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# Reduced Night Noise – Revised Next Steps

## NMB/9 - Working Paper

Date: 8 January 2017

### Summary

This paper provides an update on the proposed RNN trial taking into account feedback provided at NMB/8. The feedback included a request to fully consider the “CNG trial pre-conditions” presented at NMB-7 (covered in NMB/9 IP26) and also comments made at the meeting on the proposed objectives.

The high-level aim of the trial is to “*Minimise the noise impact of arrivals on those people currently affected, by using RNAV to optimise the transition approach profile*”. To support this aim and following further discussions, more specific objectives have been developed:

- To reduce the peak noise levels generated per arrival per aircraft type
- To not place routes outside of the extents of the current lateral arrivals distribution
- To validate the use of RNAV for arrivals

The re-focusing of these objectives has made noise the primary factor which will be measured both before, during and after the trial using mobile noise monitors. The noise data will be complimented with radar data overflight analysis. The use of these analysis methods will allow for the collection of objective, scientific data which can be used to assess the high-level aim and objectives of the trial.

In addition to the objectives, design considerations have also been introduced. These are factors which would be considered as part of the design phase and could be used to evaluate the concepts. These include, for example, managing environmental impacts, considering the number of people overflown, managing ATC and aircrew workload, and considering best practice in route design and aircraft capabilities. The considerations listed present an initial overview and it is proposed that the list is reviewed and updated periodically.

To provide a fair comparison, it is proposed that the RNN route/(s) are not moved outside of the lateral extents of the night time arrivals swathe. This precludes any changes that does not comply with the DfT imposed night time minimum ILS joining point. Although these restrictions have been applied, this only affects the outer extents of the design area and the NMB will be able to provide input to the initial design, e.g. by proposing the use of single or multiple routes, how these routes may be used, and where they are located within the outer extents of the night time arrivals swathe. The NMB will have the opportunity to provide such input using tools such as NATS CompAir in, or shortly after, the RNN workshop in March 2018.

The initial designs will be subject to an options and feasibility analysis to determine the optimal design which can be taken forward. Depending on the feedback gained in the workshops and the design considerations, the route(s) designs may be different for easterly and westerly approaches. This analysis would include an assessment against the design considerations along with comparative analysis of the trial noise footprint, frequency and overflight analysis between the baseline and proposed trial route/(s). The NMB will be provided with the results of this analysis along with the final design and will be invited to provide feedback towards a Go/No go decision.

If a decision to go-ahead is reached, the trial preparations will commence. This will include the identification of suitable noise monitoring sites and the early installation of NTK monitors to commence the baseline data capture ahead of their use in the trial. In addition, GAL will commence wider engagement activities to provide additional information on the RNN trial, the trial route/(s) and the likely benefits and impacts.

The trial will take place based on a fixed 6-month trial operated under the CAA’s airspace trial guidance (CAP1616). The trial will initially be used between 0130 and 0500 as this is the lowest traffic period and the safest opportunity to introduce new procedures, although stretch targets have been introduced to increase the applicable time period where possible.

The top airlines with arrivals between 0130 and 0500 will be invited to take part in the trial. This means that up to 70%, or 8 arrivals per night in this period could be part of the RNN trial. This does mean that a limited number of arrivals in the period will not be part of the RNN trial.

Throughout the 6 months that the trial is active, monthly data analysis will be undertaken to review the noise environment and the operational viability in comparison to the baseline environment. If the trial is not performing as expected it may be withdrawn early in accordance with the CAA guidance provided by CAP1616.

At the end of the 6 month trial period the RNN routes will be withdrawn and the previous operating procedures will be re-instated. This will permit a detailed post-trial review to commence, the review will consider all aspects of the trial but will aim to determine if the trial has achieved its high-level objective to minimise the noise impact of arrivals.

The review will also identify if the RNN routes, potentially with some adjustment, should be implemented using an airspace change process ahead of LAMP 2. The decision to take the routes forward will be based upon the outcome of the post-trial analysis using the scientific noise data gathered as part of the trial and feedback provided by the NMB.

