) and Richmond Park (FRP) were raised whilst this slide was presented, but these issues were returned to for discussion in the subsequent noise and tranquillity sections.

6. Initial Options Appraisal: Overview of Approach

6.1	TAG	Asked if the full flight schedule and aircraft type mix are inputs in the IOA.
6.2	FRP	Asked again how the options will be scored against each metric to understand if the Design Principles are fully met or partially met. Stated their dissatisfaction that criteria for scoring against Design Principles was not a subject for discussion at the workshop, and that stakeholders would not find out this methodology until Heathrow submitted it at the Stage 2 Gateway.
6.3	Heathrow	Confirmed that the full 2019 92-day flight schedule and mix of aircraft type will be included in the IOA. Noted that criteria for scoring options in the DPE is not the purpose of this workshop. Stated that the DPE methodology, including any scoring criteria, will be included in Heathrow's Stage 2 submission which will be uploaded to the CAA's public portal. Confirmed the DPE methodology and results will be shared at stakeholder engagement sessions in March 2023.

Assumptions around use of PBN arrivals options

6.4	TAG	Asked for written clarification around Heathrow's expected timings and operational use of PBN and vectoring for future arrivals as this was unclear in the CLOO material. Queried whether Heathrow would use PBN arrivals between 0430–0600 and vectoring from 0600 onwards. Noted that for the IOA, Heathrow's assumption means that modelling of PBN will include only 14 PBN arrival routes per early morning period.
6.5	FRP	Noted that the aircraft fleet mix includes aircraft equipped to RNP-AR and asked if aircraft arriving between 0430–0600 will only use PBN for sharp turns and precise positioning, rather than vectoring. Asked for clarification around what proportion of post-0600 arrivals Heathrow expected to use PBN in the future, as the technology evolved.
6.6	EGAG	Commented on the need for Heathrow to maintain runway throughput for arrivals. Suggested that PBN arrivals will be constrained to 20 arriving aircraft per hour, compared to vectored arrivals which can be up to 50 aircraft per hour.
6.7	MRA	Asked whether dispensed flights and associated noise impacts, and different times of day will be considered in the IOA.
6.8	London Borough of Ealing / HSPG	Asked if it is feasible to use PBN arrival options outside of the early morning arrivals period.
6.9	HASRA	Asked for clarification around the choice of the summer 92-day period for the baseline.
6.10	Heathrow	Stated that the CLOO included both vectored arrival options and PBN arrival options as Heathrow expect some form of vectoring to be required to maintain the runway throughput in practice. Stated that use of PBN arrivals in the early morning (0430–0600) period is a scenario that will be assessed in the IOA to compare PBN arrival options against the 2019 baseline. Confirmed that the baseline uses the 92-day period from June to September 2019, as per CAP1616 and CAP1616a guidelines. Every track that occurred during this period is modelled, without averaging, to give operations and geography of the baseline. Stated that the early morning period was selected as one scenario based on factors including operational viability, fleet mix and respite. Clarified that this does not indicate a decision to use PBN for all early morning arrivals or only early morning arrivals. By comparing PBN arrival options against the baseline, the IOA will provide information on the relative performance and likely change effect (frequency and geography of overflight) of the PBN arrivals options in the early morning period. This data will help inform the creation of systems options at Stage 3, and further analysis will also be undertaken around the impact of using PBN arrivals at different times of day. Noted that a fully systemised PBN arrivals option for all Heathrow's arrivals might not be operationally viable as this is dependent upon other airports' ACPs and NERL's proposed arrivals mechanism solution.

		Responded to FRP's point re aircraft equipped to RNP-AR and stated that PBN arrivals options consider aircraft that have either RNP-AR or RNAV approach capabilities.

Arrivals joining point

6.11	RBWM	Asked whether the arrivals joining point will remain the same as today.
6.12	EGAG	Asked whether 3-8 mile joining points are being considered as per Heathrow's previous project for Independent Parallel Approaches (IPA). Asked for clarification around the joining point assumptions in the CLOO.
6.13	Heathrow	Stated that in a 'do nothing' scenario aircraft join final approach between 8nm and 22nm from the runway. Explained that Heathrow is assessing the pros and cons of restricting joining points to (for example) 8-13nm or 10-15nm, to shrink vectoring areas and provide respite for some communities. Confirmed that the IPA ACP is no longer a separate Heathrow project, and the previous designs have been withdrawn from the CAA's portal. Stated that for CLOO arrivals options vectoring joining points are no closer than 8nm and joining points for PBN arrivals are 3-18nm.

7. IOA: Noise

The 9dB change metric

7.1	TAG	Asked if Heathrow will include quantitative analysis for the total cost of Heathrow's operations, following WebTAG guidance. Asked for justification around use of the 9dB change metric in relation to respite and suggested that this metric is not detailed enough to reflect sufficient noise separation for areas close to the airport. Asked if Heathrow is aiming to achieve 9dB differences to provide respite. Asked for an update on the Anderson Acoustics respite research. Asked Heathrow to clarify how they plan to introduce the 3 respite concepts set out in the CLOO material. Asked Heathrow to report noise impact levels relative to the base case.
7.2	MRA	Stated that route separation and noise impact are a huge concern for communities. Asked if Heathrow has a threshold for what dictates an "acceptable" level of noise profile across different times of day.
7.3	Heathrow	Confirmed that quantitative analysis will be used to consider the overall and differential cost of Heathrow's operations. Stated that an update on Anderson Acoustics work will be shared via the Noise and Airspace Community Forum (NACF). Cited the CAA document CAP2250 which refers to an 11dB L_{Amax} change as being equivalent to a 9dB L_{Aeq} difference and having a "significant [beneficial] effect on being highly annoyed". The 9dB metric was selected in line with Heathrow's previous work and will show noise impact values at low levels of change, giving visibility of where there is opportunity to apply the respite concepts to certain options. Stated their intention to have some regard for single mode analysis during options appraisal to understand likely changes in noise impact.

		Responded to MRA's point that an acceptable noise threshold is not set out in policy or government guidelines. Stated that policy leads airports to assess where the biggest noise impacts will be felt geographically and look for opportunities to introduce respite. Heathrow stated that they are following this process but will consider whether to introduce thresholds moving forward. This approach will be the basis of sensitivity tests carried out in the IOA where an option will be provided with a 'respite route' to assess whether this would result in a 9dB L_{Aeq} change. Smaller dB changes will also be identified and considered in the sensitivity test as these may be of value as well.

The N65 Noise Contour

7.4	TAG	Asked what the N65 noise contour means in terms of noise analysis (e.g. 10, 20, or 50 events). Stated that the N65 metric is basic and only applicable for routes that are used for one third of the flight schedule. Suggested that Heathrow also consider N60, N70 and N75 to understand where the more extreme impacts are likely to be experienced.
7.5	EGAG	Asked if Heathrow has considered recent PBN work at Toronto Airport.
7.6	MRA	Noted that Heathrow's noise metrics are based on static movements. Asked if Heathrow will consider dynamic noise mapping. Asked how they plan to assess the noise benefits and disbenefits of the options.
7.7	Heathrow	Stated that Heathrow is considering five N60 noise events for the night period and twenty N65 noise events for the day period and can provide supplementary metrics if useful to stakeholders. Noted that the overflight metric is useful to help visualise the geographical concentration of aircraft activity but is not itself a noise metric, whereas WebTAG is useful for examining noise impact across a range of noise exposure bands and will assist the ACP team in making recommendations on the likely impact of the options. WebTAG is also the primary decision-making metric in Government policy. Noted that Heathrow is considering the feasibility of dispersion within a PBN environment to provide relief to overflown communities, learning lessons from the US model of PBN where aircraft generally fly down a single track. Stated that the IOA is based on a fixed population dataset and that whilst dynamic noise mapping could be possible, it is dependent upon a lot of factors, information and assumptions making it less suitable for this analysis.

Wider Considerations Related to Noise

7.8	RBWM	Asked whether Heathrow has plans to change the cap for the number of departures.
7.9	Heathrow	Stated that this ACP is being designed to deliver the current cap. A change to the cap on ATMs would require a separate planning process and government approval.
7.10	FRP	Asked whether noise metrics will take account of visitors as well as resident population, since this is more applicable to Richmond Park. Noted their preliminary environmental assessment methodology shared with Heathrow.
7.11	Heathrow	Stated that it is too early in the process to undertake environmental assessments such as the one suggested by FRP. Heathrow has committed to identifying potential changes to the overflight of Richmond Park in the DPE

		and IOA, and will consider a more thorough assessment of Richmond Park if it is likely to be affected by the proposed changes.

8. IOA: Carbon

8.1	EGAG	Asked if the carbon assessment is undertaken for the 6 directional waypoints
8.2	FRP	Asked how Heathrow is considering the trade-off between noise and carbon in the IOA up to 4,000ft and between 4,000ft and 7,000ft. Noted their concern around whether carbon or noise is prioritised for arrivals.
8.3	EGAG	Asked what the definition of "disproportionate" is when assessing the trade-off between carbon and noise in accordance with ANG17's altitude-based priorities. Asked if Heathrow is assuming NADP1 or NADP2 in the assessment of options.
8.4	HACAN	Stated that there is insufficient guidance from DfT around what is classified as "disproportionate" when examining noise and carbon trade-offs. Called for stakeholders to work together with Heathrow to define this.
8.5	TAG	Related to HACAN's point, suggested that Heathrow outlines its proposals on proportionality for noise and carbon and share this with stakeholders for feedback, rather than waiting for the DfT to set guidelines.
8.6	Bucks Council / HSPG	Noted that the total carbon impact of Heathrow extends beyond the airspace design and that any carbon savings from the ACP should be considered in relation to wider airport operations.
8.7	Heathrow	Confirmed that the carbon assessment in the IOA will be undertaken for groups of 6 departure routes. Stated that there are two options to help assess carbon and noise trade-offs where Option 2 optimises noise to 7,000ft and Option 2a optimises for noise to 4,000ft and then optimises for carbon. Heathrow will compare the results for both options. Stated that policy does not define what is "disproportionate" (re the trade-off between noise and carbon 4,000 and 7,000ft) and agreed with HACAN that guidance would be helpful to understand the carbon versus noise trade-off. Stated that they need to view data outputs from the IOA before assessing proportionality between carbon and noise. Explained that the AEDT model has been used to input the aircraft profiles and consider proportions of aircraft using NADP1 and NADP2. The output is the initial climb rate and carbon fuel burn statistics. Noted that once Heathrow know where the route is going, there is the potential to assess the impacts of different NADPs in Stage 3.

9. IOA: Air Quality

9.1	EGAG	Stated that ICAO guidance cites 3,000ft as the air quality metric and asked why Heathrow has only considered air quality impacts below 1,000ft.
9.2	FRP	Stated that the preliminary environment assessment FRP sent to Heathrow includes a methodology for assessing the change in emissions below 1,000ft in Air Quality Management Areas (AQMAs). Stated that Heathrow should consider the impact of flights above 1000ft on air quality.

9.3	Heathrow	Noted that EGAG's point has been raised previously and that Heathrow are working on a technical note that sets out why 1,000ft altitude is sufficient when considering the impact of aircraft in the air on ground concentrations of NO_2, PM10 and PM2.5.

10. IOA: Biodiversity

10.1	MRA	Asked Heathrow when they will share the methodology for trading-off between all of the metrics, including thresholds to be applied when shortlisting options.
10.2	FRP	Stated that National Nature Reserves (NNRs) should be added to the sites. Recommended that Heathrow consider the 4-page methodology in the FRP preliminary environmental assessment outlining how to apply the biodiversity metric to open spaces in the IOA. Asked what the criteria is to trigger a Habitats Regulation Assessment (HRA) in Stage 3.
10.3	Heathrow	Stated that Heathrow needs visibility of the data outputs from the DPE and IOA before applying expert judgement on potential trade-offs. Noted that some key trade-offs are set out in the altitude priorities. Confirmed that any thresholds will be shared with stakeholders but that it is too early to say what these will be. Noted FRP's query about triggers for an HRA and stated that Heathrow will check and respond on this.

11. IOA: Tranquillity

11.1	FRP	Stated that Richmond Park was identified at the previous Methods and Metrics workshop, as per CAP1616 and ANG17, as a specific local area equivalent to an AONB. Asked if other areas had been nominated by stakeholders. Asked why Heathrow has classified Richmond Park in the 'parks and gardens' category for the IOA. Requested that Richmond Park is instead included as an AONB-equivalent in the AONB category. Cited clauses B76 and B78 of CAP1616.
11.2	Heathrow	Noted that only FRP and The Royal Parks have highlighted specific local areas through community engagement. Stated that Richmond Park has not been designated as an AONB so it cannot be considered as one in the assessment. However, Heathrow is considering Richmond Park within tranquillity assessments and will specifically assess the change in frequency of overflight for Richmond Park. Explained Heathrow has a two-tier criteria which considers overflight of AONBs *and* a layer of ambient noise metrics showing N65 events. This will ensure we fully understand noise impacts for AONBs and for Richmond Park.

