Appendix

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Arup - Operational Risk Report
This report takes into account the particular instructions and requirements of our client. It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 228066-56
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4 Summary
Executive Summary

The Airport Commission’s (Commission) appraisal set as its objective a goal “To enhance individual airport and airports system resilience”. The intention was “to examine the ability of proposals to adapt both to lower level disruption arising in the course of day-to-day operations and to a major disruptive event” and required “an appraisal of operational risk, the inherent risks to airport operations of the following disruptive events …”\(^1\)

Arup suggests that the Commission has not fully examined the ability of proposals to adapt to “lower level disruption” from either “day-to-day operations” or “major disruptive events”. The Commission’s appraisal reports provide limited evidence that a robust, reliable and complete assessment of operational risk has been undertaken for all three proposals against the disruptive events suggested. Therefore we believe that the conclusions drawn by the Commission in regard to operational risk may be incomplete or misleading. To minimise the potential for misinterpretation Arup would suggest that the assessment of the individual proposals should be undertaken using a standardised approach and comparing like-for-like threats, vulnerabilities or mitigation solutions to calculate the operational risk in current and in future operations.

The Commission stated in its Appraisal Framework it would assess the capability of schemes to “prevent, absorb, adapt to, and recover from these risks” and it also stated a “residual risk would be calculated for each disruptive event in relation to each scheme”. Arup believe that the Commission has not evidenced that each proposal has been assessed for its ability to “prevent, absorb, adapt to and recover from” these risks. Equally the Commission’s assessments does not provide any indication that all the proposals have impacts that have been categorised as required by the Commission appraisal requirements such that “Impacts will be categorised at a local, regional and national level”.

Arup note that the Airports Commission have concluded that the Gatwick proposals would not worsen the airport’s resilience to disruptive events. Arup suggest that its assessment and the conclusion drawn by virtue of the evidence would indicate that the resilience of Gatwick to disruptive events is actually increased rather than staying the same due to options an additional runway would provide.

The Commission also suggested that assessment process could in most instances be undertaken “on a qualitative basis, using expert judgement which takes account of relevant factors and datasets”\(^2\).

Arup suggests that the Commission has not taken into account of all relevant factors and datasets. Therefore the conclusion drawn by the Commission’s experts might be subject to challenge where evidence from datasets or other information is not identified clearly.

Arup believe that the Commission’s view, that their appraisal process utilise a qualitative basis using expert judgement, is a valid approach; however, it still requires the robust, reliable and consistent application of a standardised approach to identify and quantify operational risk.

A standardised approach to the appraisal process would allow the Commission to obtain a more detailed and better understanding of the differences between the shortlisted proposals.

Arup also considers that the Commission and its technical consultants might wish to adopt a standard approach to the use of language in their reports. Such an approach would

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1 p107, 15.4-9 - Airports Commission: Appraisal Framework Consultation - Module 15 Operational Risk
minimise the unintentional risk of introducing potential inconsistencies, misunderstanding or confusion which might affect the view taken on an individual proposal.

Assessment methodology for the risk from disruptive events

The Commission’s consultants undertook a high level review of the scheme proposers’ submissions and this may not allow for the accurate comparison of the operational risks inherent in the schemes. A high level approach can be valid if the review is comparing information from proposals that utilised a standardised assessment methodology. A standardised assessment methodology would provide the same level of detail (and completeness) for each of the proposals’ capability to “prevent, absorb, adapt to, and recover from these risks” (from disruptive events) and should provide detail of how “residual risk would be calculated for each disruptive event in relation to each scheme”.

By undertaking ‘a qualitative assessment’ approach without a standardised methodology, the Commission’s consultants has appeared to have inadvertently introduced inconsistencies. An example of this inconsistency is where information has been presented for snow resilience, using inconsistent language and no quantification metric; Gatwick’s current state of operations are described by Jacobs as – ‘well prepared for periods of heavy snow and additional resources will be provided for the expansion areas’³, whereas the Heathrow comments refer only to “significant recent investments in snow clearing equipment and developed a winter resilience plan” and it “would likely be at least as resilient to snow as today”⁴. What is unclear is if either airport adequately mitigates the risks (of disruption by extreme weather, in this case snow) in the opinion of the assessor.

Gatwick submitted the outcomes of a detailed risk assessment in May 2014⁵, as required by the Commissions Appraisal - Module 15, using an ISO 31000⁶ compliant assessment methodology, which was clear, simple and utilised a RAG (Red, Amber and Green) rating system.

Adopting this approach for the Heathrow proposals, would allow the Commission to identify Heathrow proposals’ current operational risks and the projected residual risks associated with the future proposals and the adequacy of any mitigation measures. Using an ISO 31000 approach would allow a robust, reliable and complete assessment and comparison between all three proposals, with a like-for-like comparison, to be made and to then evaluate the severity of any issues identified.

Arup note that a number of new areas of risk (from the National Risk Register) were included by the consultants in their assessment process, in addition to those (threats – disruptive events list⁷) in the Commission’s published Appraisal Framework. The consultants provide comment and some cases their opinion of the proposals ability to “prevent, absorb, adapt to, and recover from these risks”. Arup suggest that the inclusion of new risks, which the proposers have not had opportunity to inform, quantify or challenge in their submitted proposals, could introduce information and

³ p.9, 2.7.2, Jacobs – Appraisal Framework Module 15 Operational Risk: Ground Infrastructure Gatwick Airport Second Runway
⁴ p.9, 2.7.2, Appraisal Framework Module 15 Operational Risk: Ground Infrastructure Heathrow Airport North West runway
⁵ Appendix 25 - Gatwick Airport Ltd’s Response to the Airports Commission
⁶ ISO 31000:2009, Risk management – Principles and guidelines, provides principles, framework and a process for managing risk. It can be used by any organization regardless of its size, activity or sector. Using ISO 31000 can help organizations increase the likelihood of achieving objectives, improve the identification of opportunities and threats and effectively allocate and use resources for risk treatment.
⁷ p107, 15.4-9 - Airports Commission: Appraisal Framework Consultation - Module 15 Operational Risk
conclusions that may be incorrect or contain subjective opinion of the author. The
Commission might consider allowing each of the proposers to respond to risk categories
that were not part of their original submissions to ensure that a robust, reliable and
complete assessment is provided.

Arup also note that the National Risk Register\(^8\) identifies “Space Weather” as a specific
risk to aircraft “Airlines rely on high-frequency radio and satellites to maintain
communications, both of which can be disrupted by space weather. Cosmic rays and
ergetic particles from solar radiation storms can adversely affect electronic control
components in aircraft”. Whilst Arup acknowledges that this risk may not directly impact
ground operations at an airport, it may impact on the air management system as a whole. If
the Commission is considering additional National Risk Register threats then Arup would
suggest that risks specifically identifying aviation as an issue should be explored, in
addition to others identified by Jacobs in their reports.

Review of all risks

The Commission might wish to also assess the overall risk assessment picture for
comparison of the proposals by combining their review of airfield operational risk (Module
15) and airspace risk (Module 14) reports. Airfield and airspace operational risks are
intrinsically linked and therefore a holistic approach would provide a better understanding
of the strengths and weaknesses of the shortlisted options; In addition, the Commission
could provide findings for each airport and present them together in a clear manner so that
it would enable understanding of the comparative strengths of each scheme proposal.

Airspace – Resilience of the airport system

Arup note that both the Commission and NATS identify that the addition of a second
runway at Gatwick would provide “a degree of additional resilience to some events which
might require the closure of a single runway (such as a fire), assuming adequate
operational procedures are in place”\(^9\).

NATS, however, also highlight in their response that the potential impact of airport
closures, which they concede are rare events, do impact on operations of the whole London
Terminal Management Area (TMA) as other airports would have to absorb additional
aircraft and passenger movements and that this could be significant. NATS also clearly
state that the impact of runway closures across the London TMA would be mitigated by
additional runway capacity at either Gatwick or Heathrow airports\(^10\).

Arup would draw to the attention of the Commission that should the second runway at
Gatwick be delivered by 2025, it would provide the London TMA with two airports with
two runways each, a total of four runways therefore at the two main London airports. This
situation would provide additional resilience should another of the single runway
London airports or even one of Heathrow’s runways have to temporarily close. It is
also noted that should Heathrow Hub’s extension of the northern runway proposal be
granted and there is an incident on the Southern runway, which forces it to close, the
airport would effectively have a single landing runway, with consequences for the
resilience of the LTMA system.

\(^8\) p21, 3.47 National Risk Register for Civil Emergencies - 2013 edition
\(^9\) p49, 3.50, Airports Commission Consultation Document
\(^10\) Impact of airport closures – NATS Support to the Airports Commission: Appraisal Module 15:
Operational Risk: Airspace Resilience
Arup suggests that the **significant benefits of a second runway at Gatwick, which would reduce the operational risk to the London Airports system, is therefore understated** in NATS analysis and specifically does not address the risk of a three runway Heathrow airport having to completely close and the effect this would have on the London TMA.

### Surface Access

The Commission’s assessment of rail and road resilience has not been undertaken in an evidence-based and comparative manner across the three runway proposals. As a result rail and road resilience for Gatwick is presented in a misleading way and one which understates the scheme’s surface access resilience case. By contrast, road and rail resilience issues for the Heathrow schemes are not discussed and therefore there is not a fair and balanced assessment of rail resilience for each scheme.