As RNN has been further developed, it is clear that the trial presents two clear opportunities. Firstly, for the NMB, the RNN initiative allows for further understanding of the benefits of arrivals RNAV building towards recommendation Aspire-21 of the Independent Arrivals Review; whilst providing the community with an unrivalled opportunity to be involved in the initial design of trial routes and review trial performance. Secondly, for industry, RNN provides an opportunity to explore new engagement techniques. Regardless of the outcome of the RNN trial, the entire process and trial will be reviewed with the lessons learnt through this work program shared to benefit future airspace trials and changes.

**Action:** The NMB is invited to endorse further work on this task as a priority.

## Introduction

At NMB/6, it was agreed that opportunities for a night initiative should be explored and, to do this, an industry workshop was held on 31 July 2017. The workshop outcomes are summarised in NMB-7 IP09.

In addition to the workshop, Community Noise Groups (CNG) have submitted their proposals on Quiet Night Arrivals (QNA). These have been circulated to the NMB as information within NMB-7 IP10 and NMB-7 IP22 along with Flimsy submissions NMB-7 FL01, FL02 and FL03.

NMB/7 WP05 provided an initial proposal to progress the then named QNA initiative. Ahead of NMB/8 the NMB along with CNG were briefed on the Reduced Night Noise initiative (RNN), renamed from QNA. The briefing, along with discussions at NMB/8 have provided additional input which has led to this revised RNN paper, which has been developed in accordance with the proposed NMB guiding principles for change (NMB/8 WP03).

## Background

The proposed RNN trial presents the first step towards meeting the Aspire-21 recommendation by trialling arrivals RNAV technology to see if the use of carefully designed RNAV routes can provide a reduction in noise, disturb fewer people and deliver fair and equitable dispersal of noise.

The following documentation is considered supporting information to this paper and can provide additional information:

- NMB/8 RNN briefing (attached as an annex C to this paper);
- NMB/7 WP05 QNA Next Steps;
- NMB/7 IP10 CNG Quiet Night Arrivals Objectives;
- NMB/7 IP22 CAGNE response to NMB/6 IP08 Objectives for a night noise trial;
- NMB/6 IP08 Quiet Night Arrivals discussion paper.

In addition to this paper:

- The presentation provided by Helios at the NMB Public meeting in December 2017 has been included as Annex C to provide additional information.
- NMB/9 IP26 provides a response to NMB/8 Action 4 and records how the CNG inputs and pre-conditions to RNN have been considered within the RNN trial program.

## Structure of this paper

This paper builds upon previous submissions to the NMB and proposes a revised high-level aim and objectives. In addition, this paper introduces:

- Design considerations which capture a number of the CNG proposals;
- Initial success criteria;
- Proposed high level trial plan;
- Proposed high level engagement plan;
- Annex A provides information on what the RNN trial intends to do and what it doesn't;
- Annex B defines how the outer extents of the night time arrivals swathe for easterly and westerly arrivals can be measured;
- Annex C includes an adapted presentation on RNN given to the NMB public meeting;

All parts of the plan, including the design considerations and the engagement plan, may require further development as RNN progresses. As a result, this document will be periodically reviewed and updated as required. If any updates are made, the previous versions of the paper will be referenced.

**High-level aim**

RNN provides an opportunity for the NMB to understand the potential of RNAV for arrivals. For industry, the trial provides a means to use new engagement methods, procedures and tools such as the NATS CompAir tool, initially shown at the NMB public meeting. In both cases, the lessons learnt can be taken forwards into future airspace changes and most importantly LAMP 2<sup>1</sup>. As a result, the proposed high-level aim of the RNN initiative is to:

***“Minimise the noise impact of arrivals on those people currently affected, by using RNAV to optimise the transition<sup>2</sup> approach profile”.***

**How will this be achieved?**

The high-level aim will be achieved by providing aircrews with a defined lateral track with an optimal approach profile, designed to maintain a low noise approach throughout (noise will be reduced by providing aircrews with a fixed track distance to touchdown allowing an optimal low drag, low thrust, continuous descent approach to be flown). This will better standardise the approach profile which will deliver a two-fold reduction in noise as follows:

- The number of aircraft which are currently flying a sub-optimal approach profile will be reduced;
- The lowest flying aircraft could be higher when on the trial routes.