12. IOA: Appraisal of Concepts

12.1	TAG	Asked if Heathrow could expand their qualitative assessment at IOA to consider all 12 of the Design Principles, including the use of multiple routes for respite.
12.2	Heathrow	Committed to exploring whether it will be possible to assess the use of multiple routes for respite at the IOA stage.

13. AOB

13.1	London Borough of Ealing / HSPG	Asked if Heathrow is considering ways to mitigate adverse effects of the airspace change.
13.2	TAG	Stated that ANG17 does not include guidance on how to use noise policy and apply altitude priorities.
13.3	Heathrow	Noted that mitigations are a Stage 3 consideration once we understand what the impacts might be. ANG17 requires Heathrow to examine ways to mitigate potential noise impacts. There are a number of ways that Heathrow will do this, including through the current conceptual work around respite and noise efficient operational practices and through noise insulation.

Climb Gradients

13.4	MRA	Asked if Heathrow is modelling Continuous Climb Operations (CCO) and Continuous Descent Operations (CDO) as part of the route assessment.
13.5	TAG	Asked if airspace modernisation is about re-distributing noise, rather than aiming to reduce noise levels.
13.6	EGAG	Commented that the assumed 5.5% climb gradient is poor and does not reflect reality.
13.7	Heathrow	Stated that the IOA will be based on current aircraft departure profiles, including levelling. Agreed with EGAG that certain aircraft will depart with higher climb gradients than the assumed 5.5% but it is too early to make more ambitious assumptions or determinations about CCO and CDO. This will come later in the process when investigating ways to reduce noise impacts and considering route interactions with surrounding airports.

14. Closing Remarks

14.1	Heathrow	Thanked the stakeholders and the wider Heathrow team for their time. Asked stakeholders to send further correspondence to the Airspace Inbox.
14.2	EGAG	Asked if the DPE workshops will include the CLOO feedback form responses.
14.3	Heathrow	Confirmed that feedback on the CLOO will be summarised at the DPE engagement workshops in March.

From: [redacted]
Sent: 28 April 2023 10:48
To: DD - Airspace
Cc: [redacted]

Subject: Record note: Methods & Methodology Workshop 2 (M&M2)
Attachments: 2804 Heathrow M&M 2 Workshop Note.pdf

Dear [redacted],
thank you for distributing the HAL record note of the 25-Jan-23 M&M2 workshop "*0604 Heathrow M&M 2 Workshop Note*"

We have compared it with our notes of the meeting, and with the record of FRP points and HAL responses that we sent you immediately after the meeting. While the record of FRP points is essentially correct in six sections, in five sections the record note does not properly record substantive points made by FRP, and in two of those sections the Heathrow response is incorrectly recorded - see details below.

In particular during the Tranquility discussion (11.2), [redacted] representing Heathrow, clearly and definitely said, and confirmed, that HAL will assess Richmond Park in same way as an AONB. This should be properly recorded in the official record of the meeting.

Attached is a revised record note of the M&M2 meeting, "*2804 Heathrow M&M 2 Workshop Note*", incorporating the changes detailed below. We would be grateful for your confirmation that this will replace the previous document "*0604 Heathrow M&M 2 Workshop Note*" as the official record of the meeting.

Please also note that, in 10.3 when FRP asked about triggers for an HRA, Heathrow undertook to check and respond on this. No response has been received to date.

Kind regards,
[redacted]
Friends of Richmond Park

3. Update: Design Principle Evaluation (DPE)
3.1 FRP
Noted that despite ~~discussing~~ asking for disclosure of the DPE methodology at the previous Methods and Metrics workshop in July 2022, FRP remain dissatisfied with Heathrow's lack of a detailed explanation of its approach towards evaluating the Design Principles to decide if they are met, partially met, or not met by the flight path options. Stated the ~~necessity~~ crucial impact on the DPE output of using a weighting scheme to decide the appropriate importance to be given to each design principle in assessing an overall score of each flight path option. ~~Noted how important this approach had been to decision-making for other UK airports.~~ Noted that they had provided Heathrow with a suggested methodology and that no ~~further correspondence~~ reply had been received. Asked how Heathrow will use the DPE output and suggested that this is used to shortlist options ahead of the IOA. Noted that this was the approach adopted by some other airports, (including Manchester, another complex 2-

runway airport). Noted that CAP1616 does not require sponsors to put ~~the CLOO~~ options that are not broadly aligned with the DPs through an IOA.

6. Initial Options Appraisal: Overview of Approach

6.2 FRP

Against slide 14, asked ~~again~~ how the options will be scored against each IOA metric, and how those scores are combined, to understand if the ~~Design Principles~~ Policies are fully met or partially met, or not met. Stated their dissatisfaction that criteria for scoring against ~~Design Principles~~ IOA metrics was not a subject for discussion at the workshop, and that stakeholders would not find out this methodology until Heathrow submitted it at the Stage 2 Gateway.

6.3 Heathrow

Noted that criteria for scoring options in the ~~DPE~~ IOA is not the purpose of this workshop. Stated that the ~~DPE~~ IOA methodology, including any scoring criteria, will be included in Heathrow's Stage 2 submission which will be uploaded to the CAA's public portal. Confirmed the ~~DPE~~ IOA methodology and results will be shared at stakeholder engagement sessions in March 2023.

6.5 FRP

Noted that the aircraft fleet mix includes aircraft equipped to RNP-AR and asked if aircraft arriving between 0430–0600 on PBN arrival paths would be restricted to aircraft equipped with RNP-AR. ~~will only use PBN for sharp turns and precise positioning, rather than vectoring.~~ Asked for clarification around what proportion of post-0600 arrivals Heathrow expected to use PBN in the future, as the technology evolved over the future years following 2027 deployment, that being the traffic forecast on which the IOA modelling should be based.

8. IOA: Carbon

8.2 FRP

Asked how Heathrow ~~is considering the trade-off~~ will respect legally binding altitude-based priorities regarding ~~between~~ noise and carbon in the IOA up to 4,000ft and between 4,000ft and 7,000ft. Referred to ANG17 qualification to the priority of noise over carbon over 4000ft where the increase in CO2 is "disproportionate" to the noise impacts. ~~Noted their concern around whether carbon or noise is prioritised for arrivals.~~

9. IOA: Air Quality

9.2 FRP

Noted that the CAP1616a guidance in Slide 22 refers to two conditions, but the guidance is not absolute – stating that the impact on air quality is only "likely" to be necessary where the two conditions are met (allowing for the possibility of exceptions). Stated that the preliminary environment assessment FRP sent to Heathrow includes a methodology for assessing the change in emissions ~~below 1,000ft in Air Quality Management Areas (AQMAs). Stated that~~ and Heathrow should consider the air quality impact of flights above 1000ft on ~~air quality~~ sensitive ecosystems over decades.

11. IOA: Tranquility

11.1 FRP

Stated that Richmond Park was identified at the previous Methods and Metrics workshop, as per CAP1616 and ANG17, as a specific local area identified via community engagement as meriting equivalent protection to an AONB – referred to as "equivalent to an AONB". Asked if other areas had been nominated by stakeholders. Asked why Heathrow has classified Richmond Park in the 'parks and gardens' category for the IOA. Requested that Richmond Park is instead included as an AONB-equivalent i.e. a specific local area identified via community engagement as meriting equivalent protection to an AONB ~~in the AONB category.~~ Cited clauses B76 and B78 of CAP1616. Requested that the dilutive "parks and gardens" metric (effectively putting hundreds of unnominated green spaces on par with AONBs and specifically nominated areas like Richmond Park) be deleted.

11.2 Heathrow

Noted that only FRP and The Royal Parks have highlighted specific local areas through community engagement. Stated that Heathrow will will assess RP in the same way as an AONB ~~Richmond Park has not been designated as an AONB so it cannot be considered as one~~ in the assessment. However, Heathrow is considering Richmond Park within tranquillity assessments and will specifically assess the change in frequency of overflight for Richmond Park.

Explained Heathrow has a two-tier criteria which considers overflight of AONBs and a layer of ambient noise metrics showing N65 events. This will ensure we fully understand noise impacts for AONBs and for Richmond Park.

From: DD - Airspace
Sent: 04 May 2023 09:43
To: [redacted]; DD - Airspace
Cc: [redacted]
Subject: RE: Record note: Methods & Methodology Workshop 2 (M&M2)

Dear [redacted],

Thank you for your comments on the Methods & Metrics 2 workshop note.

We have reviewed your proposed changes and we are happy to accept most of them, however there are a couple that don't reflect our recollection of the workshop discussion and could potentially be misleading.

3. Update: Design Principle Evaluation (DPE)
Heathrow accepts FRP's edits.

6. Initial Options Appraisal: Overview of Approach
We are unable to accept the changes proposed to 6.2 and 6.3 – our notes (and recollection of the team) have FRP talking about the DPE at this stage, not the IOA. The notes would be incorrect if we amended them to state that Heathrow would share the IOA methodology at the March stakeholder engagement sessions, since it was always the intention to share the methodology and results of the DPE in March, not the IOA.
We propose leaving the note as it is here – but we can delete 6.2 and 6.3 if you prefer.
Heathrow accepts FRP's edits to 6.5.

8. IOA: Carbon
Heathrow accepts FRP's edits.

9. IOA: Air Quality
Heathrow accepts FRP's edits.

11. IOA: Tranquillity
Heathrow accepts FRP's edits to 11.1.

We propose a slightly alternative to the text you suggest for 11.2 to ensure clarity around the status and treatment of Richmond Park. The Heathrow team stated in the workshop that "Richmond Park is not an AONB" however [redacted] said "Heathrow's treatment of Richmond Park is equivalent to our treatment of AONBs at Stage 2", i.e. we have an additional metric that specifically considers overflight of Richmond Park. We therefore suggest that, for clarity, the red text here is amended to: "Stated that Heathrow's assessment of Richmond Park at Stage 2 will adopt the same metrics as those being used to assess AONBs at this stage".

We will re-draft the workshop note to incorporate these changes and will re-issue it.

We apologise that we hadn't yet come back to you with an explanation of the triggers for this ACP requiring a Habitat Regulations Assessment (HRA). We can confirm that as our system options emerge, we expect that an HRA screening will be required as a minimum. Government guidance (Habitats regulations assessments: protecting a European site - GOV.UK (www.gov.uk)) states that the following European sites are protected by the Habitats Regulations and any proposals that could affect them will require an HRA:
1. Special Areas of Conservation (SACs)

2. Special Protection Areas (SPAs)
3. Ramsar sites - wetlands of international importance

The guidance recognises that proposals may affect sites some distance away *"for example by causing air, water or noise pollution or affecting a feeding area used by one of the site's designated species"*. As such, any redistribution of aircraft noise over such sites may require Heathrow to undertake an HRA. Heathrow will undertake HRA screening to determine whether a full HRA is necessary based on Heathrow's noise and overflight assessments.

We look forward to seeing you in Richmond Park next Thursday. Our plan is to come together in one vehicle.

Many thanks,

[redacted]

From: [redacted]
Sent: 04 May 2023 11:12
To: DD - Airspace; [redacted]
Cc: [redacted]
Subject: RE: Record note: Methods & Methodology Workshop 2 (M&M2)

Hi [redacted],

Please see addition to the note below on HRA triggers. It should also have referred to air quality.
Hope that makes sense.

Thanks,
[redacted]

From: DD - Airspace
Sent: 04 May 2023 09:43
To: [redacted]; DD - Airspace <airspace@heathrow.com>
Cc: [redacted]
Subject: RE: Record note: Methods & Methodology Workshop 2 (M&M2)

Dear [redacted],

Thank you for your comments on the Methods & Metrics 2 workshop note.

We have reviewed your proposed changes and we are happy to accept most of them, however there are a couple that don't reflect our recollection of the workshop discussion and could potentially be misleading.

3. Update: Design Principle Evaluation (DPE)
Heathrow accepts FRP's edits.

6. Initial Options Appraisal: Overview of Approach
We are unable to accept the changes proposed to 6.2 and 6.3 – our notes (and recollection of the team) have FRP talking about the DPE at this stage, not the IOA. The notes would be incorrect if we amended them to state that Heathrow would share the IOA methodology at the March stakeholder engagement sessions, since it was always the intention to share the methodology and results of the DPE in March, not the IOA.
We propose leaving the note as it is here – but we can delete 6.2 and 6.3 if you prefer.
Heathrow accepts FRP's edits to 6.5.

8. IOA: Carbon
Heathrow accepts FRP's edits.

9. IOA: Air Quality
Heathrow accepts FRP's edits.

11. IOA: Tranquillity

Heathrow accepts FRP's edits to 11.1.

We propose a slightly alternative to the text you suggest for 11.2 to ensure clarity around the status and treatment of Richmond Park. The Heathrow team stated in the workshop that "Richmond Park is not an AONB" however [redacted] said "Heathrow's treatment of Richmond Park is equivalent to our treatment of AONBs at Stage 2", i.e. we have an additional metric that specifically considers overflight of Richmond Park. We therefore suggest that, for clarity, the red text here is amended to: "Stated that Heathrow's assessment of Richmond Park at Stage 2 will adopt the same metrics as those being used to assess AONBs at this stage".

