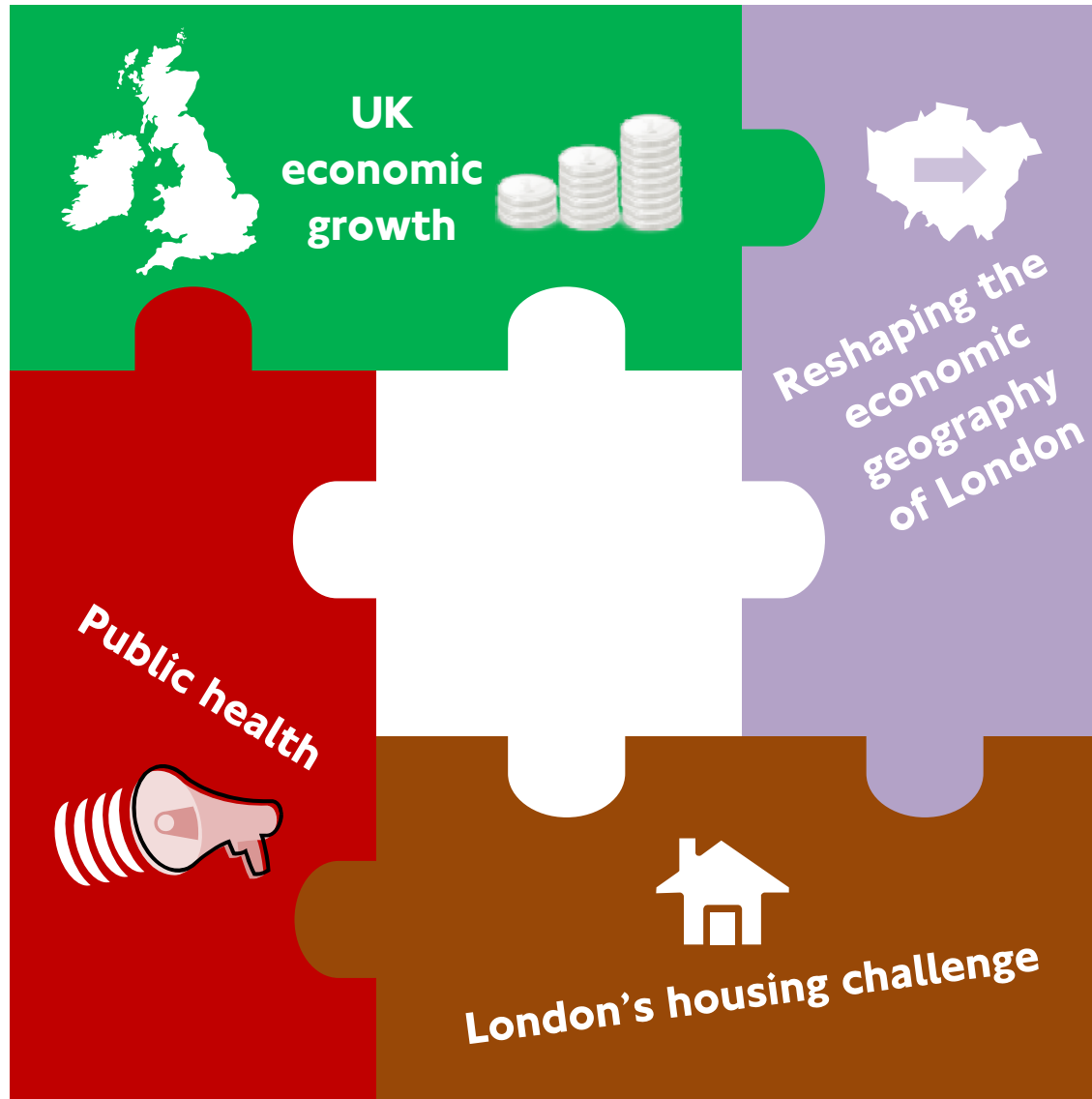


Inner Thames Estuary Feasibility Study

Response to Call for Evidence



“A new hub airport is about more than just building new runways”





FOREWORD

The United Kingdom stands at a crossroads. The Airports Commission has been asked to consider a subject that is of vital importance to our country's prosperity and place in the world. This is no easy task and not one to take lightly, given the importance and potential positive and negative impacts of its conclusions for decades to come.