To identify Operational Risk in regard to Surface Access issues we would suggest that there is a need for a robust, reliable and complete assessment of the road and rail resilience for each runway scheme (not just Gatwick as at present) noting the current position, the main causes of problems and the potential future position. This should be undertaken in conjunction with the relevant organisations, namely Network Rail, the Highways Agency and the train operators serving each airport. Otherwise there will not be a fair, objective and evidence-based analysis of the road and rail resilience issues at the time of each runway scheme becoming operational.

A detailed analysis of the issues outline above are contained within the report – Gatwick Airport Limited, Airports Commission Consultation – Surface Access.

### Bird strikes

In each of the individual airport appraisals published by the Commission there are references to the risks arising from bird strikes. However, these were not originally called for in Module 15 so they are not consistently assessed in the Operational Risk Module, which means that these risks are not easily compared.

Jacobs identify that the risks associated with the Gatwick proposal, where “bird strike risk is unlikely to be changed by the construction…” remains similar to the existing risk due to a limited change in bird population and type. Whereas both Heathrow proposals have increased risk – The Northern runway extension is described as having “a significantly elevated bird strike risk from gulls” and the North West runway “… may create a significant additional bird strike risk”. The potential increase in risk is due to the much closer proximity of the large reservoirs and feeding grounds located near to runway ends.

Arup note that the Commission has identified that there is potentially an increased risk of aircraft strike impacts for operations from the Heathrow Hub Northern runway extension proposal. The Commission makes no reference in its report to the significantly increased
risks for Heathrow North West runway proposal which is identified in the associated Jacobs report, nor does it discuss the bird strike risk at Gatwick.

We would suggest that the Commission might wish to review their assessment of bird strike risk in their main document to ensure that all risk assessments are included for consistent comparison.

**Flood Risk**

In each of the Jacobs’s reports there are specific references to the risk of flooding for each proposal. However, again the risk has not been consistently assessed and the conclusions made are not shown as a like-for-like comparison.

Arup suggest that the vulnerability of Gatwick to flooding, both on the airfield surface and to operational activity, has been overstated in the reports. Significant mitigation has been undertaken at Gatwick since the major incident in December 2013 and residual flood risk if any, post enlargement, will be off the site and will be managed appropriately by the water authorities flood management arrangements. The Commission does not note any residual flood risk in their assessment conclusions.

Arup note that the risk of flooding at Heathrow is identified by the Commission and Jacobs as currently low however on enlargement it will become an issue especially if it cannot be mitigated as the Commission suggests.

The Jacobs’ reports for both Heathrow proposals however identify that they do not currently have an issue with flooding and that the risk is therefore quite low; they go on to then identify that both of the Heathrow new runway proposal would increase the risk of surface flooding, by removing flood plain storage areas and significant culverting of waterways. The Commission report also states “— even with excellent channel design the Commission’s assessments predict that there could be residual risks of flooding downstream from the airport”. This comment is addressed to both Heathrow proposals.

A robust comparative assessment of the flood mitigation proposals would allow the Commission to provide differentiation between each option in regard to flood risk.

**Gas supply (Utilities)**

The Commission report is inconsistent in its assessment of the risk associated with disruption of utility services.

Jacobs identify that a single point of failure for gas supply is a resilience issue for Gatwick.

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15 p.4, 2.3, Jacobs – Appraisal Framework Module 15 Operational Risk: Ground Infrastructure Heathrow Airport North West Runway
16 2.2, Jacobs – Appraisal Framework Module 15 Operational Risk: Ground Infrastructure
17 Appendix 25 - Gatwick Airport Ltd’s Response to the Airports Commission
18 p46, 3.35 Airports Commission Consultation Document
19 P64, 3.88 Airports Commission Consultation Document
20 p.6, 2.4.2, Jacobs – Appraisal Framework Module 15 Operational Risk: Ground Infrastructure Gatwick Airport Second Runway
The Jacobs’ reports on Heathrow proposal provide comment on existing resilience of their utility supplies but makes only assumptions that a resilient supply will be provided for development areas in the future. The assumptions made by Jacobs appear to be an opinion based upon what should happen rather than being evidence based.

Arup suggest that by identifying a resilience issue for Gatwick, which it believes is being mitigated in its current plans (and not identified by Jacobs), and providing what could be seen as positive assumptions for future utility operations at Heathrow could be misleading and not a fair and measured assessment.

To provide an objective assessment requires a review all of the runway schemes’ proposals and identification of the evidence that supports each proposals resilience plans for their utility services and this would confirm whether or not they are in fact resilient for the operational activity described.

21 p.5, 2.4, Jacobs – Appraisal Framework Module 15 Operational Risk: Ground Infrastructure Heathrow Airport North West Runway
1 Introduction

In December 2013 the Airports Commission (Commission) published its Interim Report on the options for increasing the UK’s aviation capacity in the long term. The report identified three short listed options to be taken forward for further development into detailed proposals.

In May 2014 developed proposals were presented by their respective promoters for consideration by the Commission

The three proposal options under consideration are:

- Gatwick Airport - second runway
- Heathrow Airport - extended northern runway (also known as the Heathrow Hub option).
- Heathrow Airport – north west runway

In November 2014 the Commission published its general assessment of the proposals and initiated a period of consultation running through to February 2015. In addition, the Commission published technical reports for each of the proposals in regard to ground operations (Jacobs) and Airspace (National Air Traffic Service – NATS) and a safety assessment by the Civil Aviation Authority (CAA) and the scheme documentation provided by the proposers.

In addition to a review of the published documentation by the bid teams, the Commission will also revisit previously consulted parties in the areas around Heathrow and Gatwick and listen to their views on the shortlisted options.

The Commission states they will present a firm recommendation shortly after the General Election in May 2015.

1.1 Report Aim

The purpose of this report is to comment on the Commissions consultation publications in respect of Module 15 - Operational Risk. The publications and supporting material were produced by the Commission and its technical consultants (Jacobs, NATS and the CAA).

The aim of this report is therefore to identify and communicate any aspects of the Operational Risk module requirements, set out in the appraisal process and listed within the Commission own consultation documents, which would benefit from having further assessment, clarification of detail or alternatively provide comment to aid the Commissions understanding of each proposal’s Operational Risk issues.

The scope and requirements for the assessment of each proposal’s Operational Risk was outlined in the Airports Commission: Appraisal Framework Consultation document - Module 15 Operational Risk – starting at page 106.

1.2 Conduct of the Study

The Commission identified that the Operational Risk – Module 15 study should have as its objective a goal “To enhance individual airport and airports system resilience”.

The Commission identified that airport infrastructure needs to be resilient. The Commission’s intention was “to examine the ability of proposals to adapt both to lower..."
level disruption arising in the course of day-to-day operations and to a major disruptive event”

The Commission required “an appraisal of operational risk, the inherent risks to airport operations of the following disruptive events ...” – the disruptive events were listed, amongst others as:

- Flooding
- Power outages
- Reduced fuel supplies
- Terrorism attacks
- Extreme weather events (including volcanic ash); and
- Adaptability to climate change

The Commission would assess the capability of schemes to “prevent, absorb, adapt to, and recover from these risks” and it also stated a “residual risk would be calculated for each disruptive event in relation to each scheme”.

The Commission also requested that “Impacts will be categorised at a local, regional and national level”.

The Commission suggested that assessments would in most instances be undertaken “on a qualitative basis, using expert judgement which takes account of relevant factors and datasets”.

The Commission additionally identified that a range of risks listed in the National Risk Register should be part of the consideration in each proposal if appropriate.

1.3 Report format

Arup undertook an operational risk assessment study of Gatwick’s operations, based upon the Commission’s requirements outlined above, and produced a clear and concise report based upon an ISO 31000 methodology.

This activity was undertaken by a team of consultants from Arup’s Resilience, Security & Risk practice and culminated in a standalone Operational Risk report – Appendix 25 of the Gatwick Proposal submission.

Arup’s Resilience, Security & Risk have examined the subsequent findings of the Commission within its document – “Airports Commission: Appraisal Framework Consultation - Module 15 Operational Risk”.

Arup has undertaken a review of the main documents, listed by name below, to examine whether the assessments undertaken by the consultants have provided insight for the Commission to enable it to come to appropriate conclusions or, where comments or assumptions have been made, these are in fact correct.

The following main documents have been utilised to date:

23 p107, 15.4 - Airports Commission: Appraisal Framework Consultation - Module 15 Operational Risk
24 p107, 15.5 - Airports Commission: Appraisal Framework Consultation - Module 15 Operational Risk
25 p107, 15.6 - Airports Commission: Appraisal Framework Consultation - Module 15 Operational Risk
26 p107, 15.10 - Airports Commission: Appraisal Framework Consultation - Module 15 Operational Risk
28 ISO 31000:2009, Risk management – Principles and guidelines, provides principles, framework and a process for managing risk. It can be used by any organization regardless of its size, activity or sector. Using ISO 31000 can help organizations increase the likelihood of achieving objectives, improve the identification of opportunities and threats and effectively allocate and use resources for risk treatment.
• Commission Consultation Document – November 2014
• Commission: Gatwick Airport Second Runway: Business Case & Sustainability Assessment – November 2014
• Commission: Heathrow Airport Extended Northern Runway: Business Case & Sustainability Assessment
• Commission: Heathrow Airport North West Runway: Business Case & Sustainability Assessment
• Jacobs Appraisal Framework Module 15 – Operational Risk; Ground Infrastructure Gatwick Airport Second Runway
• Jacobs Appraisal Framework Module 15 – Operational Risk; Ground Infrastructure Heathrow Airport Extended Northern Runway
• Jacobs Appraisal Framework Module 15 – Operational Risk; Ground Infrastructure Heathrow Airport North West Runway
• NATS Support to the Airports Commission – Appraisal Module 15: Operational Risk: Airspace Resilience
• The CAA’s Module 14 Operational Efficiency – preliminary safety case
• Jacobs Appraisal Framework Module 7 - Biodiversity

Reference is made to other module findings where necessary and they are referenced within the main report.
2 Operational Risk

2.1 Background

The Commission’s main Operational Risk consultant was Jacobs supported in regard to Airspace Resilience by an independent report produced by NATS. Each was tasked with reviewing operational risk material supplied to them for each proposal.