We will re-draft the workshop note to incorporate these changes and will re-issue it.

We apologise that we hadn't yet come back to you with an explanation of the triggers for this ACP requiring a Habitat Regulations Assessment (HRA). We can confirm that as our system options emerge, we expect that an HRA screening will be required as a minimum. Government guidance (Habitats regulations assessments: protecting a European site - GOV.UK (www.gov.uk)) states that the following European sites are protected by the Habitats Regulations and any proposals that could affect them will require an HRA:

1. Special Areas of Conservation (SACs)
2. Special Protection Areas (SPAs)
3. Ramsar sites - wetlands of international importance

The guidance recognises that proposals may affect sites some distance away *"for example by causing air, water or noise pollution or affecting a feeding area used by one of the site's designated species"*. As such, any redistribution of aircraft noise over such sites may require Heathrow to undertake an HRA. Heathrow will undertake HRA screening to determine whether a full HRA is necessary based on Heathrow's noise, air quality and overflight assessments.

We look forward to seeing you in Richmond Park next Thursday. Our plan is to come together in one vehicle.

Many thanks,

[redacted]

From: [redacted]
Sent: 14 May 2023 06:21
To: [redacted]
Cc: DD - Airspace; [redacted]
Subject: Re: Record note: Methods & Methodology Workshop 2 (M&M2)

Dear [redacted],
thanks for your emails of 4May re our comments on the M&M2 workshop note.

We were going to touch on it when meeting with you last Thursday (11-May) and then respond in writing afterwards.
But that meeting didn't happen, so we're responding here.

- All your proposed changes are acceptable;
- On 6.2 and 6.3 we're content for you to leave the note and it is;
- On 11.1 we accept your proposed amendment (in red)

We look forward to seeing the re-issued record note.

Best regards,
[redacted]
Friends of Richmond Park

RE: Methods and Metrics 2 - revised workshop note

DD - Airspace

Wed 17/05/2023 11:29

To: DD - Airspace <airspace@heathrow.com>

Bcc: [redacted]

1 attachments (272 KB)

230125 Heathrow M&M 2 Workshop Note_revised.pdf;

Dear All,

Please find attached a revised version of the workshop note from Methods and Metrics 2. This includes changes requested by Friends of Richmond Park.

Kind regards,

[redacted]

Methods and Metrics Workshop 2

Report of technical workshop between Heathrow Airspace Modernisation Team and "technically-minded" stakeholder group representatives (25 January 2023, 10:00–13:00, Holiday Inn, Bath Road).

Attendees:

Stakeholder Group / Organisation:	**Heathrow Representatives:**
Buckinghamshire Council / Heathrow Strategic Planning Group (HSPG) Englefield Green Action Group (EGAG) Friends of Richmond Park (FRP) Heathrow Association for the Control of Aircraft Noise (HACAN) Harmondsworth & Sipson Residents Association (HASRA) London Borough of Ealing / Heathrow Strategic Planning Group (HSPG) Molesey Residents Association (MRA) Richmond Heathrow Campaign (RHC) Royal Borough of Windsor and Maidenhead Council (RBWM) Spelthorne Borough Council / Heathrow Strategic Planning Group (HSPG) Teddington Action Group (TAG)	[redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] (Headland - independent chair)

Throughout this note comments and questions from the 14 attendees are attributed to the organisation they represent, rather than the individual.
A slide pack was shared with stakeholders prior to the session and presented during the discussion. The structure of the report reflects the agenda and order in which the slides were presented, but key discussion points have been grouped into sub-sections where appropriate.

Discussion Agenda:

1. Purpose of the workshop
2. Update on Heathrow's Plan for Stage 2
3. Update: Design Principle Evaluation (DPE)
4. CAP1616 Requirements: Initial Options Appraisal
5. Recap: Previous Methods & Metrics Workshop
6. Initial Options Appraisal (IOA): Overview of Approach
7. IOA: Noise
8. IOA: Carbon
9. IOA: Air Quality
10. IOA: Biodiversity
11. IOA: Tranquillity
12. IOA: Appraisal of Concepts
13. AOB
14. Closing Remarks

Notes from the Discussion:

1. Purpose of the workshop

1.1	Heathrow	Welcomed stakeholders and set out that the purpose of the meeting is to focus on the proposed approach ("method and metrics") to the Initial Options Appraisal (IOA). Invited all attendees to ask questions and comment on the content shared.

2. Update: Heathrow's Plan for Stage 2

Comprehensive List of Options (CLOO)

2.1	TAG	Noted their feedback provided in December 2022 that the Comprehensive List of Options (CLOO) does not reflect the Design Principles or the requirements in ANG17 and are concerned about the method for shortlisting options. Asked if Heathrow will provide a technical response justifying their approach. Stated that the CLOO includes "radical" options. Suggested that the independent arrival and departure route options shown in the CLOO will result in multiple routes overflying the same areas and increase noise disturbance in Molesey, Richmond and Teddington. Noted that the current Civil Aviation Authority (CAA) consultation on the ACP process (CAP1616) proposes the removal of any requirement to consider "radical" options and suggested that system options are more appropriate for evaluation at Stage 2.
2.2	Heathrow	Stated that questions around ANG17 will be addressed in this workshop. Feedback relating to Heathrow's Comprehensive List of Options will be addressed in the March DPE sessions and the Stage 2A submission, Stated that CAP1616 requires sponsors to develop a "list of options" but does not prescribe a set methodology, and that creating independent arrival and departure route options allows Heathrow to robustly test the boundaries of the airspace design. If we did not consider options overflying different areas to today, we would be challenged as to why not. The Design Principle Evaluation (DPE) and IOA will provide information on the costs and benefits of the options, and additional concepts such as respite and dispersion are being explored to mitigate any adverse impacts.

Engagement Timeline

2.3	EGAG	Repeated a previous request that Heathrow upload the GIS database used to produce the CLOO maps to a publicly accessible web server for sharing with wider members of the group. Concerned that local authorities are unaware of the Airspace Modernisation Strategy and likely changes to flight paths.
2.4	RBWM	Asked Heathrow to provide contact details for the RBWM officer on Heathrow's ACP correspondence list.
2.5	TAG	Requested the local authority contact information for the Teddington & Richmond area.
2.6	FRP	Asked when the CLOO will be made publicly available.

2.7	Heathrow	Stated that it is not reasonable to expect stakeholders who have not previously been engaged to understand the level of detail in the CLOO. Wider public engagement will come at a later stage. Reminded stakeholders that the CLOO routes will evolve and change. Stated that the CLOO, DPE methodology and output, and IOA output will be submitted to the CAA at the end of July 2023, in advance of the Stage 2 Gateway in August 2023. All Stage 2 material will be published on the CAA's Airspace Change Portal. Confirmed that airport sponsors, Department for Transport (DfT), CAA, and ACOG are considering approaches to increase awareness of airspace modernisation. Noted Heathrow's Stage 1 and Stage 2 public awareness campaigns using local newspapers, social media and radio.

3. Update: Design Principle Evaluation (DPE)

3.1	FRP	Noted that despite asking for disclosure of the DPE methodology at the previous Methods and Metrics workshop in July 2022, FRP remain dissatisfied with Heathrow's lack of a detailed explanation of its approach towards evaluating the Design Principles to decide if they are met, partially met, or not met by the flight path options. Stated the crucial impact on the DPE output of using a weighting scheme to decide the appropriate importance to be given to each design principle in assessing an overall score of each flight path option. Noted that they had provided Heathrow with a suggested methodology and that no reply had been received. Asked how Heathrow will use the DPE output and suggested that this is used to shortlist options ahead of the IOA. Noted that this was the approach adopted by some other airports, (including Manchester, another complex 2-runway airport). Noted that CAP1616 does not require sponsors to put options that are not broadly aligned with the DPs through an IOA.
3.2	TAG	Stated that only some of the Design Principles were used to create the CLOO.
3.3	Heathrow	Confirmed that the Design Principles will not be weighted in the Design Principle Evaluation. The Design Principles are only categorised as "must" do and "should" do considerations. Stated that the CAA requires sponsors to propose a DPE methodology for consistent scoring of options as "met", "partially met" or "not met" against the Design Principles, and noted that FRP's feedback had been considered in developing Heathrow's approach. Clarified that it is unlikely that any options will be discounted based on the DPE results alone, and that more rigorous assessment will occur in the IOA. Heathrow will then review the DPE output and IOA output together to assess how the options perform. Confirmed there is no requirement within CAP1616 to discontinue options as a result of the DPE results alone.

4. CAP1616 Requirements: Initial Options Appraisal

Creating Systems Options

4.1	TAG	Asked at what stage the departure options will be combined with the arrivals options to create system options and assess combined impacts.
4.2	HASRA	Asked if system options will be shown at the Stage 3 public consultation.
4.3	HACAN	Asked for clarity around the projected 2024-25 timeframe for the public consultation as previously 2024 was the target date.
4.4	Heathrow	Confirmed that system options (arrivals + departures, easterly + westerly operations) will be shared at the Stage 3 public consultation, which is likely to take place in 2025. Consultation material will also need to refer to ACPs for other airports in the London Area and this requires alignment between the London airports to ensure a coordinated public consultation with information from neighbouring airports. Noted that Stage 3 work will begin once Heathrow has received CAA approval at the Stage 2 Gateway. Stated that systems options will be assembled in Stage 3, with input provided from other airports. Noted that ongoing conceptual work around respite and dispersion to understand possible mitigations for the impact of flight paths would also be completed at Stage 3.
4.5	TAG	Responded that Heathrow does not have a satisfactory understanding of changes to overflight and that it is unreasonable to upload separate departure and arrivals options in the Stage 2 Gateway Submission. Recommends that system options are assembled alongside the conceptual work at Stage 2B to better understand the likely impact on overflown areas.
4.6	Heathrow	Stated that the decision was made to assemble arrival and departure options individually, as has been done by some other sponsors, to enable us to consider a significantly greater number of options at Stage 2. These will be built into systems options at Stage 3 and assessed at the Full Options Appraisal (FOA), with detailed information on impacts then shared at public consultation.

Expert input to the IOA

4.7	MRA	Asked which parties are involved in the IOA and if associated costs with introducing PBN technology, such as investment in training crew and upgrading existing aircraft capabilities, are taken into consideration and weighted. Asked about Heathrow's internal Board-level decision making process for the ACP. Asked for clarity around the criteria and boundary threshold for discounting options following the IOA.
4.8	FRP	Asked about the criteria for assessing options and whether Heathrow will be open to stakeholder suggestions on appropriate metrics for assessing options.
4.9	TAG	Thanked Heathrow for explaining the phases of appraisal required by CAP1616. Emphasised the importance of the IOA as the only stage where qualitative assessment takes place. Suggested that the IOA should include quality thresholds against each Design Principle to provide data to inform the creation of system options.
4.10	Heathrow	Stated that the qualitative assessment to appraise the CLOO is completed by the ACP Team, which is comprised of technical experts and air traffic controllers. The Team liaises with NATS on air navigation matters and, if necessary, with airlines on additional costs and crew training.

		Confirmed that it is too early to say how many options will be taken forward to Stage 3, but that Heathrow does not currently expect to discount any options at DPE. Stated that criteria for discounting options has not yet been established. Confirmed that Heathrow is always open to stakeholder suggestions. Noted that the IOA includes metrics to appraise respite and route alternation. Stated that the Full Options Appraisal at Stage 3 requires sponsors to quantify the metrics as much as possible but qualitative assessments will also inform the ACP Team's recommendations. This will pass through Heathrow's internal governance, reaching at least Director level for final sign-off on any decisions.

The 'do nothing' option

4.11	TAG	Asked if the CLOO 'do nothing' option includes Performance Based Navigation (PBN). Recommended that Heathrow examine an enhanced base case and a 'do minimum PBN scenario' during the IOA to help discount poorly performing options.
4.12	FRP	Asked why a 'do nothing' option is not included in the CLOO as a standalone option, as required by CAP1616. Stated that 'do nothing' is being used by Heathrow only as a baseline comparator.
4.13	Heathrow	Clarified that the CLOO contains a 'do nothing' option, to be evaluated in the DPE and IOA in its own right. If it is discounted as an option at this stage, it will move into Stage 3 as a comparator. Responded to TAG's query that the 'do nothing' option does not assume introduction of PBN. Option 9a is for PBN replication of existing flight paths and this option will help to assess effects of PBN against today's baseline.

5. Recap: Previous Methods & Metrics workshop

Queries on single mode of analysis (TAG) and Richmond Park (FRP) were raised whilst this slide was presented, but these issues were returned to for discussion in the subsequent noise and tranquillity sections.