As we consider the potential benefits and impacts of large-scale aviation infrastructure investment, it is important that we do not lose sight of the bigger picture. It is all too easy to focus on the specific alignment of a proposed runway, or the exact size of the terminal building that must accompany it. But airports are a major intervention in the fabric of society: they create jobs and growth; they bind and shatter communities; and they pollute, both with noise and emissions. That is why aviation policy is of such interest to me as the Mayor of London, and why it matters so much to the country that we get this decision right.

While the case for an Inner Thames Estuary airport is being led by its promoter, Foster+Partners, I will continue to participate actively in the Commission's process across a wide range of areas that I not only feel are critical in economic, environmental and human terms but that also fall squarely within my statutory responsibilities. I also hope to work closely with the Airports Commission to provide input in the many other areas that Transport for London and the Greater London Authority can offer expert advice on. We must ensure that the process is clear, fair and comprehensive, and that the final outcome is one that future generations will not regret.

Britain needs a strong hub airport if we're serious about continuing to compete on

the world stage and taking our rightful place in the global market and the advanced manufacturing chain. Hong Kong, Munich, Denver, Bangkok, Doha, Istanbul and Beijing are some of the cities that have recognised just this and have gone ahead – or are going ahead – with a new hub airport to safeguard and enhance their global competitive position. We must stop making do and start to understand why we are in serious danger of being left behind in the never-ending race for economic advantage.

I remain convinced that only a commitment to building a new hub airport will bring an end to decades of haphazard expansion. It presents the right solution for the country. It would provide capacity for the long term; freedom to expand our hub airport capacity further, and in line with demand; hundreds of thousands of jobs across the UK; a helping hand enabling London to deliver homes to meet a projected 2.3 million additional inhabitants by 2041; global connectivity for London and the regions; and relief from severe aircraft noise for over three quarters of a million people.

By contrast, a new runway at Heathrow would exacerbate what is already an unacceptable environmental situation. A third Heathrow runway, which would be full almost as soon as it had opened, would push the number of people exposed to aircraft noise to over a million. Expansion of Gatwick, meanwhile, is a sticking plaster that expert analysis has shown would stimulate little of the global connectivity we so desperately need.

Compared with those options that have been shortlisted by the Commission, an Inner Thames Estuary airport is well placed to address our connectivity, economic and public health objectives and therefore should be included as one of the shortlisted options for more comprehensive assessment later this year.

The United Kingdom is a great country, London is a great city – the time for a great airport has come.

Boris Johnson
Mayor of London

CONTENTS

1. Purpose of this Document and Key findings
2. Priorities for the Airports Commission

Issues identified by Airports Commission

3. Study 1: Environmental: Habitats and Natura 2000 impacts
4. Study 2: Operational feasibility and attitudes to moving to a new airport
5. Study 3: Socio-economic impacts
6. Study 4: Surface access impacts

Additional issues that merit further analysis before shortlisting decision

7. Environmental: Noise and public health impacts
8. Demand, capacity and connectivity
9. Cost and financing

Conclusions

10. Comparison with shortlisted options

Supporting technical documents

for Chapter 3, Environmental: Habitats and Natura 2000 impacts

- A. Inner Thames Estuary Airport option, Waders and Waterfowl [ABPmer]
- B. Thames Estuary Inner Airport option, Impact Appraisal (hydrodynamic modelling) [ABPmer]
- C. Thames Estuary Inner Airport option, Environmental review (Habitats Directive - Compensation review) [ABPmer]
- D. Compensation and Mitigation Measures in Relation to Natura 2000 Sites [ABPmer]*
- E. Ecology Desk Study Part A: Designated Sites [Atkins]*
- F. Ecology Desk Study Part B: Marine and Coastal Baseline [ABPmer]*
- G. Cultural Heritage [Atkins]*