In regard to “risk”, the assessment of the likelihood and impact/consequence in regard to any disruptive event at an airport can be fairly easily identified and scored against the mitigation and resilience in process and procedures adopted. It should therefore be relatively easy to compare different proposals, and score them appropriately, against each other for identified disruptive events or operational risk issue.

To clarify an “Operational Risk” might be defined as the risk of loss (financial, strategic, or reputational), which results from inadequate or failed internal processes, people and systems, or disruption from external events.

Therefore to identify and quantify Operational Risk, within the detail of a proposal scheme, Arup suggest that there should be a robust and systematic risk assessment methodology applied. This methodology should then be applied across the airports’ operational environments to ensure that the organisations undertaking the assessments has clear visibility of the complete risk profile of the activities it is assessing. This process requires a sound appreciation of the fundamental operational risks being assessed or described and an understanding of their root causes.

Gatwick provided the Commission with a clear and concise report on Operational Risk – Module 15 as part of their proposal document, which utilised an ISO 31000 compliant methodology. It was assumed that the other proposals would have utilised a similar process. Had all three proposals utilised a similar methodology the consultants would have been able to compare current and residual risks from disruptive event assessments across the three proposals. It was also assumed that each proposal, as a whole and individually where necessary, would have identified and scored their resilience and risk profiles which would have allow a direct comparison and conclusion to be made. This might identify which airport proposal was the most resilient and therefore at least risk from potential disruptive events.

The Commission might wish to undertake a comparison of each proposal not only for ground infrastructure resilience but also, utilising the NATS assessments, for airspace resilience and combined risk profiles.

2.2 Assessment Methodology for the Risk of Disruptive Events

Arup on behalf of Gatwick undertook a formal Operational Risk assessment process of the airport’s operational activities and infrastructure. The assessment utilised a standardised methodology that included staff interviews and desktop assessments to establish likelihood, vulnerabilities and impacts. Information on process, procedure and associated reports were provided by Gatwick’s Operational Management Team. The assessment, which was essentially a qualitative process, as suggested by the Commission, examined the resilience of Gatwick’s operations to the disruptive events provided by the Commission in their Module 15 requirements.

The final report included full details of the assessments for each category (RAG rated – see Gatwick A 25 – Operational Risk Appendix 4 for further detail) and provided an overall view of Gatwick’s Operational Risk position, with residual risks identified post mitigation.
and an assessment of the expansion position from a local, regional and national perspective.

The Commission does not articulate in its main report its assessment process for quantification or qualification of Operational Risk for each proposal. The Commission has however provided a qualitative risk statement for each proposal which it is assumed has been informed and agreed with by its technical consultants.

2.2.1 Consultants Assessment Approach

The approach taken by Jacobs for ground infrastructure resilience and NATS for airspace resilience, utilise different approaches. Three individual ground infrastructure reports were provided by Jacobs (one for each runway scheme); they included their conclusion on operational risk. They provide no comment or comparison between the different proposals assessment of their residual risks. However, NATS produced only a single airspace resilience report, which considered similarities between all three proposals and combinations of options for disruptive events, such as severe weather, and then provided some comments on individual proposals. It would therefore appear that the two consultants have taken somewhat different approaches to assessing Operational Risk which may have complicated the Commission’s task in this area of comparing like with like and minimising the possibility of inconsistencies or misinterpretation.

The Jacobs ground infrastructure risk reports appear to be mainly their informed observations and comments on a list of potential threat categories which they have identified from the National Risk Register and included some of those required by the Commission.

Arup consider that the Commission has not fully examined the ability of proposals to adapt to “lower level disruption” from either “day-to-day operations” or “major disruptive events”. The Commission’s appraisal reports provide limited evidence that a robust, reliable and complete assessment of operational risk has been undertaken for all three proposals against the disruptive events suggested. Therefore we believe that the conclusions drawn by the Commission in regard to operational risk are incomplete or potentially misleading. The Commission might wish to assess individual proposals with a standardised approach and comparing like-for-like threats, vulnerabilities or mitigation solutions to calculate the operational risk in current and in future operations.

Arup believe it would be have been very beneficial to external observers and the Commission if the consultants had actually carried out an assessment and therefore identified how each proposal team had undertaken their risk assessment process, what areas they had assessed and how this was evidenced in their submissions. The consultants could then have assessed the effectiveness of the proposed mitigation measures and the extent to which they bought down the residual risks from the nominated disruptive events.

2.2.2 Commission Assessment Approach

The Commission stated it would assess the capability of schemes to “prevent, absorb, adapt to, and recover from these risks” and it also stated a “residual risk would be calculated for each disruptive event in relation to each scheme”. Arup believe that the Commission has not evidenced that each proposal has been assessed for its ability to “prevent, absorb, adapt to and recover from” these risks. Equally the Commission required that identified impacts should be categorised - “Impacts will be categorised at a local, regional and national level”. Arup again believe that the Commission has not evidenced that each proposal has been assessed in this regard.
The Commission also suggested that assessment process could in most instances be undertaken “on a qualitative basis, using expert judgement which takes account of relevant factors and datasets”\textsuperscript{29}.

Arup suggests that the Commission has not taken account of all relevant factors and datasets. Therefore the conclusion drawn by the Commission’s experts could be subject to challenge where evidence from datasets or other information is not identified clearly.

Arup believe that the Commission’s view, that its appraisal process utilise a qualitative basis using expert judgement, is a valid approach. However, it still requires the robust, reliable and consistent application of a standardised approach to identify and quantify operational risk. This would allow the Commission to obtain a more detailed and better understanding of the differences between the shortlisted proposals.

2.2.3 Language

Arup also considers that the Commission and its technical consultants might wish to adopt a standard approach to the use of language in their reports. Such an approach would minimise the unintentional risk of introducing potential inconsistencies, misunderstanding or confusion, which might affect the view taken on an individual proposal.

Therefore Arup believe that as the findings are shown as a series of comments on individual threat, disruptive event or risk category for each scheme, and they do not provide a holistic view of operational risk or residual risk for each proposal, it is not possible to compare proposals against each other.

In the main, the ground infrastructure assessments provide only a high level view and the conclusions made do not include a view, which might provide a level of differentiation. Arup suggest that a wider comparison of risk and resilience of the London airports system as a whole should be undertaken.

By undertaking ‘a qualitative assessment’ approach without a standardised methodology, the Commission’s consultants appeared to have inadvertently introduced inconsistencies. An example of this is where information has been presented for snow resilience, using inconsistent language and no quantification metric. Gatwick’s current state of operations are described by Jacobs as – ‘well prepared for periods of heavy snow and additional resources will be provided for the expansion areas’, whereas the Heathrow comments refer only to ‘a significant investment in equipment’, “there is now a winter resilience plan in place” and it “would be at least as resilient to snow as it is today”. What is unclear is if either airport adequately mitigates the risks in the opinion of the assessor.

The Commission could provide a clear and evidence-based assessment of the capability of schemes to prevent, absorb, adapt to, and recover from identified risks. This would also indicate what residual risk has been calculated for each disruptive event in relation to each scheme and show how the impacts have been categorised at a local, regional and national level.

2.2.4 National Risk Register

Arup note that there are a number of categories of risk, taken from the National Risk Register, that have been included in the assessments which were not in the original Commission’s requirements. Arup acknowledge that the Commission required an all risks approach to be taken for the assessment of proposals, however, we would note that to date

\textsuperscript{29} p108, 15.10 - Airports Commission: Appraisal Framework Consultation - Module 15 Operational Risk
Gatwick have not submitted information in regard to these new disruptive events. Therefore, any conclusions made by the Commission in regard to these events are likely to be made using incomplete information, which might result in misleading conclusions. We recommend that the Commission should provide the proposers with an opportunity to inform the Commission of their proposals to address any additional risks identified in reports.

Arup also note that the National Risk Register identifies “Space Weather” as a specific risk to aircraft. “Airlines rely on high-frequency radio and satellites to maintain communications, both of which can be disrupted by space weather. Cosmic rays and energetic particles from solar radiation storms can adversely affect electronic control components in aircraft”. Whilst Arup acknowledges that this risk may not directly impact ground operations at an airport it may impact on the air management system as a whole. Therefore, Arup suggest that if additional National Risk Register threats are being considered by the Commission then one that specifically identifies aviation as an issue might be explored in addition to others identified by Jacobs in their reports.

2.2.5 Assessment Methodology Conclusion

To conclude, Gatwick has submitted the outcomes of a detailed risk assessment to the Commission in May 2014. Arup note that the Airports Commission has concluded that the Gatwick proposals would not worsen the airport’s resilience to disruptive events. Arup suggest that their assessment and the conclusion drawn by virtue of the evidence would indicate that the resilience of Gatwick to disruptive events is actually increased rather than staying the same due to options an additional runway would provide.