**Revised trial objectives**

The following objectives were initially proposed at NMB/7 and have been revised following feedback gathered at NMB/8. The initial and stretch targets listed below are provided to aim and focus the RNN trial.

Note, not meeting a specific initial or stretch target does not mean that the RNN trial has not been successful, the decision on trial success will initially be made in the mid-trial review and the post-trial analysis and review.

| Objective   | Rationale   | Target   |
|---|---|--|
| <p><b>Reduce the peak noise level generated by arrivals per aircraft type</b></p>                     | <p>The introduction of an RNAV route/(s) will allow arrivals to be better standardised to the optimal low noise vertical approach profile. The optimisation will reduce the number of aircraft flying a noisy approach profile and will therefore reduce the noise generated by arrivals.</p> <p>The noise generated by arrivals will be measured using mobile noise monitors. Analysis will be performed to determine changes in the loudest event (Lmax) and the sound exposure level (SEL) per aircraft type.</p> <p>Lmax of 60dB (as counted by the N60 metric) per aircraft type will be of particular importance. Due to acoustic insulation of a partially open window, an Lmax event of 60dB outside will be heard as 45dB indoors, and considerably less with the windows closed. For reference, planning guidance<sup>3</sup> states that new housing should be designed so that noise in bedrooms does not exceed 45dB indoors more than 10 times per night.</p> | <p>Reduction in the SEL and Lmax noise levels by the following margins:</p> <ul style="list-style-type: none"> <li>- Initial: at least a 3dB reduction in noise per aircraft type.</li> <li>- Stretch: at least a 5dB reduction in peak noise per aircraft type.</li> </ul>  |
| <p><b>To not place routes outside of the extents of the current lateral arrivals distribution</b></p> | <p>To provide a fair comparison and evaluation of the current baseline to the RNN trial, it is proposed that routes are not moved outside of the lateral extents of the arrivals swathe.</p> <p>The initial design stage will provide an opportunity for the NMB to provide input to the location of these routes which could be located anywhere within these outer extents. Lateral density plots will be provided as a guide to aid this process.</p>  | <p>To maintain route designs within the existing swathe, defined as areas receiving more than 5% (this figure to be reviewed) of night time (2330 to 0600<sup>5</sup>) arrivals movements below 7,000ft as shown on the latest lateral density map available - Spring 2017 (March, April and May). These heatmaps for arrivals to runway 26 and 08 are shown in Annex B.</p> |

<sup>1</sup> Note, although LAMP 2 intends to engage and consult widely on the airspace design. The constraints within LAMP 2, which could be conflicting would need to be traded-off to deliver the best situation for all.

<sup>2</sup> Transition is the segment of the approach which stretches from the entry into the Gatwick RMA to the point at which the ILS, or RNAV final approach is commenced.

<sup>3</sup> <http://www.ioa.org.uk/sites/default/files/14720%20ProPG%20Main%20Document.pdf>

<sup>5</sup> The entire night period has been used to define this area as there is an aim to seek to use the RNN routes not just in the proposed trial time, but within the entire night period should traffic, weather and disruption allow.

| Objective                                    | Rationale  | Target   |
|--|--|--|
|  | To provide a fair comparison and to allow RNN to be implemented in a reasonable timescale <sup>4</sup> , RNN does not propose any changes to the night time ILS joining point.   |  |
| <b>Validate the use of RNAV for approach</b> | This objective aims to validate the use of RNAV technology of arrivals in terms of safety, flyability, and its ability to deliver meaningful noise reduction. Part of this objective is to understand the limitations of RNAV arrival routes with regard to under what traffic environments they can be applied. | Safe and successful use of the RNN routes between the hours of:<br>- Initial: 0130 and 0500 local<br>- Stretch: 0045 and 0515 local<br>- Stretch+: 2330 and 0600 local |

**Proposed trial timing**

The RNN trial routes will need to be firstly introduced at a low traffic period to maintain safety. Data analysis of summer movements has identified that between the hours of 0130 and 0500 local, traffic is at a suitably low level to allow for the safe trialling of new procedures. This is regarded as the initial target subject to weather and other disruption.