6. Initial Options Appraisal: Overview of Approach

6.1	TAG	Asked if the full flight schedule and aircraft type mix are inputs in the IOA.
6.2	FRP	Asked again how the options will be scored against each metric to understand if the Design Principles are fully met or partially met. Stated their dissatisfaction that criteria for scoring against Design Principles was not a subject for discussion at the workshop, and that stakeholders would not find out this methodology until Heathrow submitted it at the Stage 2 Gateway.
6.3	Heathrow	Confirmed that the full 2019 92-day flight schedule and mix of aircraft type will be included in the IOA. Noted that criteria for scoring options in the DPE is not the purpose of this workshop. Stated that the DPE methodology, including any scoring criteria, will be included in Heathrow's Stage 2 submission which will be uploaded to the CAA's public portal. Confirmed the DPE methodology and results will be shared at stakeholder engagement sessions in March 2023.

Assumptions around use of PBN arrivals options

6.4	TAG	Asked for written clarification around Heathrow's expected timings and operational use of PBN and vectoring for future arrivals as this was unclear in the CLOO material. Queried whether Heathrow would use PBN arrivals between 0430–0600 and vectoring from 0600 onwards. Noted that for the IOA, Heathrow's assumption means that modelling of PBN will include only 14 PBN arrival routes per early morning period.
6.5	FRP	Noted that the aircraft fleet mix includes aircraft equipped to RNP-AR and asked if aircraft arriving between 0430–0600 on PBN arrival paths would be restricted to aircraft equipped with RNP-AR. Asked for clarification around what proportion of post-0600 arrivals Heathrow expected to use PBN in the future, as the technology evolved over the future years following 2027 deployment, that being the traffic forecast on which the IOA modelling should be based.
6.6	EGAG	Commented on the need for Heathrow to maintain runway throughput for arrivals. Suggested that PBN arrivals will be constrained to 20 arriving aircraft per hour, compared to vectored arrivals which can be up to 50 aircraft per hour.
6.7	MRA	Asked whether dispensed flights and associated noise impacts, and different times of day will be considered in the IOA.
6.8	London Borough of Ealing / HSPG	Asked if it is feasible to use PBN arrival options outside of the early morning arrivals period.
6.9	HASRA	Asked for clarification around the choice of the summer 92-day period for the baseline.
6.10	Heathrow	Stated that the CLOO included both vectored arrival options and PBN arrival options as Heathrow expect some form of vectoring to be required to maintain the runway throughput in practice. Stated that use of PBN arrivals in the early morning (0430–0600) period is a scenario that will be assessed in the IOA to compare PBN arrival options against the 2019 baseline. Confirmed that the baseline uses the 92-day period from June to September 2019, as per CAP1616 and CAP1616a guidelines. Every track that occurred during this period is modelled, without averaging, to give operations and geography of the baseline. Stated that the early morning period was selected as one scenario based on factors including operational viability, fleet mix and respite. Clarified that this does not indicate a decision to use PBN for all early morning arrivals or only early morning arrivals. By comparing PBN arrival options against the baseline, the IOA will provide information on the relative performance and likely change effect (frequency and geography of overflight) of the PBN arrivals options in the early morning period. This data will help inform the creation of systems options at Stage 3, and further analysis will also be undertaken around the impact of using PBN arrivals at different times of day.

		Noted that a fully systemised PBN arrivals option for all Heathrow's arrivals might not be operationally viable as this is dependent upon other airports' ACPs and NERL's proposed arrivals mechanism solution. Responded to FRP's point re aircraft equipped to RNP-AR and stated that PBN arrivals options consider aircraft that have either RNP-AR or RNAV approach capabilities.

Arrivals joining point

6.11	RBWM	Asked whether the arrivals joining point will remain the same as today.
6.12	EGAG	Asked whether 3-8 mile joining points are being considered as per Heathrow's previous project for Independent Parallel Approaches (IPA). Asked for clarification around the joining point assumptions in the CLOO.
6.13	Heathrow	Stated that in a 'do nothing' scenario aircraft join final approach between 8nm and 22nm from the runway. Explained that Heathrow is assessing the pros and cons of restricting joining points to (for example) 8-13nm or 10-15nm, to shrink vectoring areas and provide respite for some communities. Confirmed that the IPA ACP is no longer a separate Heathrow project, and the previous designs have been withdrawn from the CAA's portal. Stated that for CLOO arrivals options vectoring joining points are no closer than 8nm and joining points for PBN arrivals are 3-18nm.

7. IOA: Noise

The 9dB change metric

7.1	TAG	Asked if Heathrow will include quantitative analysis for the total cost of Heathrow's operations, following WebTAG guidance. Asked for justification around use of the 9dB change metric in relation to respite and suggested that this metric is not detailed enough to reflect sufficient noise separation for areas close to the airport. Asked if Heathrow is aiming to achieve 9dB differences to provide respite. Asked for an update on the Anderson Acoustics respite research. Asked Heathrow to clarify how they plan to introduce the 3 respite concepts set out in the CLOO material. Asked Heathrow to report noise impact levels relative to the base case.
7.2	MRA	Stated that route separation and noise impact are a huge concern for communities. Asked if Heathrow has a threshold for what dictates an "acceptable" level of noise profile across different times of day.
7.3	Heathrow	Confirmed that quantitative analysis will be used to consider the overall and differential cost of Heathrow's operations. Stated that an update on Anderson Acoustics work will be shared via the Noise and Airspace Community Forum (NACF). Cited the CAA document CAP2250 which refers to an 11dB L_{Amax} change as being equivalent to a 9dB L_{Aeq} difference and having a "significant [beneficial] effect on being highly annoyed". The 9dB metric was selected in line with Heathrow's previous work and will show noise impact values at low levels of

		change, giving visibility of where there is opportunity to apply the respite concepts to certain options. Stated their intention to have some regard for single mode analysis during options appraisal to understand likely changes in noise impact. Responded to MRA's point that an acceptable noise threshold is not set out in policy or government guidelines. Stated that policy leads airports to assess where the biggest noise impacts will be felt geographically and look for opportunities to introduce respite. Heathrow stated that they are following this process but will consider whether to introduce thresholds moving forward. This approach will be the basis of sensitivity tests carried out in the IOA where an option will be provided with a 'respite route' to assess whether this would result in a 9dB L_{Aeq} change. Smaller dB changes will also be identified and considered in the sensitivity test as these may be of value as well.

The N65 Noise Contour

7.4	TAG	Asked what the N65 noise contour means in terms of noise analysis (e.g. 10, 20, or 50 events). Stated that the N65 metric is basic and only applicable for routes that are used for one third of the flight schedule. Suggested that Heathrow also consider N60, N70 and N75 to understand where the more extreme impacts are likely to be experienced.
7.5	EGAG	Asked if Heathrow has considered recent PBN work at Toronto Airport.
7.6	MRA	Noted that Heathrow's noise metrics are based on static movements. Asked if Heathrow will consider dynamic noise mapping. Asked how they plan to assess the noise benefits and disbenefits of the options.
7.7	Heathrow	Stated that Heathrow is considering five N60 noise events for the night period and twenty N65 noise events for the day period and can provide supplementary metrics if useful to stakeholders. Noted that the overflight metric is useful to help visualise the geographical concentration of aircraft activity but is not itself a noise metric, whereas WebTAG is useful for examining noise impact across a range of noise exposure bands and will assist the ACP team in making recommendations on the likely impact of the options. WebTAG is also the primary decision-making metric in Government policy. Noted that Heathrow is considering the feasibility of dispersion within a PBN environment to provide relief to overflown communities, learning lessons from the US model of PBN where aircraft generally fly down a single track. Stated that the IOA is based on a fixed population dataset and that whilst dynamic noise mapping could be possible, it is dependent upon a lot of factors, information and assumptions making it less suitable for this analysis.

Wider Considerations Related to Noise

7.8	RBWM	Asked whether Heathrow has plans to change the cap for the number of departures.
7.9	Heathrow	Stated that this ACP is being designed to deliver the current cap. A change to the cap on ATMs would require a separate planning process and government approval.

7.10	FRP	Asked whether noise metrics will take account of visitors as well as resident population, since this is more applicable to Richmond Park. Noted their preliminary environmental assessment methodology shared with Heathrow.
7.11	Heathrow	Stated that it is too early in the process to undertake environmental assessments such as the one suggested by FRP. Heathrow has committed to identifying potential changes to the overflight of Richmond Park in the DPE and IOA, and will consider a more thorough assessment of Richmond Park if it is likely to be affected by the proposed changes.

8. IOA: Carbon

8.1	EGAG	Asked if the carbon assessment is undertaken for the 6 directional waypoints
8.2	FRP	Asked how Heathrow will respect legally binding altitude-based priorities regarding noise and carbon in the IOA up to 4,000ft and between 4,000ft and 7,000ft. Referred to ANG17 qualification to the priority of noise over carbon over 4000ft where the increase in CO2 is “disproportionate” to the noise impacts.
8.3	EGAG	Asked what the definition of “disproportionate” is when assessing the trade-off between carbon and noise in accordance with ANG17’s altitude-based priorities. Asked if Heathrow is assuming NADP1 or NADP2 in the assessment of options.
8.4	HACAN	Stated that there is insufficient guidance from DfT around what is classified as “disproportionate” when examining noise and carbon trade-offs. Called for stakeholders to work together with Heathrow to define this.
8.5	TAG	Related to HACAN’s point, suggested that Heathrow outlines its proposals on proportionality for noise and carbon and share this with stakeholders for feedback, rather than waiting for the DfT to set guidelines.
8.6	Bucks Council / HSPG	Noted that the total carbon impact of Heathrow extends beyond the airspace design and that any carbon savings from the ACP should be considered in relation to wider airport operations.
8.7	Heathrow	Confirmed that the carbon assessment in the IOA will be undertaken for groups of 6 departure routes. Stated that there are two options to help assess carbon and noise trade-offs where Option 2 optimises noise to 7,000ft and Option 2a optimises for noise to 4,000ft and then optimises for carbon. Heathrow will compare the results for both options. Stated that policy does not define what is “disproportionate” (re the trade-off between noise and carbon 4,000 and 7,000ft) and agreed with HACAN that guidance would be helpful to understand the carbon versus noise trade-off. Stated that they need to view data outputs from the IOA before assessing proportionality between carbon and noise. Explained that the AEDT model has been used to input the aircraft profiles and consider proportions of aircraft using NADP1 and NADP2. The output is the initial climb rate and carbon fuel burn statistics. Noted that once Heathrow know where the route is going, there is the potential to assess the impacts of different NADPs in Stage 3.

9. IOA: Air Quality

9.1	EGAG	Stated that ICAO guidance cites 3,000ft as the air quality metric and asked why Heathrow has only considered air quality impacts below 1,000ft.
9.2	FRP	Noted that the CAP1616a guidance in Slide 22 refers to two conditions, but the guidance is not absolute – stating that the impact on air quality is only "likely" to be necessary where the two conditions are met (allowing for the possibility of exceptions). Stated that the preliminary environment assessment FRP sent to Heathrow includes a methodology for assessing the change in emissions and Heathrow should consider the air quality impact of flights above 1000ft on sensitive ecosystems over decades.
9.3	Heathrow	Noted that EGAG's point has been raised previously and that Heathrow are working on a technical note that sets out why 1,000ft altitude is sufficient when considering the impact of aircraft in the air on ground concentrations of NO_2, PM10 and PM2.5.

10. IOA: Biodiversity

10.1	MRA	Asked Heathrow when they will share the methodology for trading-off between all of the metrics, including thresholds to be applied when shortlisting options.
10.2	FRP	Stated that National Nature Reserves (NNRs) should be added to the sites. Recommended that Heathrow consider the 4-page methodology in the FRP preliminary environmental assessment outlining how to apply the biodiversity metric to open spaces in the IOA. Asked what the criteria is to trigger a Habitats Regulation Assessment (HRA) in Stage 3.
10.3	Heathrow	Stated that Heathrow needs visibility of the data outputs from the DPE and IOA before applying expert judgement on potential trade-offs. Noted that some key trade-offs are set out in the altitude priorities. Confirmed that any thresholds will be shared with stakeholders but that it is too early to say what these will be. Noted FRP's query about triggers for an HRA and stated that Heathrow will check and respond on this.

11. IOA: Tranquillity

11.1	FRP	Asked why Heathrow has classified Richmond Park in the 'parks and gardens' category for the IOA. Requested that Richmond Park is instead included as an AONB-equivalent in the AONB category. Cited clauses B76 and B78 of CAP1616. Stated that Richmond Park was identified at the previous Methods and Metrics workshop, as per CAP1616 and ANG17, as a specific local area identified via community engagement as meriting equivalent protection to an AONB – referred to as "equivalent to an AONB". Asked if other areas had been nominated by stakeholders. Asked why Heathrow has classified Richmond Park in the 'parks and gardens' category for the IOA. Requested that Richmond Park is instead included as an AONB-equivalent i.e. a specific local area identified via community engagement as meriting equivalent protection to an AONB. Cited clauses B76 and B78 of CAP1616. Requested that the dilutive "parks and gardens" metric

		(effectively putting hundreds of unnominated green spaces on par with AONBs and specifically nominated areas like Richmond Park) be deleted.
11.2	Heathrow	Noted that only FRP and The Royal Parks have highlighted specific local areas through community engagement. Stated that Heathrow's assessment of Richmond Park at Stage 2 will adopt the same metrics as those being used to assess AONBs at this stage. However, Heathrow is considering Richmond Park within tranquillity assessments and will specifically assess the change in frequency of overflight for Richmond Park. Explained Heathrow has a two-tier criteria which considers overflight of AONBs *and* a layer of ambient noise metrics showing N65 events. This will ensure we fully understand noise impacts for AONBs and for Richmond Park.