Gatwick used an ISO 31000 compliant assessment methodology, which was clear, simple and utilised a RAG (Red, Amber and Green) rating system.

The Commission might benefit from utilising the same or a similar approach to assessing the two Heathrow proposals. If this was undertaken it would enable the Commission to identify the current RAG rating for the operational risks at Heathrow to the same disruptive events assessed by the Gatwick. This approach would then allow a direct, fair and balanced comparison of risk and resilience to specified disruptive events for each proposal. Assessing the situation as it stands today, and consideration of additional mitigation measures applied to expansion plans, would potentially identify the bigger risk picture for the London TMA as system. This process would then again enable a fair and balanced comparison to be made without any subjectivity and to evaluate the severity of issues identified.
3 Review of all Risks

Airfield and airspace operational risks are intrinsically linked and therefore a holistic approach to their assessment would provide a better understanding of the strengths and weaknesses of the shortlisted options. In addition, the Commission might wish to provide findings for each runway scheme and present them together in a clear manner so that it would enable understanding of the comparative strengths of each scheme proposal.

Arup suggest that the Commission might consider providing an overall risk picture for each proposal and the London TMA as a whole by combining the airfield operational risk (Module 15) and the airspace risk (Module 14) assessments.

3.1 Airspace – Resilience of the airport system

Arup note that both the Commission and NATS identify that the addition of a second runway at Gatwick would provide “a degree of additional resilience to some events which might require the closure of a single runway (such as a fire), assuming adequate operational procedures are in place”31.

NATS, however, also highlight in their response that the potential impact of airport closures, which they concede are rare events, do impact on operations of the whole London Terminal Management Area (TMA) as other airports would have to absorb additional aircraft and passenger movements and that this could be significant. NATS also clearly state that the impact of runway closures across the London TMA would be mitigated by additional runway capacity at either Gatwick or Heathrow airports32.

Arup would draw to the attention of the Commission that should the second runway at Gatwick be delivered by 2025, it would provide the London TMA with two airports with two runways each, a total of four runways therefore at the two main London airports. This situation would provide additional resilience should another of the single runway London airports or even one of Heathrow’s runways have to temporarily close. It is also noted that should Heathrow Hub’s extension of the northern runway proposal be granted and there is an incident on the Southern runway, which forces it to close, the airport would effectively have a single landing runway, with consequences for the resilience of the LTMA system. This scenario effectively leaves the London TMA with only two operational runways at Gatwick and Heathrow, which is the same number as currently in use under the scenario if it were to happen today – this adds nothing to the future resilience of the whole London TMA. Therefore it is suggested that there is actually a significant benefit of a second runway being located at Gatwick by reducing the operational risk to the London Airports system as a whole and that this is understated and missing from this current analysis.

Arup suggests that the significant benefits of a second runway at Gatwick, which would reduce the operational risk to the London Airports system, is therefore understated in NATS analysis. A future London airport system comprising a 2 runway Gatwick, alongside Stansted, Luton and City airports will have a significantly higher level of inherent resilience than if future increased capacity is focused in a three runway Heathrow. This is because disruption at a 3 + 1 Heathrow solution, with 46% share of the traffic based on Gatwick’s forecasts, would deliver a greater shock to the system than in a more

31 p49, 3.50, Airports Commission Consultation Document
balanced airports system, the 2+2 Gatwick solution, where no airport has more than 35% of the traffic.

The NATS report on airspace resilience was also supplemented by the Civil Aviation Authority (CAA) technical report on operational efficiency and their preliminary view on safety issues for operation of each airport’s proposals.

The CAA report among other things has provided an assessment of each runway scheme’s potential safety risk and comments on the complexity of operations and how long it might take to prepare and plan for implementation of runway operations. The CAA clearly identifies that Gatwick’s proposals are less complex, with no interdependencies and require less time to plan than either of Heathrow’s proposals. This is not clearly identified in the Commission report.

It would be fair to say that the more complexity and interdependencies there are within a system the more likely there is for either a system failure, or individual component or operational errors to manifest and why a design takes much longer to deliver control mechanisms.

Operational Risk is the risk of loss (financial, strategic, or reputational) which results from inadequate or failed internal processes, people and systems, or disruption from external events. The more complex and dependent an airport operations systems are then the more likely it might be to being disrupted by events especially those outside of its direct control.

The CAA’s assessment of the Gatwick air traffic management proposals for a second runway “provides fairly straightforward ATC [air traffic control] procedures and therefore reduces workload and risk” and providing “an ATC Strategy to align with the Concept of Operations, including Missed Approach Procedures (MAPs) and helicopter crossings. This is considered unlikely to present significant challenges”.

The CAA’s assessment of the Heathrow North West runway air traffic management proposals “require new procedures and mitigations to ensure safety of ATC operation”. Current Heathrow operations are described as “intensive and complex” and “RAF Northolt is likely to become dependent …. This may limit flexibility….” It is estimated by the CAA that it would take approximately an additional two years to plan the revised airspace beyond that required for the Gatwick proposal.

The CAA’s assessment of the Heathrow Hub Northern runway extension operations is described as “a novel concept without any pre-existing standards or experience globally” and “a particular safety concern that must be resolved and fully articulated by the proposer is the safety case between missed approaches and departures.” Current Heathrow operations are described as “intensive and complex” and “RAF Northolt is likely to become dependent” The CAA also identify that there are “5 different modes of operation a day which has the potential to increase risk of human error”. It is estimated by the CAA that it would take approximately an additional two years to plan the revised airspace beyond that required for the Gatwick proposal.

33 p6 2.5 CAA Module 14 Operational Efficiency preliminary safety review
34 p6 2.6 CAA Module 14 Operational Efficiency preliminary safety review
35 p9 2.17 CAA Module 14 Operational Efficiency preliminary safety review
36 P9 2.17 CAA Module 14 Operational Efficiency preliminary safety review
37 p9 2.19 CAA Module 14 Operational Efficiency preliminary safety review
38 P11 2.26 CAA Module 14 Operational Efficiency preliminary safety review
39 p11 2.27 CAA Module 14 Operational Efficiency preliminary safety review
40 p11 2.27 CAA Module 14 Operational Efficiency preliminary safety review
41 p12 2.33 CAA Module 14 Operational Efficiency preliminary safety review
42 p12 2.33 CAA Module 14 Operational Efficiency preliminary safety review
43 p12 2.34 CAA Module 14 Operational Efficiency preliminary safety review
44 p13 2.42 CAA Module 14 Operational Efficiency preliminary safety review
The CAA comments on each proposal, in regard to potential risk based upon difficulty of implementation, has been summarised by Arup and presented in a tabular form and assigned a colour coding using a RAG rating model.

<table>
<thead>
<tr>
<th>Proposal</th>
<th>CAA Comment</th>
<th>Reference</th>
<th>Risk</th>
<th>Potential rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gatwick</td>
<td>Fairly straightforward &amp; reduces workload and risk</td>
<td><em>p6 2.5 CAA Module 14</em></td>
<td>LOW</td>
<td></td>
</tr>
<tr>
<td>Heathrow NW</td>
<td>Currently intensive &amp; complex - new procedures and mitigations</td>
<td><em>p9 2.17 CAA Module 14</em></td>
<td>MEDIUM</td>
<td></td>
</tr>
<tr>
<td>Heathrow Hub</td>
<td>a novel concept without any pre-existing standards or experience globally</td>
<td><em>p11 2.27 CAA Module 14</em></td>
<td>HIGH</td>
<td></td>
</tr>
</tbody>
</table>

Table 1 – RAG rating model - CAA comments in regard to difficulty in implementation for new runway proposals.

### 3.2 Surface Access

The Commission’s assessment of rail and road resilience has not been undertaken in an evidence-based and comparative manner across the three runway proposals. As a result rail and road resilience for Gatwick is presented in a misleading way and without a clear and objectives evidence base. This understates the scheme’s surface access resilience case. By contrast, road and rail resilience issues for the Heathrow schemes are not discussed and therefore there is not a fair and balanced assessment of rail resilience for each runway scheme.

To identify Operational Risk in regard to Surface Access issues we would suggest that there is a need for a robust, reliable and complete assessment of the road and rail resilience for each runway scheme (not just Gatwick as at present) noting the current position, the main causes of problems and the potential future position. This should be undertaken in conjunction with the relevant organisations, namely Network Rail, the Highways Agency and the train operators serving each airport. Otherwise there will not be a fair, objective and evidence-based analysis of the road and rail resilience issues at the time of each runway scheme becoming operational.

A detailed analysis of the issues outline above, and further summarised below, are contained within the report – Gatwick Airport Limited, Airports Commission Consultation – Surface Access.

### 3.2.1 Rail

The Commission’s assessment of rail resilience has not been undertaken in an evidence-based and comparative manner across the three runway schemes.

For Gatwick, no information is provided as to the location of the full line blocked incidents quoted on the Brighton Main Line (BML), the main north-south rail corridor serving
Gatwick Airport. This is important given that Jacobs and Commission’s reports acknowledge that north of East Croydon there are alternative routes. Moreover, alternatives routes that exist south of East Croydon are not highlighted by the Commission.

In contrast, no comparative examination of rail resilience is presented for the two Heathrow options. Unlike for Gatwick, Jacobs did not analyse the number of full line block incidents affecting the main rail corridor to Heathrow from Paddington Station, the Great Western Main Line, and for the London Underground Piccadilly Line (and the proportion that are suicides). Therefore it is difficult to conclude (as the Commission has not provided any evidence) that rail resilience is any worse at Gatwick than for the two alternative runway schemes at Heathrow.