The top airlines with arrivals in this period will be involved in the RNN trial, this means that up to 70%, or 8 arrivals per night in this period will be included in the trial. This does mean that a small number (on average 2 per night in the trial period) of night arrivals may not be part of the RNN trial.

It is understood that the initial target does not cover the entire night period, a core CNG concern. However, it is important to start in low traffic periods, test the new procedures and then slowly build up the applicable trial periods to cover more of the night period. Analysis of lower traffic periods in the winter has highlighted that the trial period could be expanded to 0045 to 0515, subject to weather and other disruption. This presents the stretch target.

A further, stretch+ target, has been used to provide an ambitious target for the RNN trial which could cover the defined night period.

**Proposed design considerations**

Design considerations are intended to provide guidance to the design process and can be used to assess the viability and suitability of design concepts. They can also be applied to the preferred solution.

The following list represents an initial set of design considerations and has been developed from feedback gathered from both industry and community members of the NMB. This list is not complete, and it is understood that additional points may be proposed for inclusion or may arise as the concepts and design progresses. As a result, it is proposed that the list is periodically reviewed and updated as required.

In cases where no driver is provided (i.e. minimise, maximise or maintain), the consideration is simply a factor for the initial design to consider.

**Design considerations:**

- Consider distribution across the night time arrivals swathe as defined in the objectives, subject to the feedback gained in the initial design workshops. Note, the industry is currently investigating options for RNAV dispersal by design and these high-level concepts will be presented to the NMB in the RNN workshop.
- Consider the number of people overflown by the proposed RNN routes. Tools such as NATS CompAir<sup>6</sup> will provide initial feedback on the concepts developed in, or shortly after, the RNN workshops.
- Consider the local terrain under the night time arrivals swathe and proposed RNN routes.
- Operate within the extant airspace limits of the Gatwick Radar Manoeuvring Area (RMA).
- Consider limitations of trial data capture, such as the availability of suitable sites for noise monitors.

<sup>4</sup> The requirement for a 10NM night time minimum ILS joining point was introduced prior to 2004 for noise abatement purposes. In NMB/7 WP05 the DfT confirmed that for a trial this restriction could be changed without a formal consultation however it would require a consensus agreement between all relevant community noise groups.

<sup>6</sup> The CompAir tool uses a Government population database based upon the 2011 census with annual updates.

- Note that different design requirements may be required between easterly and westerly arrivals.
- Operate between the entry points to the Gatwick RMA and the commencement point of the final approach (ILS or RNAV).
- Consider ATC and aircrew workload (Safety, complexity etc.).
- Consider international best practice in route design.
- Consider aircraft navigational equipage and aircrew training.
- Consider aircraft navigational database storage capacity – this may limit the number of routes used.
- Consider community feedback in the initial design and trial period.
- Use extant guidance provided by the CAA and DfT, in particular CAP1378 and CAP1498.
- Consider research on low noise approach and the work carried out as part of NMB 2017/2018 workplan Activity 9.
- Consider environmental impact in terms of noise, fuel burn (track distance) and CO<sub>2</sub>.

### Proposed trial and engagement plan

The trial will follow the CAA's new process for airspace change and temporary operational trials, CAP1616<sup>7</sup>. The trial timeline and engagement plan are outlined below:

- **Step 1 Trial definition (November 2017 to January 2018):** Development and refinement of the high-level trial aims and objectives.
- **Step 2 Agreement of trial aim and objectives (NMB 9, January 2018):** Agreement of the high-level trial aims and objectives by the NMB – the purpose of this paper noting that periodic updates to the design considerations, trial and engagement plan will be required.