12. IOA: Appraisal of Concepts

12.1	TAG	Asked if Heathrow could expand their qualitative assessment at IOA to consider all 12 of the Design Principles, including the use of multiple routes for respite.
12.2	Heathrow	Committed to exploring whether it will be possible to assess the use of multiple routes for respite at the IOA stage.

13. AOB

13.1	London Borough of Ealing / HSPG	Asked if Heathrow is considering ways to mitigate adverse effects of the airspace change.
13.2	TAG	Stated that ANG17 does not include guidance on how to use noise policy and apply altitude priorities.
13.3	Heathrow	Noted that mitigations are a Stage 3 consideration once we understand what the impacts might be. ANG17 requires Heathrow to examine ways to mitigate potential noise impacts. There are a number of ways that Heathrow will do this, including through the current conceptual work around respite and noise efficient operational practices and through noise insulation.

Climb Gradients

13.4	MRA	Asked if Heathrow is modelling Continuous Climb Operations (CCO) and Continuous Descent Operations (CDO) as part of the route assessment.
13.5	TAG	Asked if airspace modernisation is about re-distributing noise, rather than aiming to reduce noise levels.
13.6	EGAG	Commented that the assumed 5.5% climb gradient is poor and does not reflect reality.
13.7	Heathrow	Stated that the IOA will be based on current aircraft departure profiles, including levelling. Agreed with EGAG that certain aircraft will depart with higher climb gradients than the assumed 5.5% but it is too early to make more ambitious assumptions or determinations about CCO and CDO. This will come later in the process when investigating ways to reduce noise impacts and considering route interactions with surrounding airports.

14. Closing Remarks

14.1	Heathrow	Thanked the stakeholders and the wider Heathrow team for their time. Asked stakeholders to send further correspondence to the Airspace Inbox.
14.2	EGAG	Asked if the DPE workshops will include the CLOO feedback form responses.
14.3	Heathrow	Confirmed that feedback on the CLOO will be summarised at the DPE engagement workshops in March.

From: [redacted]
Sent: 17 May 2023 11:37
To: [redacted]
Cc: DD - Airspace; [redacted]
Subject: RE: Record note: Methods & Methodology Workshop 2 (M&M2)

Thanks [redacted]. You should have received the revised workshop note just now.

We received notification from our last email that [redacted] [redacted] and [redacted] email addresses had detected it might be spam. Please can you confirm we are still using the correct contact details for them?

I've copied the text from the email notification below.

Thanks,
[redacted]

smtp6.gate.ord1d.rsapps.net rejected your message to the following email addresses:

[redacted]
Your message couldn't be delivered because it's suspected of being spam. For best practices when sending email, refer to the guidelines found here: https://go.microsoft.com/fwlink/?LinkID=526654.

smtp6.gate.ord1d.rsapps.net gave this error:
Decision Engine classified the mail item was rejected because of IP Block (from outbound normal IP pools) -> [redacted] blocked using sa-ip4tset.blagr.emailsrvr.com=[redacted] Senderscore. Please visit https://senderscore.org/rtbl/ for more information on why this message could not be delivered (G31)

[redacted]
Your message couldn't be delivered because it's suspected of being spam. For best practices when sending email, refer to the guidelines found here: https://go.microsoft.com/fwlink/?LinkID=526654.

smtp6.gate.ord1d.rsapps.net gave this error:
Decision Engine classified the mail item was rejected because of IP Block (from outbound normal IP pools) -> [redacted] ACL dns_rbl; Client host [redacted] blocked using sa-ip4tset.blagr.emailsrvr.com=[redacted] Senderscore. Please visit https://senderscore.org/rtbl/ for more information on why this message could not be delivered (G31)

[redacted]
Your message couldn't be delivered because it's suspected of being spam. For best practices when sending email, refer to the guidelines found here: https://go.microsoft.com/fwlink/?LinkID=526654.

smtp6.gate.ord1d.rsapps.net gave this error:
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From: [redacted]
Sent: 17 May 2023 12:35
To: DD - Airspace
Subject: RE: [EXTERNAL] RE: Methods and Metrics 2 - revised workshop note

Caution: external email. Unless you recognise the sender and know the content is safe, do not click links or open attachments.

Thanks [redacted],

[redacted]

[redacted]
Environmental Protection Team Leader
Housing and Regulatory Services
Planning, Growth and Sustainability Directorate
Buckinghamshire Council

From: [redacted]
Sent: 17 May 2023 17:19
To: [redacted]
Cc: DD - Airspace; [redacted]
Subject: Re: Record note: Methods & Methodology Workshop 2 (M&M2)

Caution: external email. Unless you recognise the sender and know the content is safe, do not click links or open attachments.

Dear [redacted],
you are using the correct email addresses for [redacted], [redacted] and [redacted] - respectively:
[redacted]

Rest assured that I have received your email with the revised M&M2 note (evidence appended below) and can hereby confirm it is received by FRP.

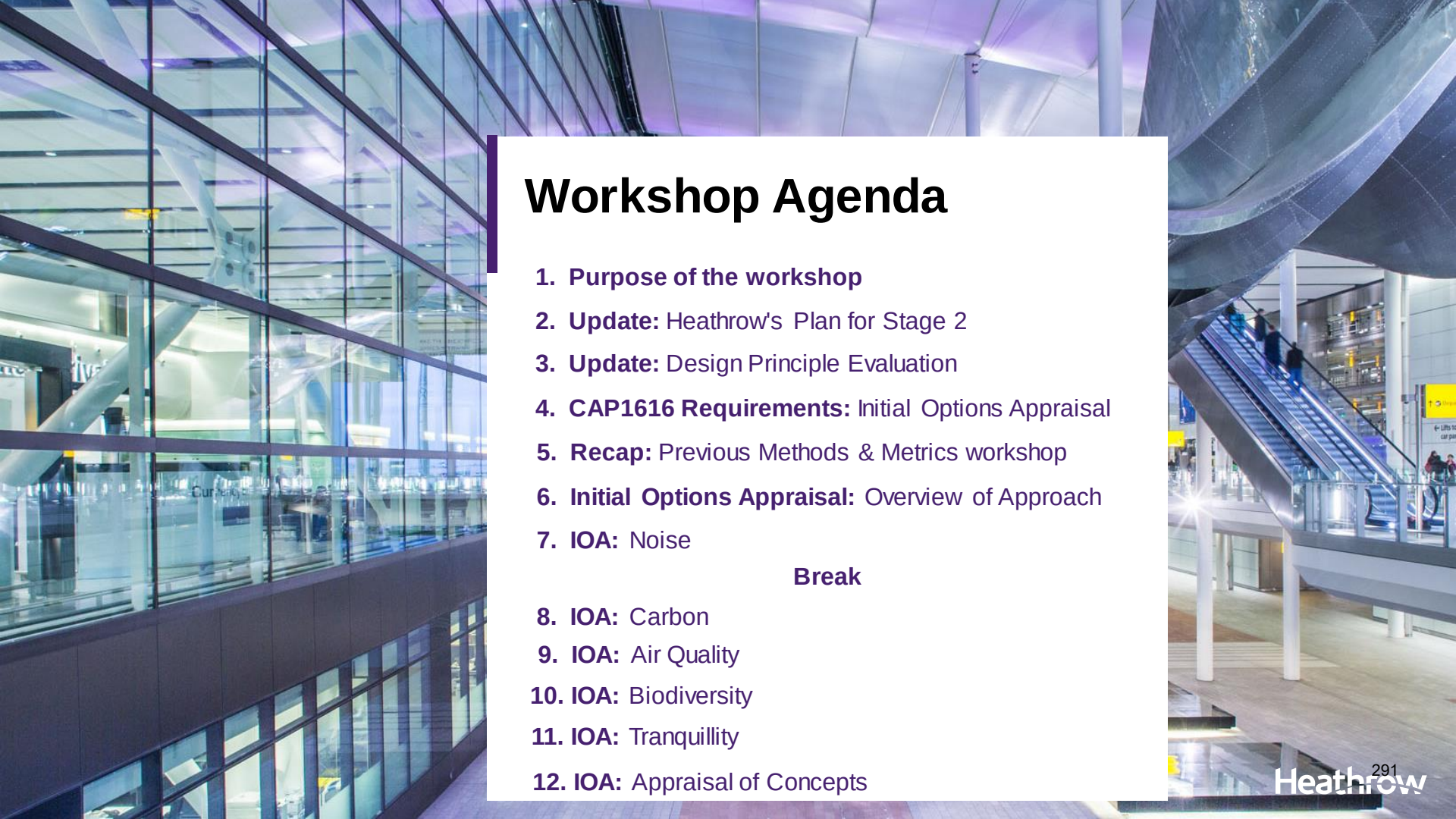
I will check with the others here re their copies.
Best regards,
[redacted]
FRP

January 2023

Airspace Modernisation: Airspace Change Proposal

Methods & Metrics Workshop 2

Heathrow



Workshop Agenda

1. **Purpose of the workshop**
2. **Update:** Heathrow's Plan for Stage 2
3. **Update:** Design Principle Evaluation
4. **CAP1616 Requirements:** Initial Options Appraisal
5. **Recap:** Previous Methods & Metrics workshop
6. **Initial Options Appraisal:** Overview of Approach
7. **IOA:** Noise

Break

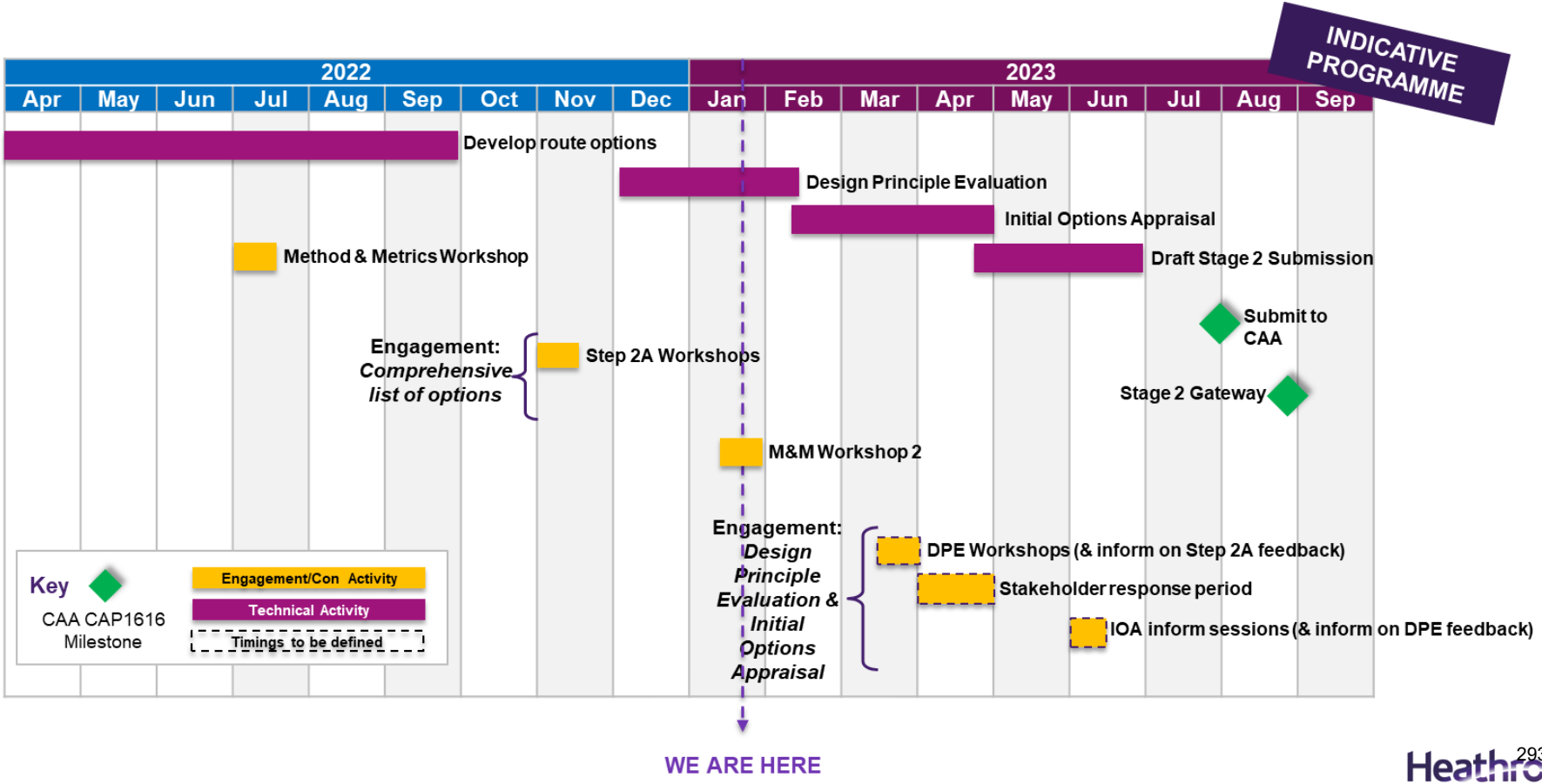
8. **IOA:** Carbon
9. **IOA:** Air Quality
10. **IOA:** Biodiversity
11. **IOA:** Tranquillity
12. **IOA:** Appraisal of Concepts