Methodology:

In its Consultation Document, the Airports Commission states that “south of East Croydon, disruptive incidents (for example power supply failures, signalling failures and suicides) can lead to a total suspension of services between London and [Gatwick] airport.” The Commission’s consultants Jacobs also comment on this issue stating that “performance data provided by NR indicates that 22 “four-line block” incidents requiring the closure of the BML have occurred in the last three years on the section between London and Gatwick, an average of just over 7 per year. Of these events, approximately 70% involved fatalities and it is noted that in these circumstances, [Network Rail] aim to re-open the line within 90 minutes”. This suggests the majority of incidents involved suicides at or close to stations.

Suicides are a growing problem across the whole rail network. 286 suicides took place on the railway in 2013/4, and Network Rail notes that “around 400,000 minutes of delays were attributed to suicides in 2013/14, an increase of 35% from 2012/13”. Various initiatives (including joint initiatives with the Samaritans) are underway to reduce the number of suicides on the rail network which, if successful, will significantly reduce the numbers of incidents on the Brighton Main Line and the network as a whole. This is not discussed by Jacobs or the Commission.

We would recommend that suicides should not be included in the assessment of rail resilience for any of the runway schemes given the national problem they pose.

Response for Gatwick:

The presentation of the rail resilience issues for Gatwick is misleading and does not recognise the positive rail resilience case. In particular, the analysis presented is incomplete in that:

- No details are provided on the location of incidents, despite the implied lack of resilience south of East Croydon. Arup contacted Network Rail who confirmed of the 22 incidents quoted to Jacobs that just over a half of these (12) “occurred on the sections between Stoats Nest Junction and Earlswood or after the route splits to London Bridge and London Victoria at the London end. Therefore at these locations there is an

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49 Network Rail – Delays explained, Fatalities http://www.networkrail.co.uk/timetables-and-travel/delays-explained/fatalities/?cd=1
51 For example, the Samaritans website notes that “a National Suicide Prevention Group has been formed to tackle the issue of railway suicide, comprising Samaritans, Network Rail, British Transport Police (BTP), Train Operating Company representatives and the wider railway industry, such as ATOC (Association of Train Operating Companies), RSSB (Rail Safety & Standards Board) and rail unions”. The Samaritans – Working to Prevent Railway Suicides http://www.samaritans.org/your-community/saving-lives-railway/suicide-and-railways/working-prevent-railway-suicide
alternative route to London available and theoretically a service to London from Gatwick Airport could be maintained, though likely with service disruption”. This full evidence should be presented by the Commission.

- No analysis has been provided on the resilience benefits of third rail Direct Current (DC) electrification on the Brighton Main Line. Evidence from Network Rail shows this type of electrification is more reliable than the overhead electrification used on the Great Western Main Line serving Heathrow.

- An assessment has only been undertaken using historic data without reference to any potential future operational and infrastructure enhancements that will improve resilience as set out in the 2013 Network Rail Sussex Route Plan; and

- No analysis is provided in terms of the ability of Gatwick Airport railway station to cope with disruption. Arup’s analysis shows sufficient spare capacity to enable resilient operation during disruption.

Comparison with Heathrow Schemes:

As already highlighted there is little or no discussion of rail resilience today or in the future for the two Heathrow schemes in the Commission or Jacobs documents. A detailed critique of the Commission’s examination of rail resilience can be found within the report – Gatwick Airport Limited, Airports Commission Consultation – Surface Access. The critique shows that the Commission’s analysis of rail resilience for the two Heathrow runway schemes has not been evidence-based, objective or robust.

In summary, when considering Gatwick’s rail resilience, the Commission might wish to consider the following:

- The Commission’s analysis of rail resilience lacks rigour and evidence-based objectivity and there is no similar Commission analysis of this element for the other runway schemes. Furthermore it fails to take account of the actual rail geography as well as Network Rail and GTR’s plans for improving resilience on the Brighton Main Line.

- Significant investment is planned for the Brighton Main Line to increase capacity and reliability, and as these works will be completed before the opening of a second runway, reliability will increase to above the South-East average.

- Gatwick has one of the widest ranges of through train destinations of any station in the south of England, which makes it an ideal transport hub with a number of alternative routes, including two to London in terms of Victoria and London Bridge.

- Gatwick works closely with Train Operating Companies, including Southern, and indeed the working relationship with Southern has been identified as being best practice and was nominated for the Air Rail Awards 2014. Gatwick is currently forging a close partnership with Govia Thameslink Railway (GTR).

To identify Operational Risk in regard to rail issues we would suggest that there is a need for a robust, reliable and complete assessment of the rail resilience for each runway scheme (not just Gatwick as at present) noting the current position, the main causes of problems and the potential future position. This should be undertaken in conjunction with Network Rail and the train operators serving each airport. Otherwise there will not be a fair, objective and evidence-based analysis of rail resilience issues at the time of each runway scheme becoming operational.

3.2.2 Road

No robust analysis has been presented by the Commission or its consultants on road resilience; only limited anecdotal information is presented. For example, in the Jacobs review of the strategic road network around Gatwick, Jacobs note that “discussions with
the HA indicate that there is a concern over the heavy reliance of Gatwick on the stretch of the M23 between junctions 8 and 9 for strategic road connectivity. In the event of a major incident it is likely that the link would be closed for a period of time.\textsuperscript{52} Moreover, the assessment of road resilience at Heathrow fails to acknowledge published evidence on highways performance such as the Highways Agency’s Route Strategy – Evidence Reports which highlight congestion for the M25\textsuperscript{53}, M4 and A30\textsuperscript{54} which will negatively impact on the resilience of these links to accommodate disruption.

**Methodology:**

No analysis or evidence has been presented by the Commission or its consultants other than the statement on Gatwick identified above. There is no qualification on the nature of a “major incident” or of “a period of time”, nor is there any indication if such incidents have occurred in the past and at what frequency. No similar statement or discussion is made for the M25 around Heathrow.

**Response for Gatwick:**

Whilst the M23 is the only motorway linking Gatwick with the M25, there are a number of alternative A standard routes that run parallel along this corridor including the A23, A217, A264 / A22 and A24. A review of spare capacity along these routes was undertaken using the Highways Agency’s M25 Model, used by GAL to assess strategic highway effects with a second runway. A summary of the available spare capacity along these routes is shown in Table 2.

<table>
<thead>
<tr>
<th>Volume to capacity ratio</th>
<th>A217</th>
<th>A23</th>
<th>A22</th>
<th>A24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spare capacity (PCU/hr)\textsuperscript{55}</td>
<td>1,750</td>
<td>900</td>
<td>1,450</td>
<td>1,450</td>
</tr>
<tr>
<td>Total spare capacity</td>
<td>5,550</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Source: Highways Agency’s M25 Model at 2040*

The capacity analysis identifies that there is capacity on parallel alternatives to cater for Gatwick demand in the event of a major incident on the M23. The spare capacity on the routes identified accounts for around a third of the projected demand on the M23 at this time, or 2 lanes worth of capacity.

In section 13.5 of in *A Second Runway for Gatwick, Appendix A6 Surface Access*, Gatwick identifies its strong working relationship with West Sussex and Surrey County Councils, the Highway Agency and West Sussex Police in terms of diversionary routes. Gatwick also acknowledges that “an update to contingency planning will be required both for construction phases and for full build-out” of R2. There are a number of parallel routes

\textsuperscript{52} p.47, 4.2.12, Jacobs, Appraisal Framework Module 4. Surface Access: Gatwick Airport Second Runway, November 2014

\textsuperscript{53} p.11, 2.1.8 “In the south west quadrant of the M25, particularly between junctions 10 and 16, average peak time speeds are typically between 40 mph and 50 mph in both directions... This section of the M25 does not appear in Table 2.2 because the congestion is fairly consistent, in other words it is reliably congested”. Highways Agency, London Orbital and M23 to Gatwick Route Strategy - Evidence Report, April 2014

\textsuperscript{54} p.13, 2.1.16 “Within the London Orbital the route sections that are in the highest class for delay include the M4 eastbound, the M11 southbound and the A30 in both directions”. Highways Agency, London Orbital and M23 to Gatwick Route Strategy - Evidence Report, April 2014

\textsuperscript{55} A PCU (Person Carrying Unit) is broadly equivalent to the number of private vehicles or cars in a SATURN model, though it is noted that trucks or articulated lorries can be equivalent to between 2 and 4 PCUs depending on length.
between Gatwick and the M25 that can provide alternatives to the M23 in the event of a major incident and absorb a large volume of traffic. ITS and live information provision can assist in maximising the effectiveness of these alternative routes.

**Comparison with Heathrow Schemes:**

Jacobs state that “Heathrow has good access to the M25, M4 and M40, but the high levels of congestion forecast on these routes may limit the effectiveness of the airport’s road links.” The road access strategy for Heathrow is heavily dependent on the operation of these routes. Major incidents on any of these motorways will result in delays and traffic diverting onto parallel, more minor roads of a similar standard to that along the M23 corridor.

An examination of the Highways Agency’s M25 Model to identify network congestion was undertaken for all roads in a 5km radius from both Gatwick and Heathrow Airports. This review analysed the volume of traffic into and out of each airport and the amount of spare capacity to accommodate any disruption. The availability of spare capacity is an indication of the resilience of the road network to accommodate disruption.