If the go-ahead is given at NMB 9, the CAA will be informed about the intention of the proposed trial and how the trial will be developed over the following period ahead of the go/no go decision in June 2018.

- **Step 3 Concept development and RNN workshops (February to March 2018):** At the NMB workshop in March 2018 the industry will present the high-level concepts for dispersal by design with RNAV. These concepts will aid the NMB in providing input to the initial design process in this workshop.

The workshop will provide an opportunity for the NMB and representatives from the wider community to provide input to the initial design process. As part of this phase, the workshop attendees will have the opportunity to provide comment on the design considerations outlined above, identify areas or locations of concern and discuss the use of single/multiple routing options along with the location and design of routes.

- **Step 4 Initial design and evaluation (March – April 2018):** Using inputs gained from the RNN design workshop initial routing options will be evaluated taking into account the RNN aim, objectives and design considerations. This process will allow the optimal design points to be identified and will form the basis for the final optimal design to be developed within Step 5.
- **Step 5 Detailed design and evaluation preparation (April to June 2018):** Based upon the optimal design points identified in Step 4, along with the trial design considerations, the final designs will be developed and refined. Given the current design considerations, this could involve single or multiple routes which may be different for easterly and westerly operations.

This phase will involve the consideration of several options assessed using the same criteria used in Step 4. In accordance with CAP 1616 a high-level noise and operational assessment will be undertaken to identify the potential benefits and the unintended consequences that the proposed RNN routes could deliver. This analysis will also be part of the formal trial submission to the CAA.

The options considered will also be subjected to high level safety and operational assessments.

The analysis will result in the identification of a suitable design that can be presented to the NMB for comment alongside the analysis undertaken in an information paper.

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<sup>7</sup> <http://publicapps.caa.co.uk/modalapplication.aspx?appid=11&mode=detail&id=8127>

- **Step 6 Trial Go/No Go decision (June 2018):** At NMB/11 in June 2018, the outcome and supporting analysis from Step 5 will be presented to the NMB which will be invited to provide feedback towards a go/no go decision.
- **Step 7 Design finalisation, trial preparation and community engagement (July 2018 to December 2018):** If a go decision is reached, the trial plan will be formalised and submitted to the CAA for review. If this is agreed then steps will be taken to finalise the RNN route designs, test the solution in simulators and prepare the RNN routes for entry into aircraft Flight Management Systems (FMS).

Whilst the routes are being finalised, the data analysis processes will be finalised and setup. The noise monitors will be sited to commence the measurement of the pre-trial noise environment for comparison to the trial noise environment.

Gatwick will also commence its pre-trial engagement with the local community to provide information about the trial, when it will take place, and any specific impacts and benefits that might be delivered. The exact process and form that this engagement will take will be developed in accordance with CAA guidance.

- **Step 8 Trial commencement (January 2019):** Start of the trial and commencement of the trial data analysis and reporting processes. Data reports will be provided to the NMB, along with other groups (GATCOM, NATMAG) as appropriate.
- **Step 7 Trial data analysis (Monthly throughout trial):** Data analysis will be carried out a monthly basis to review trial performance and the noise reductions achieved. Summary reports will be provided to the NMB meetings in this period.

In accordance with CAA guidance in CAP1616 if the trial, for any reason, results in a measurable negative impact, the trial may be ceased prior to the planned end date. If this was to occur, the post-trial analysis process will still report on the trial and share the lessons learnt.

- **Step 8 Trial completion and post-trial review (June 2019):** The trial will take place over a fixed period of 6 months. At the end of this period, the RNN routes would be removed and normal operations resume.

Regardless of the action taken, the post-trial analysis will take place and will form part of a detailed trial review. It will consider the benefits and drawbacks of arrivals RNAV, the new engagement process, and develop the lessons learnt for future airspace trials and changes. The trial report and lessons learnt will be shared with the NMB and other stakeholders.

The noise monitors will remain on-site beyond the 6-month trial period to continue recording the noise environment to provide additional data for consideration in the post-trial analysis.