Purpose of this workshop

The purpose of today's workshop is:

- To share our proposed approach (method and metrics) to the Initial Options Appraisal we will undertake at Stage 2B
- To provide an opportunity for you to ask questions and share views on the proposed approach
- To collect feedback on the methods and metrics to ensure that the IOA results we publish will help stakeholders to understand the likely impacts of the airspace design options

Heathrow's Stage 2 Plan

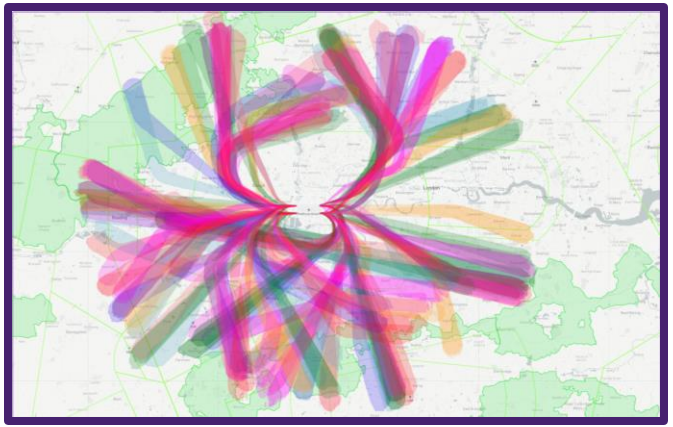


Update: Design Principle Evaluation

The DPE is underway: this will complete Stage 2A.

Work to date has indicated that all of the options are likely to be taken through to Stage 2B (Initial Options Appraisal): ***we do not plan to discount any options based on the DPE results***.

The results of the DPE will be shared at engagement workshops (planned for March 2023), providing an opportunity for stakeholder questions and feedback.



The comprehensive list of departure options

The Design Principle Evaluation:

Each of the options is being assessed against each design principle using a combination of qualitative and quantitative assessment.

The options evaluated in the DPE are:

1. PBN departure options
2. PBN arrival options
3. Vectored arrival options

Today's workshop is to:

- Heathrow to share the method and metrics we intend to use in the Initial Options Appraisal
- Stakeholders to ask questions and share their views on Heathrow's proposed method and metrics

Today's workshop is not to:

- Discuss Stage 1 elements (e.g. Statement of Need, Design Principles)
- Discuss the pros and cons of the comprehensive list of options
- Discuss the wider political/regulatory landscape
- Discuss Stage 3 elements of the ACP (there will be a future opportunity for this)

CAP1616: Purpose of Options Appraisal

Options appraisal is a means of assessing the possible different approaches for delivering a desired outcome (in this case, the outcome is the introduction of airspace modernisation at Heathrow).

The Options Appraisal should deliver clear and comparable evidence about a range of factors so that different airspace design options can be compared and assessed on the basis of these factors.

The environmental factors for assessment are set out in CAP1616:

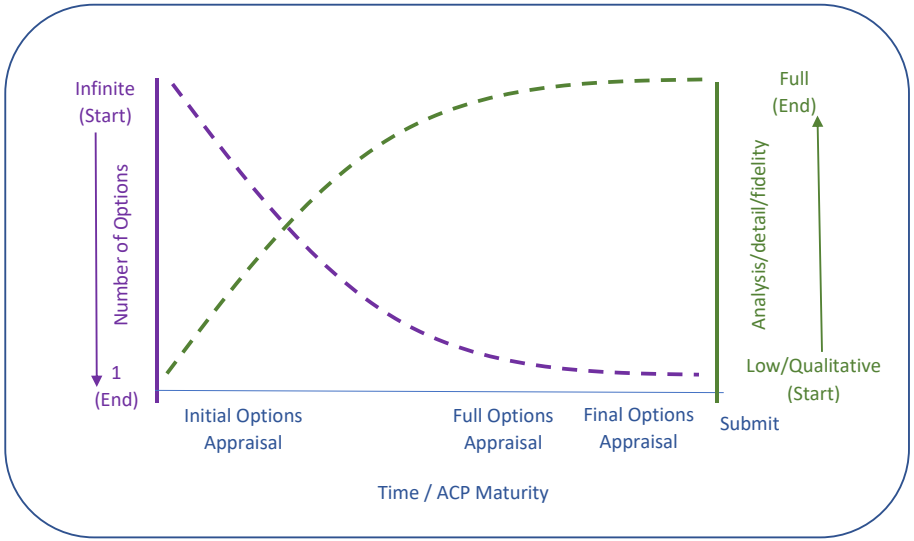
- Noise
- CO_2 emissions
- Local air quality
- Tranquility
- Biodiversity

The options appraisal process requires each option to be assessed against a “do nothing” scenario to understand the impacts (positive and negative) of each option. However, CAP1616 recognises that “do nothing” is not always a feasible option for consideration (e.g. the introduction of airspace modernisation is government policy).

CAP1616: Phases of Appraisal

The Initial Options Appraisal (IOA) is the first of three appraisal phases, and **the level of detail will increase as we move through the appraisal phases**

Stage 2B: 'Initial' Options Appraisal:	Qualitative and/or quantitative assessment of longlist of options
Stage 3A: 'Full' Options Appraisal:	Quantitative assessment of shortlist of options, shared at consultation
Stage 4A: 'Final' Options Appraisal:	Update based on any changes required following public consultation



CAP1616 requires an 'Initial' Options Appraisal (IOA) to be prepared at Stage 2B which can be based on **qualitative information rather than quantitative analysis***, however Heathrow intends to use data wherever possible to ensure the appraisal is robust, consistent and evidence-based.

** Appendix B, B8*

Heathrow

CAP1616: Initial Options Appraisal

CAP1616 (Appendix E, E12) states: "*the Initial appraisal must contain the following, as a minimum:*

• *A comprehensive list of viable options. This must include the 'do nothing/minimum' option which will act as the baseline for the analysis. The baseline should be fully described. The list of options must also include:*
– a description of the change proposal
– an indicator of the likely noise impacts
– a high-level assessment of costs and benefits involved

• *Criteria for assessing the list of options, and the application of those criteria to the list to develop the shortlist of options*

• *Shortlist options described qualitatively and an indication of the preferred option*

• *What evidence the change sponsor will collect, and how, to fill in its evidence gaps and to develop the Full appraisal."*

Other ACP sponsors have used a range of different approaches to environmental assessment at Stage 2B: there is no single approach considered to be "best practice"

Recap: Previous Methods & Metrics workshop

Our first Methods & Metrics workshop was held in July 2022, in response to requests from some of our community stakeholders for a greater level of detail around Heathrow's approach to designing flight path options.

The workshop was attended by 11 stakeholders representing community groups, environmental groups and Local Authorities. The workshop content was intended for a technically-minded audience.

Heathrow shared:

- Our approach to developing a Comprehensive List of Options (flooding, use of data)
- Proposed metrics for evaluating each option against each design principle in the Design Principle Evaluation

Recap: Previous Methods & Metrics workshop

The workshop was facilitated by Headland, and an independent meeting note was produced and shared with all attendees. A number of areas were identified and "parked" for future discussion and consideration:

"Car Park" Issue:	Heathrow Response:
Consider cumulative impacts with other airports	Ongoing bi-laterals with surrounding airports. ACOG coordination planned for post-Stage 2.
Use of LOAEL	Heathrow is including secondary noise metrics (detail in this workshop) in addition to LOAEL
Use of overflight cones to describe noise impacts	Heathrow to include a suite of noise metrics in addition to overflight cones
Government guidance on PBN	Raised at bi-lateral with DfT: Public Consultation expected in 2023
Suitability of WebTAG/TAG	Heathrow will work with TAG so long as it remains Government policy
Health assessment	Still under consideration as a Stage 3 activity
Air quality	Heathrow to provide rationale for approach to air quality assessment

Outcomes from the first Methods & Metrics workshop include:

- Inclusion of event-based noise metrics (N60 and N65) in the Initial Options Appraisal (IOA);
- Modelling below the LOAEL (Lowest Observed Adverse Effect Level) to a value more consistent with WHO guidance; and
- Having consideration for parks and gardens within the IOA.

➢ **Each of these outcomes will be explained in further detail in today's workshop**

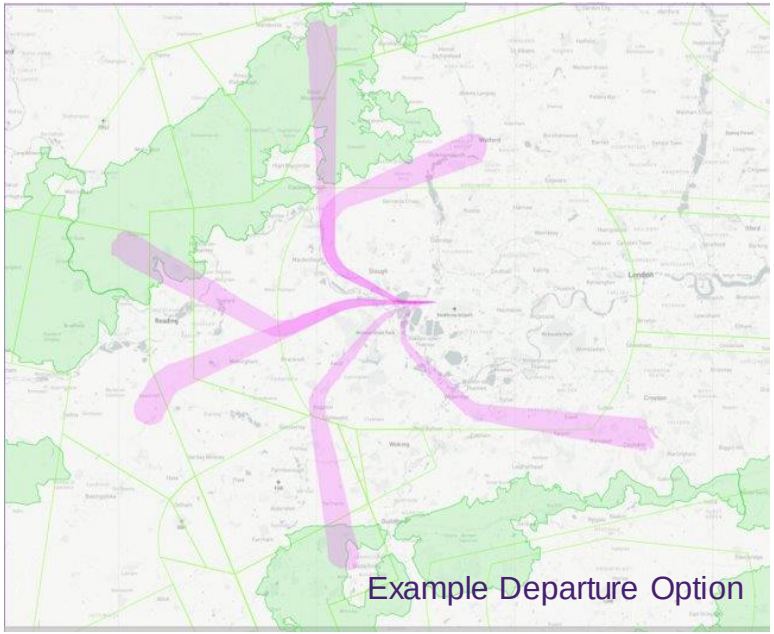
Today's Workshop: Initial Options Appraisal

Today's workshop provides an opportunity for us to discuss our proposed approach to the environmental aspects of the IOA, including:

- Our **approach**;
- **Primary metrics** linked to policy; and
- **Secondary metrics** to help you understand the likely impacts of the proposed airspace change

Method: Developing Heathrow's approach to the IOA

Our Comprehensive List of Options (CLOO) are options which have been developed specifically for routes to and from each of Heathrow's four runway ends.



Our approach to the IOA needs to reflect:

- The nature of our options and how they would be used within Heathrow's operational environment;
- The various environmental considerations set out in CAP1616;
- The provision of information that helps the CAA and key stakeholders to be able to understand the potential performance of each option, particularly if an option might be discounted as a result of the IOA

Method: Assumptions and Limitations of the IOA

Approach:

The IOA will compare all options against a 2019 base case (i.e the airspace design and route usage of 2019). 2019 is a more suitable base year than 2020/2021/2022 due to the impacts of Covid-19.

This method therefore requires:

- A base case to be developed for each metric (noise, CO_2 emissions, air quality etc) based on 2019 operations using the actual tracks that were flown;
- Each route option to be modelled and appraised assuming the 2019 operations occurred using the option design;
- The performance of each option to then be measured and compared against the 2019 base case.

Assumptions include:

- All options assume the same flight profiles (climb/descent gradients). We expect this to change as options mature in later stages.
- Vectored arrival options assume similar dispersion patterns to today, but with different Instrument Landing System (ILS) joining points;
- PBN departures and arrivals assume a small degree of dispersion as observed in previous PBN trials;
- When appraising our PBN arrivals options, we will include operations between 0430 and 0600 as fewer arriving aircraft may allow for PBN arrivals to be viable.

Heathrow

Method & Metrics: Noise

For each option, the IOA will consider:

- Overall noise impact;
- Change in noise impact, compared with 2019 base case.

The following slides set out the many noise metrics we intend to use: some are primary metrics linked to policy, others are secondary metrics intended to help stakeholders to understand the potential impacts of the option(s).