The results of this analysis are shown in Table 3. This indicates that the road network around Gatwick is less congested than around Heathrow. It also shows that the road network provides an equivalent level of spare capacity to that of around Heathrow.

### Table 3: Volume to capacity ratios through airport 5km cordons

<table>
<thead>
<tr>
<th>Volume to capacity ratio</th>
<th>Inbound</th>
<th>Outbound</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heathrow</td>
<td>76%</td>
<td>76%</td>
<td>76%</td>
</tr>
<tr>
<td>Gatwick</td>
<td>73%</td>
<td>56%</td>
<td>65%</td>
</tr>
<tr>
<td>Spare Capacity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heathrow</td>
<td>14,500</td>
<td>14,050</td>
<td>28,500</td>
</tr>
<tr>
<td>Gatwick</td>
<td>8,700</td>
<td>13,800</td>
<td>22,450</td>
</tr>
</tbody>
</table>

*Source: Highways Agency’s M25 Model (excluding minor roads)*

In addition, it is noted that no discussion is presented on the M25 section that will be in tunnel in the two Heathrow schemes. Both Heathrow schemes propose M25 in tunnel over about 650metres. It is desirable to avoid standing traffic in tunnels and indeed the Heathrow Hub proposal states “no standing traffic should occur in tunnel due to congestion as the tunnel would have to be close to maintain acceptable air quality”.

From a resilience perspective, the Commission might wish to review the proximity of the tunnel to the M25 Junction 15 and issues upstream of the tunnel with the scope to affect traffic within the tunnels. Given that there is regularly standing traffic on this section of the M25, it is difficult to see how standing traffic in the tunnels can be avoided. Recognition of this issue may drive an alternative design and construction sequence.

For the North West Runway scheme, two tunnel bores will be dedicated for traffic from the M25 heading eastbound or westbound on traffic whilst two bores will be dedicated for M25 northbound and southbound through traffic. If there is an accident and one of the tunnel bores needs to be closed, this could have a significant impact on the road system at

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57 p.11, 3.2, Runway Innovations Ltd and Heathrow Hub Ltd Heathrow Expansion. Updated scheme design - Surface Access Development Strategy submitted to the Airports Commission, June 2014
this location i.e. if the tunnel for traffic heading northbound to the M4 is closed, this traffic will need to continue on to Junction 16 then onto the M40 before executing a U-turn.

To identify Operational Risk in regard to road issues we would suggest that there is a need for a robust, reliable and complete assessment of the road network resilience for each runway scheme noting the current position, future service levels, the main causes of problems and the potential future position. This should be undertaken in conjunction with the Highways Agency. Otherwise there will not be a fair, objective and evidence-based analysis of road resilience issues at the time of each runway scheme becoming operational.

3.3 Bird strikes

In each of Jacobs Operational Risk appraisals there are references to the risk of bird strikes. However, these were not originally called for in Module 15, consequently they have not been consistently assessed by each of the proposers for the Operational Risk Module 15 assessment, which means that these risks cannot easily compared.

The Commission also does not identify the bird strike risk for the three proposals consistently. Arup note that the Commission report has identified that there is potentially an increased risks of aircraft strike impacts for operations from the Heathrow Hub Northern runway extension proposal\textsuperscript{58}. However, the Commission does not make any reference to the significantly increased risks for Heathrow North West runway proposal\textsuperscript{59} which is identified in the associated Jacobs report. There is also no discussion of the risk of bird strike at Gatwick in the Commission report.

The main detail of Bird Strike Risk and its assessment by Jacobs is actually found within their Module 7 Biodiversity report and includes comprehensive analysis and findings. A brief summary of these findings is transposed into the Operational Risk Module 15 reports.

Jacobs identify the risks associated with Gatwick’s proposal, where “bird strike risk is unlikely to be changed by the construction…”\textsuperscript{60} and therefore remains unchanged due to a limited change in bird population and type. The Jacobs Gatwick report states that “[As the proposed new runway is on a similar alignment to the existing runway and will sit in the same habitat type, the overall bird strike risk per flight on the new runway is likely to be similar to that on the existing site, providing that any environmental mitigation for lost habitats is appropriately designed and sited]”\textsuperscript{61}.

Arup understands that Gatwick will manage bird strike risk appropriately and provide environmental offsetting as necessary. Jacobs reinforce this by stating that the Gatwick “…need to manage bird strike risk (e.g. by netting lengths of river that pass through the approaches close to the runway thresholds to exclude hazardous birds) and also proposes that environmental offsetting (development of land of equivalent or greater conservation value elsewhere) should be a feature of the proposal”\textsuperscript{62}. In regard to Operational Risk Arup would conclude that the Commission view bird strike risk at Gatwick has not changing with the addition of a second runway.

\textsuperscript{58} p.4, 2.3, Jacobs – Appraisal Framework Module 15 Operational Risk: Ground Infrastructure Heathrow Airport Extended Northern Runway
\textsuperscript{59} p.4, 2.3, Jacobs – Appraisal Framework Module 15 Operational Risk: Ground Infrastructure Heathrow Airport North West Runway
\textsuperscript{60} p.5, 2.3, Jacobs – Appraisal Framework Module 15 Operational Risk: Ground Infrastructure Gatwick Airport Second Runway
\textsuperscript{61} p.5, 2.3, Jacobs – Appraisal Framework Module 15 Operational Risk: Ground Infrastructure Gatwick Airport Second Runway
\textsuperscript{62} p16, 2.1.4 – Jacobs Module 7 – Biodiversity Assessment
Jacobs identifies significant difference in habitat at Heathrow as compared to Gatwick where it notes that the airport differs from other UK airports by “the presence of several very large water supply reservoirs and the complex of flooded mineral extractions in the Thames and Colne valleys which lie to the south and west of the airport”.63 Jacobs state for the Heathrow extended Northern Runway scheme that there is “a significantly elevated bird strike risk from gulls”64 (Heathrow extended Northern runway) and “this may create a significant additional bird strike risk...”65 for the Heathrow North West runway scheme due to the much closer proximity of the large reservoirs and feeding grounds located near to runway ends.

Jacobs identify that in addition to the usual bird populations found around airports in the UK, Heathrow’s population is “augmented by very large numbers of gulls that roost on the reservoirs in the winter, for example over 18,000 gulls were recorded roosting on Queen Mother reservoir in February 2013 (P. Cropper pers. comm.) and by large numbers of waterfowl that occupy these reservoirs and gravel pits all year round”66. They comment that “…any development that influences the number or behaviour of these birds, or brings the aircraft into closer proximity to them, has the potential to increase the bird strike risk, unless appropriate mitigating action is taken”67.

In regard to the North West runway proposal, Jacobs note that “moving the runway closer to the reservoir may mean that aircraft arriving or departing on the western end will be low enough to conflict with gulls spiralling over the reservoir or those arriving at the roost from feeding sites...”68. They continue “This may create a significant additional bird strike risk which needs to be managed”69.

In regard to the extension of the Northern runway they make similar comments as the other Heathrow proposal but add that “… the threshold of the northern runway will be significantly closer to the complex of reservoirs and gravel pits…”70 and “it is likely that the scheme will result in a significantly elevated bird strike risk from gulls, which will need to be mitigated ....”.71

Arup would suggest, as previously with the operational safety and planning risk identified previously, that bird strike risk could be presented using a simple RAG rating table. Below we have used Jacobs’ conclusions to create such a table. We suggest that as Gatwick is noted as having no increase in risk this might be scored as a Green, the North West runway proposal with significantly additional risk of bird strike as High a Red score and the Northern runway extension with potentially significantly elevated risk as also High and also a Red score. By ordering the risks in this way it is possible to easily differentiate potential risks to flights arriving or leaving each airport in regard to bird strike.

The comments and potential risks identified by Jacobs in regard to bird strike assessment has been summarised by Arup and presented in a tabular form and assigned a colour coding using a RAG rating model.

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63 p64, 4.1 – Jacobs Module 7 – Biodiversity Assessment
64 p4, 2.3 Jacobs – Appraisal Framework Module 15 Operational Risk: Ground Infrastructure Heathrow Airport Extended Northern Runway
65 p5, 2.3 Jacobs – Appraisal Framework Module 15 Operational Risk: Ground Infrastructure Heathrow Airport North West Runway
66 p21, 2.2.1 (f) – Jacobs Module 7 – Biodiversity Assessment
67 p21, 2.2.1 (f) – Jacobs Module 7 – Biodiversity Assessment
68 p28, 2.2.4 – Jacobs Module 7 – Biodiversity Assessment
69 p28, 2.2.4 – Jacobs Module 7 – Biodiversity Assessment
70 p42, 2.3.4 – Jacobs Module 7 – Biodiversity Assessment
71 p42, 2.3.4 – Jacobs Module 7 – Biodiversity Assessment
Proposal | Jacobs Comment | Reference | Risk | Potential RAG rating |
--- | --- | --- | --- | --- |
Gatwick | “unlikely to be changed” | p.5, 2.3, Jacobs – Module 15 Operational Risk: Gatwick | LOW |  |
Heathrow NW | “create a significant additional bird strike risk” | p28, 2.2.4 – Jacobs Module 7 – Biodiversity Assessment | HIGH |  |
Heathrow Hub | “a significantly elevated bird strike risk” | p42, 2.3.4 – Jacobs Module 7 – Biodiversity Assessment | HIGH |  |

Table 4 - RAG rating model – Jacobs comments in regard to bird strike risk (unmitigated)

To summarise again the Commission concludes that the risks associated with bird strikes remains unchanged / similar at Gatwick with a limited change in bird population and type, Heathrow has significantly increased risks due to the large number of gulls and waterfowl associated with the close proximity of reservoirs and feeding grounds to new adjacent flight paths and runway ends.