If the post-trial analysis shows that clear noise reduction and other benefits can be delivered with the RNN routes. A decision will be taken, considering feedback from the NMB, to determine if the RNN routes, or some form of the RNN routes could be introduced as part of an airspace change process<sup>8</sup>. This decision may be taken part-way through the trial if the monthly data analysis shows a clear improvement in the noise environment. In which case steps may be taken with the CAA and NMB to explore options to maintain the RNN routes as a temporary operational change beyond the 6-month trial pending the post-trial analysis and the formal airspace change process.

If the decision is made to implement the RNN routes, then GAL will commence a formal process in accordance with the guidance provided in CAP 1616. In addition, GAL will engage with the CAA to understand if the RNN routes could be implemented as a temporary operational change whilst the formal ACP progresses. This will allow whatever benefit is delivered by RNN to be achieved in a short timescale whilst the formal process, which may take up to 2 years.

If the trial-review determines that RNN does not deliver a material benefit above the current scenario, future options could be explored and the lessons learnt from the trial will be shared with the relevant stakeholders.

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<sup>8</sup> This refers to the use of a slightly modified RNN route to address shortcomings that may not have been envisioned in the design process, such as a modification to an altitude or speed waypoint to further optimise the approach.

## **Additional RNN improvement works**

As the implementation of an operational evaluation is unlikely before the start of 2019, an interim quiet night initiative was proposed as part of NMB/7 WP05. This engagement process will continue to take place and will aim to deliver improvements to the approach profile prior to the trialling of arrivals RNAV.

This will use the approach profile analysis proposed in NMB-7 IP04 to identify which airlines/crews are consistently performing sub-optimal or excessively noisy approaches. Follow-up engagement activity with airlines may include, but is not limited to, teleconferences, face to face meetings and with attendance at training events/open days. This process will also engage with NMB 2017/2018 work plan activities covering CDO engagement and improvement. Regular updates will be provided as part of the NMB implementation report.

## **Conclusions**

Following NMB/8 the trial high-level aim and objectives have been refined following feedback gained from the NMB and the design considerations, trial and engagement plan have been further developed and refined.

The refined objectives focus the RNN trial solely on reducing arrivals noise whilst building upon recommendation Aspire-21 of the Independent Arrivals Review. RNN continues to aim to deliver a precise arrivals path to allow an optimised continuous descent, low power low drag approach whilst also reducing the number of sub-optimal approach profiles that occur today.

In addition to the primary objectives, several design considerations have been proposed along with a draft trial and engagement plan. These have been introduced to provide initial information and guidance to support the process and will be periodically reviewed and updated as required.

As noise is a key consideration in the trial, mobile noise monitors will be used to track the maximum noise (Lmax) and Sound Exposure Level (SEL) per aircraft for the baseline (current) and RNN trial environment.

To provide a fair comparison, it is proposed that the routes are not moved outside of the lateral extents of the night time arrivals swathe. This precludes any changes to the DfT imposed night time minimum ILS joining point. Although these design restrictions have been applied, this only affects the outer extents of the design area and the NMB will be able to provide input to the initial design by proposing routings anywhere within this area.

As RNN has been further developed, it is clear that the trial presents two clear opportunities. Firstly, for the NMB, the RNN initiative allows for further understanding of the benefits of arrivals RNAV whilst providing the community with an unrivalled opportunity to be involved in the initial design of trial routes and review trial performance. Secondly, for industry, RNN provides an opportunity to explore new engagement techniques. Regardless of the outcome of the RNN trial, the entire process and trial will be reviewed, sharing the lessons learnt through this work program to benefit future airspace trials and changes.

## **Next steps**

The RNN trial is now well defined and the NMB is invited to agree the trial aim and objectives noting that the remainder of this document (design considerations, trial and engagement plan) will require periodic review and update as the RNN routes are investigated and matured.

## **Annex A: What the RNN trial aims to do, and what it doesn't**

The following statements are designed to provide clarity to the NMB on what the RNN trial aims to achieve and what it doesn't. The following list is not complete, and it is proposed that additional topics are added as more is understood about the trial. The NMB are invited to provide comment.