Our proposed approach is based on the metrics set out in Appendix B of CAP1616, however **in response to stakeholder feedback we have included metrics that consider WHO guidance and the N65/N60 noise event metrics.**

- Noise modelling will be carried out using the AEDT model
- Noise modelling will conform with CAP2091 Category A requirements: this will include validation of flight profiles and noise emissions data

Metrics: Overall noise impact

	Primary metric
	Secondary metric

The following metrics are proposed to provide an indicator of **overall noise impact:**

Monetised Noise	92-day Average **Daytime and Night-time**	£ (net present value)	Provides an indication of the option's performance with respect to TAG. Indicates whether the option may contribute positively or negatively towards overall noise as part of the system.
Noise Exposure	92-day summer average policy period – **daytime** (LAeq,8/16h)	Population above SOAEL	Indication of the population who may experience significant impacts during daytime operations
		Population above LOAEL	Indication of the population who may be subject to adverse effects under policy during daytime operations
		Population above 45 dB	Indication of the population that may experience noise levels above 45dB during daytime periods. Prepared as a sensitivity test to noise exposure beyond LOAEL and towards WHO thresholds.
	92-day summer average policy period - **night-time**	Population above SOAEL	Indication of the population who may experience significant impacts during night-time operations
		Population above LOAEL	Indication of the population that may be subject to adverse effect under policy during daytime operations
		Population above 40 dB	Indication of the population that may experience levels above 40dB during night-time periods. Prepared as a sensitivity test to noise exposure beyond LOAEL and towards WHO thresholds.
Noise Events	92-day summer average policy period - **daytime**	N65	The population experiencing noise events from the use of the option during day and night-time periods.
	92-day summer average policy period - **night-time**	N60	
Overflight	92-day summer average policy period - daytime	20 times per day	The population potentially overflown by use of the option during day and night-time periods.
	92-day summer average policy period - night-time	5 times per night	
Respite Potential	92-day summer average policy period - daytime	9 dB Leq differences	Will be used to illustrate the potential scale of respite available by designing to incorporate respite.

Metrics: Change in noise impact

	Primary metric
	Secondary metric

The following metrics are proposed to provide an indicator of **change in noise impact:**

Noise Exposure	92-day summer average policy period – **daytime** (LAeq,16h)	Populations with **increase** of > 1 dB and >3 dB	Indicates the scale of the population experiencing adverse changes in noise exposure
		Populations with changes of < 1 dB	Indicates the total population with any (even negligible) change to noise exposure
		Population with **decreases** if > 1 dB and > 3 dB	Indicates the scale of the population experiencing reduced noise exposure
	92-day summer average policy period - **night-time**	Populations with **increase** of >1 dB and >3 dB	Indicates the scale of the population experiencing adverse changes in noise exposure
		Populations with changes of < 1 dB	Indicates the total population with any (even negligible) change to noise exposure
		Population with **decreases** if > 1 dB and > 3 dB	Indicates the scale of the population experiencing reduced noise exposure

The change in noise impact will be considered for populations within the LOAELs by comparing the options with the base case

Metrics: Change in noise impact

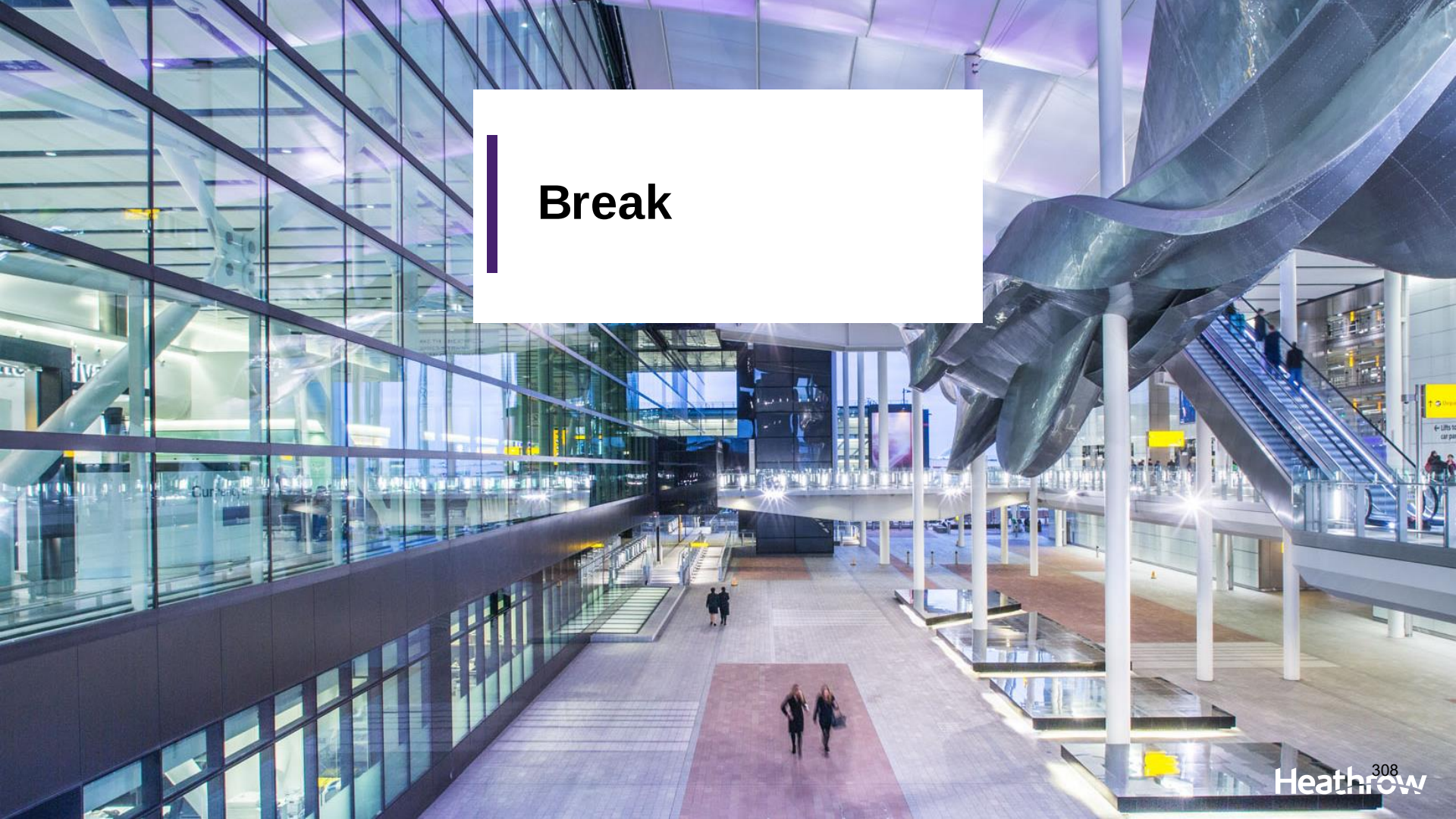
	Primary metric
	Secondary metric

The following metrics are proposed to provide an indicator of **change in noise impact:**

Noise Events and Overflight	92-day summer average policy period – **daytime**	> 25% and > 50% **increase** in events	These metrics will help describe how noise events and overflight could change across the population.
		< 25% change in events	
		> 25% and > 50% **decrease** in events	
	92-day summer average policy period - **night-time**	> 25% and > 50% **increase** in events	
		< 25% change in events	
		> 25% and > 50% **decrease** in events	

The change in noise impact will be considered for populations where:

- N65 and daytime overflight is equal to or higher than 20 events; and
- N60 and night-time overflight is equal to or higher than 5 events.



Break

Method & Metrics: Carbon

The IOA will consider overall carbon impact of each route and compared to the base case.

The method for calculating the Carbon impact is:

- 2019 flight tracks and all options are connected to set points in the network to calculate track miles
- Data from AEDT will be used to determine fuel burn for each movement on each route, using the Boeing Fuel Flow Model for operations up to 10,000ft
- Beyond 10,000ft, BADA* is used to calculate fuel burn to/from set points in the network
- Fuel burn estimates are converted into CO_2 estimates for each option and the base case
- Outputs are fed into TAG to calculate monetised carbon outcomes.

*Base of Aircraft Data

Metrics: Change in carbon impact

	Primary metric
	Secondary metric

The following metrics are proposed to provide an indicator of **change in carbon impact:**

Monetised Carbon	2019 Annual	TAG	Provides an indication of the carbon performance in monetised terms.
Change in Carbon Emissions	2019 Annual	CO_2 Tonnes	Indicates whether an option will increase or decrease CO_2 emissions and by how much with reference to the 2019 base case. Assists Heathrow in understanding how redesign of flight paths can contribute towards its own carbon reduction targets.
Change in Fuel Burn	2019 Annual	Tonnes	Indicates the additional fuel required to operate the option compared to the base case.

Note: Most ACP sponsors have only considered track miles in their Stage 2B appraisals. Track miles alone do not allow potential trade-offs between carbon and noise to be understood in detail, since this requires consideration of how routes would be used.

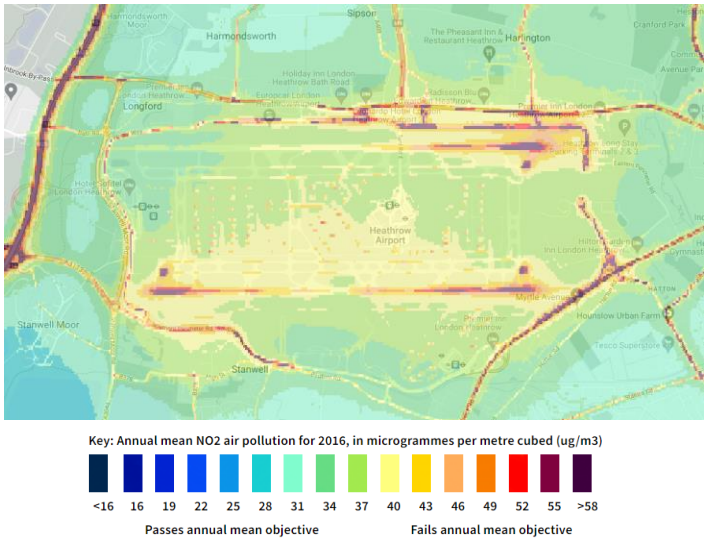
Method & Metrics: Local Air Quality

ACP Sponsors must consider possible impacts upon local air quality, but CAP1616a (1.97) states that *"Change sponsors must produce information on local air quality impacts **only** where there is the possibility of pollutants breaching legal limits following the implementation of an airspace change (or worsening an existing breach of legal limits). The CAA deems that this is only likely to become a possibility where:*

- *there is likely to* (be) *a change in aviation emissions (by volume or location) below 1,000 feet, **and***
- *the location of the emissions is within or adjacent to an identified AQMA"* (Air Quality Management Area)

At the IOA stage we intend to identify options where there is a **risk** that one of the conditions above is met (and where a full local air quality assessment may therefore be required at Stage 3). A full assessment of local air quality will need to take consideration of all sources of pollution (roads, railways, industrial plants etc).

Extract from London Air Quality Map, 2016



Our proposed approach is to:

- Review options to identify any which potentially change location of areas overflown below 1,000ft;
- Use information regarding potential ground level concentrations from aircraft operations in 2019 to review whether options have the potential to breach legal limits, taking account of Air Quality mapping.

Metrics: Change to local air quality

	Primary metric
	Secondary metric

The following metrics are proposed to provide an indicator of **potential risk with respect to air quality**:

Local Air Quality	Change in Route Location below 1,000ft	Where this is the case, the option has the potential to impact local air quality
Local Air Quality	Route has potential to breach legal limits	Data will be used to identify whether the new route could result in an increase in ground concentrations below 1,000ft.

Note: Most ACP sponsors have adopted a similar approach at Stage 2B.

A full air quality assessment may need to be prepared at Stage 3 if shortlisted flight paths meet **both** criteria.

Method & Metrics: Biodiversity

The IOA will consider biodiversity impacts at sites recognised within policy, such as RAMSAR, SSSI, SACs etc.

We will assess the impact of aircraft operations within the following altitude bands, based on scientific literature:

- 0 – 1640ft
- 1640 – 2000ft
- 2000 – 3000ft

The IOA will assess the overall impact of each option compared to the base case to identify the potential risk that options present to these sites.

Map of Designated Sites

Metrics: Biodiversity

Metrics are not currently set within policy

The following metrics are proposed to provide an informed indicator of **potential risk with respect to biodiversity**:

Biodiversity	Number and area of sites overflown between 0-1640ft	Assess impact where evidence indicates that disturbance effects may occur
Biodiversity	Number and area of sites overflown between 1640-2000ft	
Biodiversity	Number and area of sites overflown between 2000-3000ft	

Note: Most ACP sponsors have adopted a similar approach at Stage 2B by using overflight bands to identify the potential overall impact on relevant sites.

Metrics: Biodiversity

Metrics are not currently set within policy

The following metrics are proposed to provide an informed indicator of **potential risk of adverse change on biodiversity**:

Biodiversity	Number and area of sites overflown between 0-1640ft	Number and area of sites which experience an **increase in overflight** compared to the base case
		Number and area of sites which experience a **potential change** in overflight compared to the base case
Biodiversity	Number and area of sites overflown between 1640-2000ft	Number and area of sites which experience an **increase in overflight** compared to the base case
		Number and area of sites which experience a **potential change** in overflight compared to the base case
Biodiversity	Number and area of sites overflown between 2000-3000ft	Number and area of sites which experience an **increase in overflight** compared to the base case
		Number and area of sites which experience a **potential change** in overflight compared to the base case

Note: Use of these metrics has not been observed in other Stage 2B IOAs, however such considerations may have been made qualitatively. These metrics and associated information will help us identify whether an option may lead to adverse impacts on certain biodiversity sites. This information will help identify whether any options may warrant the need for a full Habitats Regulation Assessment at Stage 3.