To reiterate the Commission has only identified that there is potentially an increased risks of aircraft strike impacts for operations from the Heathrow Northern runway extension proposal. The Commission make no reference at all to the significantly increased risks for Heathrow North West runway proposal. There is also no mention of the bird strike risk at Gatwick. Arup suggest that there is inconsistency between the Commission’s and its consultant’s reports.

The Commission might wish to permit each proposer to respond further to the bird strike risk findings for the Operational Risk - Module 15 reports to ensure that the Commission has appropriate detail and information for each scheme’s mitigation proposals.

3.4 Flooding

In each of the Jacobs’s reports there are specific references to the risk of flooding for each proposal; however, again the risk has not been consistently assessed and the conclusions made are not shown as a like-for-like comparison.

Arup suggest that the vulnerability of Gatwick to flooding, both on the airfield surface and to operational activity, has been overstated in the reports.
Gatwick’s current threat from flooding has been the subject of significant mitigation\textsuperscript{73} in the last year. In addition, the measures proposed for the second runway will further significantly reduce the risk from all types of flooding. In addition, it is noted that the Commission acknowledged that there will be a significant change to water management in Gatwick’s proposal, which is designed to mitigate any potential future flood risk on the airfield. Nevertheless Jacobs also identify that potential flooding may be an issue elsewhere\textsuperscript{74}. Gatwick would state that whilst this is being addressed in their proposal, and any residual flooding risk will be managed by the water authorities flood mitigation arrangements, it would not impact on airfield operations and therefore is of no impact to Operational Risk but rather one of a reputational nature. The Commission in its report does not note any residual flood risk in their assessment conclusions.\textsuperscript{75}

The Jacobs’ reports for both Heathrow proposals identify that they do not currently have an issue with flooding and that the risk is therefore quite low. They go on to then identify that both of the new runway proposal would increase the risk of surface flooding, by removing flood plain storage areas and significant culverting of waterways.

Jacobs note that currently “Heathrow is considered to be largely free of flood risk, with surface flooding risk of around 1 in 1000 (year) event, and only a few peripheral sites seen to be at risk of large floods, such as a serious breach of one of the reservoirs to the south west”\textsuperscript{76}. They continue by finding that proposals for the new runway would provide “new flood risks arise from the loss of floodplain storage, relocation and culverting of several watercourses, from the increased area at risk from surface water flooding and the increased exposure to the risk of a breach in the nearby reservoirs”\textsuperscript{77}.

Similarly Jacobs note that the Northern Runway extension would “cause loss of floodplain storage, culverting several major watercourses and significantly modify groundwater flow paths that may risk groundwater flood risk”\textsuperscript{78}. Additionally they identify it may shift risk of reservoir breach but do not expand or explain this statement.

The Commission report also states “– even with excellent channel design the Commission’s assessments predict that there could be residual risks of flooding downstream from the airport”\textsuperscript{79}. This comment is addressed to both Heathrow proposals.

The Commission might wish to consider providing a more robust comparative assessment of the flood mitigation proposals to provide differentiation between each option in regard to flood risk.

### 3.5 Additional Disruptive Events

Jacobs have introduced two new threat categories – Major Transport and Major industrial Accidents to their assessment which were not covered in Module 15.

\textsuperscript{73} Appendix 25 - Gatwick Airport Ltd’s Response to the Airports Commission

\textsuperscript{74} p4, 2.2 Jacobs – Appraisal Framework Module 15 Operational Risk: Ground Infrastructure Gatwick Airport Second Runway

\textsuperscript{75} p46, 3.35 Airports Commission Consultation Document

\textsuperscript{76} p.3, 2.2, Jacobs – Appraisal Framework Module 15 Operational Risk: Ground Infrastructure Heathrow Airport North West Runway

\textsuperscript{77} p4, 2.2, Jacobs – Appraisal Framework Module 15 Operational Risk: Ground Infrastructure Heathrow Airport North West Runway

\textsuperscript{78} p.4, 2.2, Jacobs – Appraisal Framework Module 15 Operational Risk: Ground Infrastructure Heathrow Airport Northern Runway Extension

\textsuperscript{79} P64, 3.88 Airports Commission Consultation Document
3.5.1 Transport Accidents

Jacobs state that a Major Transport Accident risk is one that has an effect on the national response capability of the UK. Jacobs acknowledge that an airport would have significant exposure to such a risk. Arup would suggest that an aircraft incident at either Gatwick or Heathrow or in adjacent areas on approach or departure would be seen as significant and trigger a national response. The resilience of either airport to such an incident would be compromised and it is likely that there would be closures of at least one runway. Arup have identified the resilience increase provided by a second runway at Gatwick in previous sections of this report.

Jacobs have not assessed the risks of a transport accident consistently across the three proposals.

Arup note that Jacobs state that a major rail accident on the BML serving Gatwick Airport “would have a significant impact on passenger access to the airport”\(^80\). Arup refer the Commission back to previous comments in Section 3.2.1.

Jacobs do not provide an assessment of the criticality of the impact to operations of the airport and they do not also provide evidence on the frequency of these accidents and the mitigation strategies.

In regard to Heathrow’s two proposals Jacobs use identical wording in their report and therefore do not differentiate between the two options even though they do have some differences in surface access solutions. Jacobs state that “an accident on either the mainline or underground railway lines into Heathrow would be disruptive”\(^81\) however they continue to state that “it would not be likely to critically impact the operations of the airport” without providing supporting evidence or analysis.

Jacobs refer to road accident risk for Heathrow in a similar vein “closure of the M25 or M4 would be disruptive, but be extremely unlikely to prevent continued operation of the airport”\(^82\).

They also add comment that Heathrow has “several significant railway and highway tunnels located under the airfield.” …. “….complete closure of the central terminal area road tunnel is likely to have a critical impact on the ability of that part of the airport to remain open”\(^83\). Jacobs also comment that placing the M25 in part into a tunnel is “a new incremental risk that the event (for example a major fire) in the M25 tunnel could disrupt operations on this runway”\(^84\).

Arup would suggest that in addition to runway operations being disrupted the M25 would have to be closed for a considerable period of time and then again for recovery, inspection and infrastructure renewal, which might include runway repairs if damage is extensive. The Commission should note that a single lorry catching fire on the M4 in Wales in the westbound bore of the Brynglas Tunnel in 2011 closed the M4 in both directions and is now reportedly going to cost in the region of £40m pounds and 20 months to repair the damage and provide additional resilience to the tunnels and associated infrastructure\(^85\).

\(^80\) P11, 2.9 Jacobs – Appraisal Framework Module 15 Operational Risk: Ground Infrastructure Gatwick Airport Second Runway
\(^81\) P11, 2.9 Jacobs – Appraisal Framework Module 15 Operational Risk: Ground Infrastructure Heathrow proposals (either)
\(^82\) p11, 2.9 Jacobs – Appraisal Framework Module 15 Operational Risk: Ground Infrastructure Heathrow proposals (either)
\(^83\) p11, 2.9 Jacobs – Appraisal Framework Module 15 Operational Risk: Ground Infrastructure Heathrow proposals (either)
\(^84\) p11, 2.9 Jacobs – Appraisal Framework Module 15 Operational Risk: Ground Infrastructure Heathrow proposals (either)
\(^85\) http://www.nce.co.uk/news/transport/40m-repair-job-for-fire-damaged-motorway-tunnels/8673015.article
fire in a scrap yard beneath the M1 in April 2011 closed the road due to the intense heat with the fire being described as "unprecedented". The heat was so intense some of the elevated road's concrete exploded. Some of the bridge's steel structure expanded forcing concrete to fall away. The Highways Agency erected 200 tonnes of steel pillars across the width of the carriageway to make the structure safe in the short term.  

Arup suggest that the Commission might wish to consider and therefore compare the risks between the Gatwick and the Heathrow scenarios to identify the significant infrastructure differentiators and potential recovery timescales, as well as costs involved, alongside the pure criticality of operational activity or passenger delays.

The Commission might also wish to explore the differences between the proposals in regard to the worst case scenario of an aircraft incident occurring over a populated areas on take-off or landing from either Gatwick, which is mostly rural in nature, or Heathrow where the flight paths cross large areas of urban landscape to the east of the airport? Arup believe the differences in response and national impact would be considerably increased should an aircraft accident, such as the Korean 747 crash at Stansted Airport in December 1999, impacted within an urban area rather than a rural space.

The Commission could also consider the operational risk for proposals in regard to flight paths on approach and take-off over populated and rural areas for each scheme from a serious aircraft accident even if they are identified as being rare events.

3.5.2 Major Industrial Accidents

Jacobs again introduce the risk from Major Industrial Accidents however fail to identify any sites within the proposals. The Commission should note that there are Top Tier COMAH sites (Control of Major Accident Hazards) at both airports (fuel farms) and in the case of Heathrow another just outside of its southern perimeter.

Arup would suggest that further assessment of these facilities might be required to identify any issue in regard to risk change with proposal expansion or probably more importantly the risk of reduced supply of jet fuel if any of these sites were compromised by a disruptive event.