### **The RNN trial does plan to:**

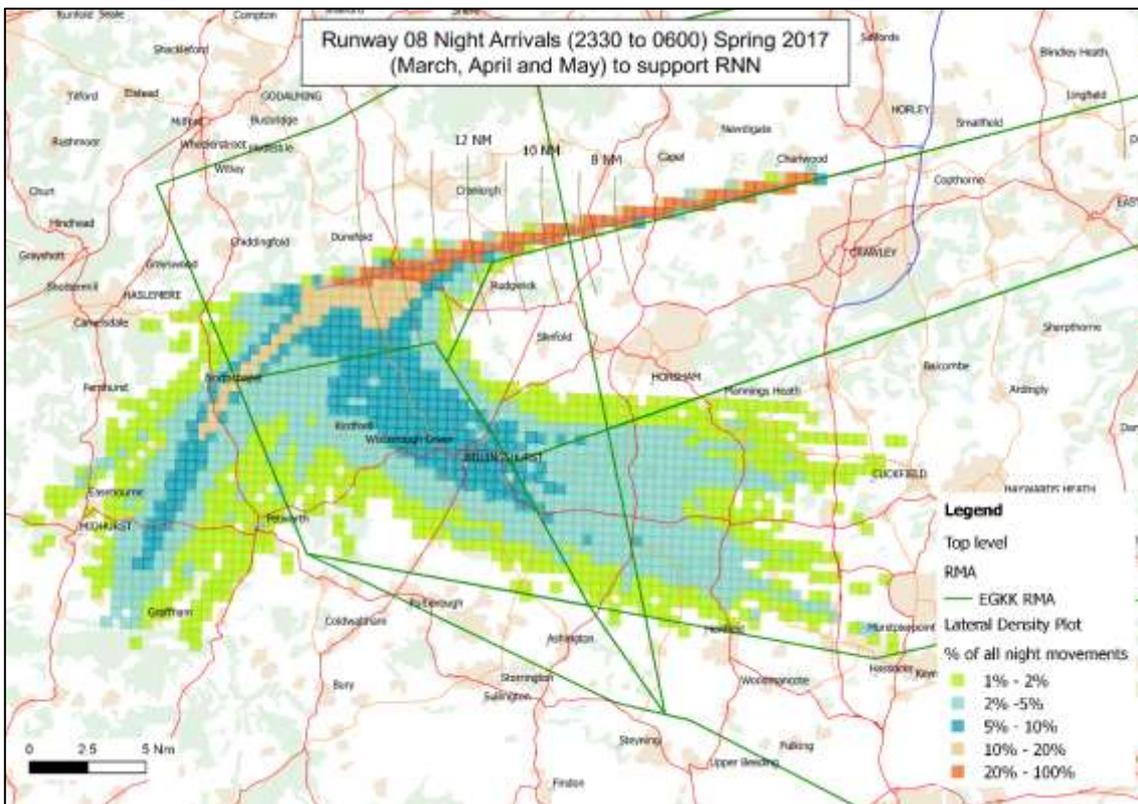
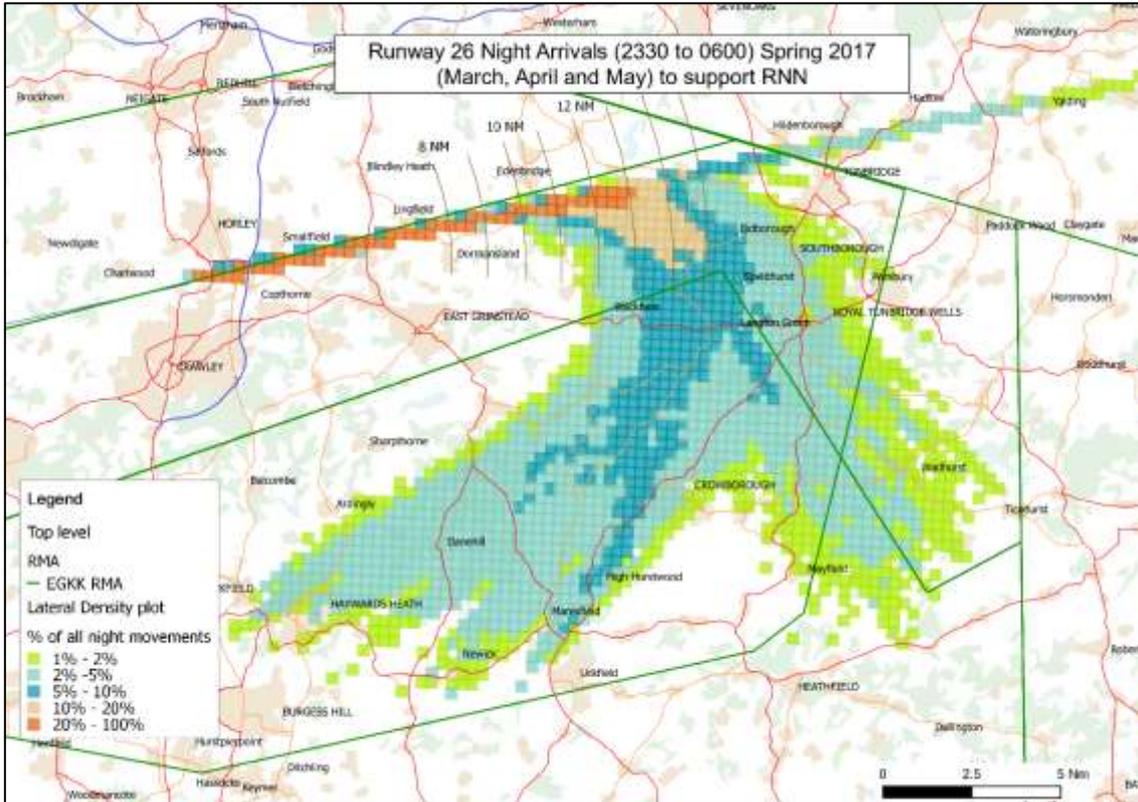
- Deliver a reduced noise environment for those who currently experience night time arrivals traffic, with these areas defined by the lateral density plots in Annex B.
- Build understanding towards the achievement of recommendation Aspire-21 of the Independent Arrivals Review, focusing on reducing the impact of arrivals noise.
- Optimise the vertical approach profile to reduce the number of 'outlier' approaches.
- Measure the noise environment using noise monitors before and during the trial to develop a baseline and trial scenario for comparative analysis.
- Further develop the NMB's understanding of arrivals RNAV.
- Test new community engagement initiatives and processes for use in future airspace trials and changes.

### **The RNN trial does not plan to:**

- Overfly people outside of the current of night time arrivals swathe as defined in Annex B. This is to provide a fair trial comparison.
- Optimise routes for capacity improvements or efficiency; noise is the primary driver and thus its inclusion as an objective.
- Identify future night flight routes for use in a LAMP 2 airspace design – RNN is a trial program which intends to explore the potential benefits and drawbacks of arrivals RNAV within the current operational environment. LAMP 2 involves a fundamental re-design of the airspace such that the RNN routes would not be applicable. However, the lessons learnt from RNN could be used as part of the 'clean sheet' airspace design with LAMP 2.
- Design routes for use in LAMP 2.
- Conduct specific research on low noise approaches, however RNN will consider best practice in the area and will include any information gained from Activity 9 (Development of the low noise approach metric).

### Annex B: Supporting RNN Data

The following charts show the lateral density plots of night time (2330 to 0600) arrivals. This period extends beyond the proposed trial period of 0130 and 0500 local due to the stretch+ trial target. In line with the proposed objectives, it is proposed that the RNN trial routes are constrained within the area representing 5% or more of arrivals (although this limit is to be reviewed).



## **Annex C: Supporting RNN Presentation**

Helios Presentation provided at the NMB public airspace meeting in December 2017.