Method & Metrics: Tranquillity

- CAP1616 singles out AONBs and National Parks with respect to impacts upon tranquillity, given these are *"designated areas with specific statutory purposes to ensure their continued protection in relation to landscape and scenic beauty"* (CAP1616 B77).
- CAP1616 also states that *"other areas for consideration"* might be *"identified through community engagement"* (CAP1616 B76). Following community feedback, our IOA will also consider Parks and Gardens*, such as Richmond Park and the Royal Parks.
- CAP1616 notes that there is no universally accepted metric by which tranquillity can be measured (CAP1616 p280).
- For the IOA we propose to qualitatively assess the potential overall impact of the options on tranquillity, by identifying any potentially adverse changes which could arise.
- The overall tranquillity impact of each option will be considered by considering the total area and number of sites exposed to various levels of N65 and overflight.

**Based on data held by Ordnance Survey and Natural England*

Metrics: Tranquillity

Metrics are not currently set within policy

The following metrics are proposed to provide an informed indicator of **potential overall impact with respect to tranquillity**:

Tranquillity	Total area of AONB and National Parks overflown (0 - 7000ft)	Indicates how AONBs and National Parks may be overflown by an option and how this may change compared to the base case
Tranquillity	Total area of AONB and National Parks overflown (experiencing 20 events per day of more than N65)	Indicates how AONBs and National Parks may experience ambient noise events from an option and how this may change compared to the base case
Tranquillity	Total area of Parks and Gardens overflown (0 - 7000ft)	Indicates how many Parks and Gardens may be overflown by an option and how this may change compared to the base case
Tranquillity	Total area of Parks and Gardens overflown (experiencing 20 events per day of more than N65)	Indicates how many Parks and Gardens may experience ambient noise events from an option and how this may change compared to the base case

Note: Other appraisals undertaken at Stage 2B have adopted overflight as a means of considering the impact on AONBs, National Parks, and Parks and Gardens.

Use of N65 to articulate potential impacts has not been observed on other appraisals to date. This metric will help to identify outdoor spaces that may be particularly affected by noise.

Metrics: Tranquillity

Metrics are not currently set within policy

The following metrics are proposed to provide an informed indicator of **potential risk of change on tranquillity**:

Tranquillity	Number and area of AONB and National Parks overflown (0 - 7000ft)	increase in overflight compared to the base case
		decrease in overflight compared to the base case
Tranquillity	Number and area of Parks and Gardens overflown (0 - 7000ft)	increase in overflight compared to the base case
		decrease in overflight compared to the base case

Note: Other ACP sponsors have not sought to quantify potential risks of change to tranquillity, instead considering change in a qualitative manner. This approach will allow the IOA to identify any particular options which have potentially adverse or beneficial impact on these spaces. Further information regarding these spaces can then be obtained where necessary.

The same considerations as above will also be made for the N65 metric.

Where such changes are considered potentially significant these will be identified, along with whether options may result in changes to the locations within AONB, National Parks, and Parks and Gardens that are affected.

Appraisal of potential concepts

Additional appraisal work will be carried out within the IOA to assess operational concepts, including assessment of potential impacts (costs and benefits) of:

- Applying various techniques for providing respite (as set out in CLOO engagement material)
- Applying techniques to enable dispersion of PBN routes

The impact of these concepts will be assessed in the IOA using a sample of options to understand the likely environmental impacts (positive and negative).

Glossary

Term	Description
ACP Sponsor	An organisation that proposes, or sponsors, a change to the airspace design in accordance with the CAA's airspace change process. Heathrow is the sponsor of this airspace change.
Aviation Environmental Design Tool (AEDT)	The Aviation Environmental Design Tool (AEDT) is a software system that models aircraft performance in space and time to estimate fuel consumption, emissions, noise and air quality consequences. This tool is used to generate the noise contours.
Airspace Change Organising Group (ACOG)	ACOG was established in 2019 at the request of DfT and CAA to coordinate the delivery of key elements of the UK's Airspace Modernisation Strategy. ACOG is a fully independent organisation and is responsible for coordinating individual airspace changes via an Airspace Masterplan.
Airspace Change Proposal (ACP)	Airspace change proposals (ACPs) are requests from a 'change sponsor', usually an airport or a provider of air navigation services (including air traffic control), to change the notified airspace design. ACPs must follow the CAA's CAP1616 airspace change process.
Air Quality Management Area (AQMA)	Air Quality Management Areas are defined geographical areas where air pollution levels exceed, or are likely to exceed, national air quality objectives (where the public may be exposed to harmful air pollution over a period of time).
Area of Outstanding Natural Beauty (AONB)	An area of outstanding natural beauty is an area of countryside in England, Wales or Northern Ireland that has been designated for protection by the Countryside and Rights of Way Act 2000 (CROW Act) due to its significant landscape value. The Act protects the land to conserve and enhance its natural beauty.
Base of Aircraft Data (BADA)	The Base of Aircraft Data is an Aircraft Performance Model (APM) developed and maintained by EUROCONTROL, with the cooperation of aircraft manufacturers and operating airlines. The BADA APM is designed for simulation and prediction of aircraft trajectories for purposes of ATM research and operations.
Biodiversity	Biodiversity is the variety of all life on Earth including all species of animals and plants. Biodiversity supports the vital benefits humans get from the natural environment.
CAP1616	CAP1616 is the CAA's airspace change process guidance, introduced in December 2017. CAP1616 establishedadditional CAA scrutiny and validation of sponsors' work and evidence as they develop proposals; increased requirements relating to transparency and engagement; and introduced new opportunities for those impacted by proposals to have their voices heard.

Glossary

Term	Description
CAP2091	CAP2091 is the CAA's Policy on Minimum Standards for Noise Modelling, introduced in January 2021. It sets out requirements to be used when ACP sponsors are carrying out noise calculations.
Civil Aviation Authority (CAA)	The CAA is the UK's aviation regulator, overseeing and regulating all aspects of civil aviation in the UK. The Secretary of State for Transport placed a statutory duty upon the CAA to develop a strategy and plan for modernising airspace.
Climb Gradient	The climb gradient is how steeply the aircraft climbs on departure. It is the ratio between distance travelled over the ground and altitude gained and is usually expressed as a percentage.
Comprehensive List of Options (CLOO)	Airspace change sponsors are required to develop a Comprehensive List of Options at Stage 2 of the CAP1616 process. The CLOO should include a comprehensive set of airspace design options that address the Statement of Need and align with the Design Principles set at Stage 1.
Cumulative Impacts	Consideration of the combined impacts of multiple airports' ACPs, where proposed flight paths overfly the same geographical areas.
Department for Transport (DfT)	The Department for Transport (DfT) is the United Kingdom government department responsible for the English transport network (and a limited number of transport matters in Scotland, Wales and Northern Ireland that have not been devolved).
Descent Gradient	The descent gradient is the rate at which an aircraft decreases altitude on the approach to the runway for landing. It is the ratio between distance travelled over the ground and altitude lost and is usually expressed in degrees.
Design Principle (DP)	Design Principles encompass the objectives that the airport seeks to achieve through the airspace change, including safety, policy, environmental, and operational factors. Design Principles are set through engagement with stakeholders at Stage 1, and they guide the airspace designers to create suitable flight path options at Stage 2.
Design Principle Evaluation (DPE)	The Design Principle Evaluation is a requirement of the CAP1616 airspace change process at Stage 2. It involves assessing the Comprehensive List of Options against each Design Principle.
Flight Path Options	Flight path options are operationally viable (flyable) flight paths developed by Heathrow's technical team.

Glossary

Term	Description
Initial Options Appraisal (IOA)	The IOA is required at Step 2B of the CAP1616 process. It involves an assessment of the impacts (costs and benefits) of each of the viable options. The appraisal must use WebTAG, DfT's appraisal guidance, which includes consideration of environmental and economic impacts of the airspace change options.
Instrument Landing System (ILS)	The Instrument Landing System is a precision radio navigation system that provides short-range guidance to arriving aircraft on approach to the runway.
Laeq,16h and Laeq,8hr	LAeq is the most common international measure of noise and means 'equivalent continuous noise level'. 51dB LAeq 16hr (daytime noise) and 45dB LAeq 8hr (night-time noise) contours form part of the primary CAP1616 metrics used to evaluate the benefits and impacts of an airspace change. These contours represent the daytime and night-time lowest observable adverse effect level (LOAEL) contour defined in UK airspace policy. LAeq contours are the equivalent sound level of aircraft noise in dBA. This is based on the daily average movements that take place in the 16hr daytime period (0700-2300) or 8hr night period (2300-0700) during the 92-day peak period from 16 June to 15 September. This metric is the measure of noise exposure adopted by Government for the purpose of considering adverse effects from aircraft noise.
Lowest Observed Adverse Effect Level (LOAEL)	Lowest Observed Adverse Effect Level: This is the level above which adverse effects on health and quality of life can be detected. It is set at 51 dB LAeq for daytime periods and 45 dB LAeq for night-time periods. The LOAEL and the LAeq metrics which underpin it are based on average noise measured over a 92-day period, taking into account all arrival and departure operations.
N60/N65	A noise metric which describes the number of aircraft noise events above a noise level of 60 LAmax for night-time periods and 65 LAmax for daytime periods. These are event-based metrics which can be used to better understand the number of noise events that occur and where.
Overflight	CAA's CAP1498 document sets out a definition of overflight for use in ACPs. "Overflown" is defined as "an aircraft in flight passing an observer at an elevation angle of 48.5° from the ground at an altitude below 7000ft" (CAA). The overflight metric enables calculation of the number of times a location may be considered to be overflown.

Glossary

Term	Description
Overflight Cones	The CAA's CAP1498 document states that overflight above a given location should be measured using a cone. The cone identifies the airspace above a given location within which an aircraft might be perceived as "overflying" that location. This is because an aircraft does not need to be directly overhead to have an impact (noise and/or visual) on the local population. 
Parks and Gardens	Areas of land designed, constructed, managed and maintained as a public park or garden. These normally have a defined perimeter and free public access, and generally sit within or close to urban areas.
Performance Based Navigation (PBN)	PBN improves the accuracy of where aircraft fly by using modern satellite navigation and moving away from outdated and conventional navigation techniques using ground-based beacons (it is similar to GPS "sat nav" devices that most people use in their cars today). PBN is being adopted worldwide through International, Regional and State level initiatives and regulations.
RAMSAR	A Ramsar site is a wetland site designated to be of international importance under the Ramsar Convention (also known as "The Convention on Wetlands"), an intergovernmental environmental treaty established in 1971 by UNESCO in Ramsar, Iran.
Respite	Scheduled relief from aircraft noise for a set period of time.
Runway Alternation	Heathrow has two runways, with one used for arrivals and one used for departures at most times. During the day, when planes are landing and taking off to the west (westerly operations), we alternate the use of our two runways to provide local communities with respite. The alternation pattern means that for part of the day we use one runway for landings and the other for take-offs, then halfway through our operational day (at 15:00) we switch over. Runway alternation is not currently possible when planes are landing and taking off to the east (easterly operations).
Special Areas of Conservation (SAC)	Protected areas in the UK designated under UK Government environmental regulations. These sites are classified as making a significant contribution to conserving habitats and species identified in the Habitats Directive.
Sites of Special Scientific Interest (SSSI)	An SSSI is an area that is of particular interest to science due to the rare species of fauna or flora it contains - or important geological or physiological features that may lie in its boundaries. These areas have high conservation value and need to be protected. Natural England is the official authority in England determining which sites have SSSI status.
Significant Observed Adverse Effect Level (SOAEL)	This is the noise level above which significant adverse effects on health and quality of life occur. The SOAEL is likely to be different for different noise sources, for different receptors and at different times.

Glossary

Term	Description
Sound Exposure Level (SEL)	Occasional loud noise is measured in the UK by Sound Exposure Level (SEL). An SEL footprint can be created to show the geographical area over which a particular SEL is reached from a single noise event (e.g. the area in which the sound of a plane taking off reaches 70 decibels).
Statement of Need (SoN)	At the first stage of the airspace change process, airport sponsors are required to outline the objectives of the ACP in a formal submission to the CAA. The Statement of Need sets out the airspace issue or opportunity the sponsor is seeking to address and what outcome it wishes to achieve.
Vectoring	Vectoring is the provision of navigational guidance to aircraft by air traffic controllers (ATC). Vectoring helps to maximise use of available airspace.
WebTAG/TAG	TAG (formerly known as WebTAG) is the DfT's suite of guidance on how to assess the expected impacts of transport policy proposals and projects. As part of the CAP1616 process, Heathrow is required to apply specific noise metrics and quantify the benefits and impacts on an airspace change using the TAG tool. The TAG tool is a workbook using calculations and formulae that are set by DfT. The CAP1616 process requires TAG analysis methods to be used for evaluation of quantified noise benefits and disbenefits.
World Health Organisation (WHO)	WHO is a specialised agency of the United Nations responsible for international public health. WHO has provided guidance on recommended maximum noise levels for sleep and education.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