3.6 Extreme Weather Events

Jacobs have provided comment on extreme weather events, volcanic eruption, snow, wind, fog and storms. Arup have previously noted (in section 2.2.3) the use of language in regard to snow disruption potentially causing inconsistency in understanding of the risk or resilience of proposals.

To reiterate Jacobs assessed that Gatwick is ‘well prepared for periods of heavy snow and additional resources will be provided for the expansion areas’.

Jacobs are not then consistent in how they describe Heathrow’s resilience to snow where they offer no direct comment on the level of resilience. They refer to Heathrow by stating that they have made “significant recent investments in snow clearing equipment and developed a winter resilience plan” and assumed that “with the deployment of additional resources in proportion to the scale of the expanded area and operation, a three runway Heathrow would likely be at least as resilient to snow as today”. What is unclear is if...
either airport adequately mitigates the risks (of disruption by extreme weather, in this case snow) in the opinion of the assessor.

NATS, in their response, comment on strong winds but make no clear differentiation between proposals except that they are managed by increased separation times. Jacobs comment that both Gatwick and Heathrow have a response to high winds. Gatwick’s being described as having “a scheme of graduated response to wind conditions to help mitigate such risks, by providing common procedures and responses across key stakeholders to prioritise the highest probability and severity risks for earliest response”. Jacobs describe Heathrow as having “procedures to respond to high winds to protect the airfield …”

Jacobs also note that poor visibility is a specific issue for the northern runway extension and this is likely to compound the CAA’s observation that safety is a major factor in determining whether the unprecedented and unproven proposal is capable of being implemented.

Jacobs also specifically detail the issues of fog at both Gatwick and Heathrow but do not directly link this low visibility issue with the Heathrow northern runway extension low visibility concerns raised elsewhere.

The Commission might wish to review the assessments in this area, to present a fair and balanced assessment of extreme weather events risk, as there appears to be inconsistencies in language, level of detail and conclusions drawn and again no comparison between proposals.

3.7 Utilities

The Commission report is again inconsistent in its assessment of the risk associated with disruption of utility services.

Gatwick have undertaken an assessment of all utility services as part of their response to Module 15. They have provided detailed information on services and their current vulnerabilities and what resilience and mitigation measures are planned for the expanded airport.

The Commission has reported on Gatwick’s vulnerabilities but have made observations and assumptions for Heathrow’s two proposals and in fact used identical wording in regard to both electricity and gas statements.

The Commission might wish to review the assessments of utility services to present a fair and balanced assessment of the resilience of proposals to interruptions in supply.

3.7.1 Electricity

Arup note that the Commission has confirmed that the resilience and capacity improvements proposed by Gatwick in their submission are assessed to improve the capability of the airport to withstand and recover from interruptions to supply.

Jacobs acknowledged that Gatwick have identified limitations in their existing power supply infrastructure which could result in loss of availability under certain circumstances. They describe the measures Gatwick plan to introduce to mitigate identified vulnerabilities and state their additional proposals for the planned extension of supply. The mitigation measures include relocation of elements liable to flood risk that were identified during the major flood event at the airport in 2012.

Jacobs approach to Heathrow’s electricity capacity and resilience is the same for both schemes; here, there is an acknowledgement of on-site generation capability and comment that it “…appears to have resilient electricity supplies that are compliant with regulations and standards”. It continues to assert that “It is not unreasonable to assume that the
expansion of the airport would be accompanied with additional provision of resilient supplies and back-up generation or uninterruptable supplies to serve the additional facilities”.

The Commission might wish to clarify whether these two assumption, that it appears to be resilient and additional provision of resilient supply, are actually correct and confirm Jacobs’s concluding assumption that “These additions could potentially enhance the resilience of the existing facilities” is evidenced within current proposals.

The Commission might wish to compare the resilience of utility supplies for each proposal by utilising an evidenced based assessment. Without this review the Commission might not present a fair and balanced assessment of the utility services resilience position and without it could provide a misleading conclusion and distorts the overall position.

3.7.2 Gas

The Commission report is again inconsistent in its assessment of the risk associated with disruption of utility services.

Jacobs identify that a single point of failure for gas supply is a resilience issue for Gatwick. The Commission’s consultants have specifically identified that heating the terminal buildings at Gatwick is an issue where failure in gas supply could impact on passenger experience (being cold) should the supply of gas to central heating boilers be disrupted. The Commission also note that the sole fuel source for these systems is mains gas. Arup would state that this is potentially incorrect as Gatwick have intimated that they are considering converted some boilers to dual fuel operation. In addition Gatwick’s future proposals identify that they wish to supplement off-site gas supplies with their own supply of fuel gas from a new biogas plant on site.

The Jacobs’ reports on Heathrow proposal provide comment on existing resilience of their utility supplies but makes only assumptions that a resilient supply will be provided for development areas in the future. The assumptions made by Jacobs appear to be an opinion based upon what should happen rather than being evidence based.

Arup suggest that by identifying a resilience issue for Gatwick, which it believes is being mitigated in its current plans (and not identified by Jacobs), and providing what could be seen as positive assumptions for future utility operations at Heathrow could be misleading and put Gatwick at a disadvantage.

The Commission might wish to review the Heathrow proposals and identify the evidence that supports their resilience plans for the utility services rather than assume they will be in place and therefore confirm or not that they are in fact resilient for the operational activity described. This could provide the Commission with a more balanced and objective assessment.

88 p.6, 2.4.2, Jacobs – Appraisal Framework Module 15 Operational Risk: Ground Infrastructure Gatwick Airport Second Runway
89 p.6, 2.4.2, Jacobs – Appraisal Framework Module 15 Operational Risk: Ground Infrastructure Gatwick Airport Second Runway
90 Appendix 25 - Gatwick Airport Ltd’s Response to the Airports Commission
91 p.5, 2.4, Jacobs – Appraisal Framework Module 15 Operational Risk: Ground Infrastructure Heathrow Airport North West Runway
3.8 Fuel supply

The Commission report is again inconsistent in its assessment of the risk associated with disruption of fuel supply.

Jacobs note that the capacity of the fuel pipeline network and any constraint on operations will be critical to airport operations.

They identify that the capacity of the fuel network supplying Gatwick\(^\text{92}\) is currently capable of supplying sufficient fuel without upgrading until 2040. On-site storage is currently 2.5 times daily demand and proposals are planned to increase this by a significant amount by 2050 to meet future resilience needs.

Jacobs do not however, state what Heathrow’s current capacity is in regard to daily demand or how that will change by 2040 or 2050. Comparing the proposals for fuel storage improvements for both Heathrow schemes Jacobs use identical wording on the location and number of tanks required and where these might be located.

The Commission might wish to clarify the position for Heathrow on daily fuel capacity and confirm that both proposals have identical solutions to meet their long term needs given the difference in geographical layout and design of each option.

The Commission could provide a clear comparison between proposals highlighting differences, or similarities, between the three proposals and which airport has the most resilience to fuel supply for day to day operations and equally how they mitigate an interruption to their supply.

3.9 Terrorism

Arup make no specific comment on the terrorism threat within the UK and at London airports as this is likely to be similar for all international airports. However having two airports with two runways would add resilience to the whole London system should an individual airport be targeted by extremists and flights be disrupted.

Aside from the Jacobs comments on Heathrow\(^\text{93}\) in regard to terrorism if expanded, it is also reasonable to state that a three runway Heathrow option might, additionally, attract a disproportional level of attention and be seen as more attractive to extremists. The potential concentration of long haul flights to higher “at risk” locations into one place would increase risks rather than spread across multiple locations.

Jacobs also add a comment purely in regard to the Gatwick proposal\(^\text{94}\) that “the scheme would provide an opportunity to enhance resilience and to incorporate global best practice and the latest standards in design for security” – Arup would suggest that this statement should also apply to the Heathrow proposals to avoid any misunderstanding or misleading assumptions being made about Gatwick’s security arrangements.

The Commission might wish to consider the national threat profile of the airports within the London TMA in their considerations.

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\(^{92}\) p.8, 2.5, Jacobs – Appraisal Framework Module 15 Operational Risk: Ground Infrastructure Gatwick Airport Second Runway

\(^{93}\) p.8, 2.6, Jacobs – Appraisal Framework Module 15 Operational Risk: Ground Infrastructure Heathrow Airport North West Runway

\(^{94}\) p.8, 2.6, Jacobs – Appraisal Framework Module 15 Operational Risk: Ground Infrastructure Gatwick Airport Second Runway
3.10 Adaptability to Climate Change

Nothing is highlighted in this area by the Commission or its consultants for any of the proposals despite it forming a specific risk element of their Commission’s assessment.

The Commission might wish to review the proposals and provide an objective assessment in this area for all of the runway schemes and noting the information provided by Gatwick.
Arup note the Commission’s recognition of the operational resilience that a second runway at Gatwick delivers. However, to enable the Commission to differentiate between the three proposals it could apply a standardised approach to identifying and quantifying operational risk. Such an approach would allow the Commission to obtain a more accurate, fair and balanced comparison of the different proposals.

The Commission might wish to articulate the understatement of the benefits that the increased resilience to the airports system, which a second runway at Gatwick provides and address any other inconsistencies identified so that they provide a fair and balanced appraisal of the Operational risk for each proposals.

The Commission could clarify the impacts on the London TMA of a failure of a 3 runway airport compared to the loss of one of two 2 runway airports.

The Commission should assess each proposal equally and might wish to undertake further analysis to ensure that a like for like comparison between proposals has been made.