for Chapter 4, Operational feasibility and attitudes to moving to a new airport

- H. A Flood Resilient Airport Hub for London [Atkins]
- I. Low Visibility Procedures [Atkins]
- J. Wildlife Hazards Good Practice [Atkins]*
- K. Potential Airspace Impacts of a New Hub Airport [Atkins]
- L. Planning for Transition to a New Hub Airport [Atkins]
- M. Attitudes to Relocating Hub Airports [York Aviation]

for Chapter 5, Socio-economic impacts

- N. The Strategic Planning Case for a New Hub Airport in the Inner Thames Estuary [Atkins]

- O. Regional Economic Impacts of Improved Connectivity [York Aviation and Oxford Economics]
- P. Heathrow Redevelopment Scenarios [Jones Lang LaSalle and Peter Brett Associates]
- Q. Competition and Airline needs (Extract from response to Airports Commission Discussion Paper 04) [TfL]

for Chapter 6, Surface access impacts

- R. Surface Access [Atkins]
- S. Surface Access Scenarios: Cost Appraisal [TfL]

for Chapter 7, Environmental: Noise and public health impacts

- T. Aviation Noise Modelling: Heathrow options [CAA ERCD]

for Chapter 8, Demand and connectivity

- U. Runway utilisation [Atkins]
- V. Hub Airport Capacity [Atkins]

for Chapter 9: Cost and financing

- W. Commercial and Financial Analysis of the loG option based on KPMG's analysis [EY]

for Chapter 10: Comparison with shortlisted options

- X. Performance of Options against Commission's Assessment Framework Objectives [TfL]

[* These technical notes were prepared to support the Mayor's three outline options submissions in July 2013 and were also used to inform TfL's responses to the Commission's follow-up questions.]

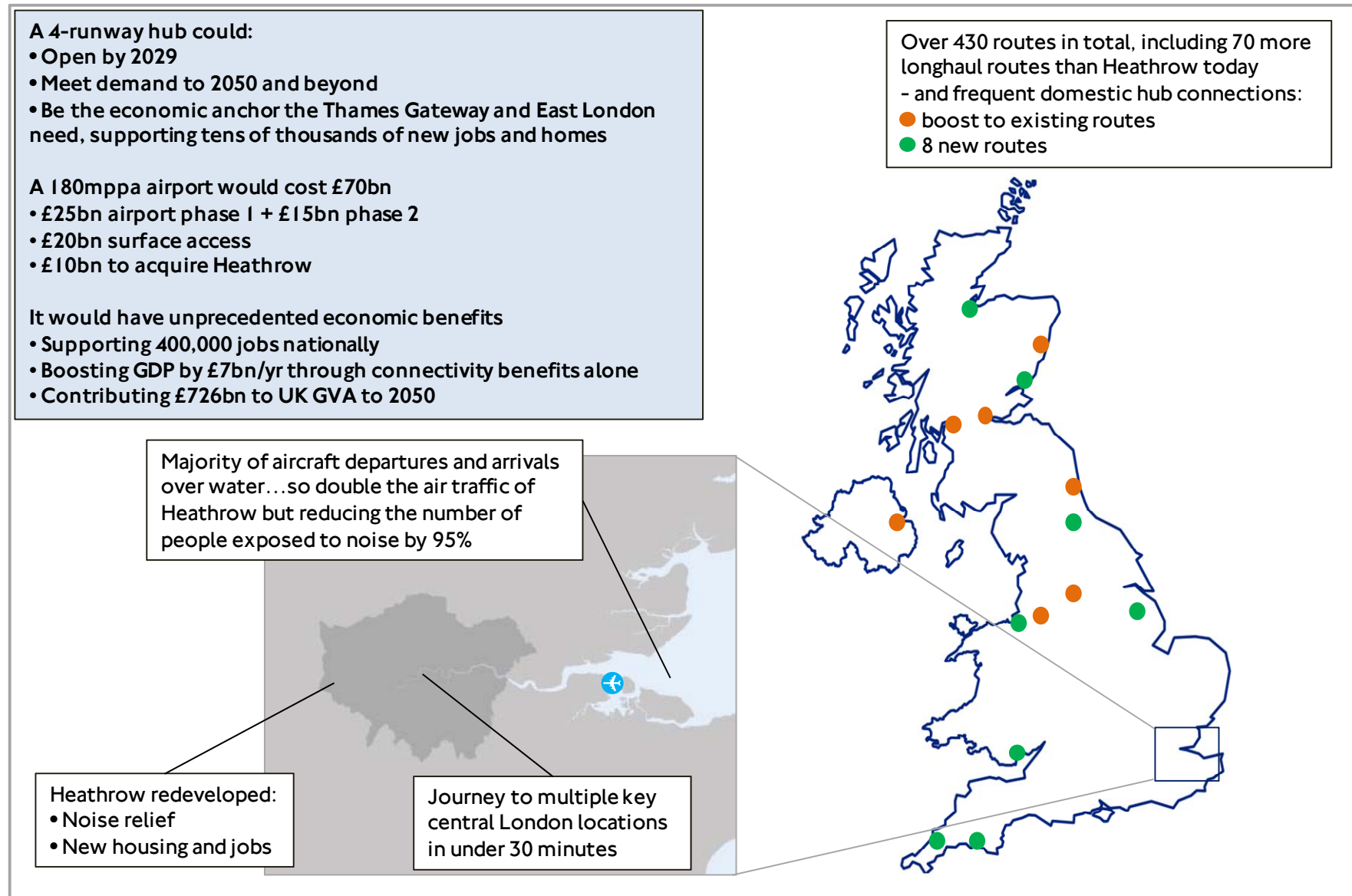
1. Purpose of this Document

- 1.1. The Mayor welcomed the decision by the Airports Commission in its Interim Report to keep an Inner Thames Estuary (ITE) airport option on its list of options under consideration.
- 1.2. The Commission are due to conduct work until September 2014 on the feasibility of an ITE option, at which point they will decide whether to formally shortlist this option.
- 1.3. This document is the response by TfL on behalf of the Mayor of London to the call for evidence on an Inner Thames Estuary airport issued by the Airports Commission earlier this year. It has three components:
 1. It responds to the Commission's request for evidence in four study areas. Each of the 35 issues that the Commission identified with a bullet point in their Inner Thames Estuary Feasibility Studies: Terms of reference document¹
 2. It provides additional evidence in other areas not identified in the Terms of Reference, which the Commission must also consider in its assessment as it decides whether to shortlist a new hub airport in the ITE.
 3. It sets out a comparison of an ITE option against the three options currently on the Airports Commission's shortlist.
- 1.3. Accompanying this document are a series of technical notes which support the evidence and statements made herein.
- 1.4. The Mayor and TfL are not engaging as a promoter, and are keen to continue to support the work of the Commission as it develops and assesses all of the options which remain on the table.

Key Findings

- 1.4. **An Inner Thames Estuary option is credible and deliverable. It is technically, economically, environmentally feasible. It is the option which would deliver a long term solution to aviation capacity and best meets our economic, environmental and long-term planning needs.**
 - Only a new four-runway hub airport can provide the connectivity to best support the UK's long term economic growth. By contrast, a three-runway Heathrow would effectively be full shortly after opening.
 - The potential impacts of a new ITE hub airport on the local environment could be significant, but there are no legal or practical obstacles to mitigating and compensating for these.
 - There are no insurmountable operational issues facing a new airport; detailed assessment in the next phase will identify the best strategies for issues such as transition, airspace and meteorological conditions.
 - The economic and regeneration benefits of a new ITE hub airport, together with the potential of a Heathrow site released for redevelopment, are significant and can support a long term sustainable development strategy for London beyond 2036.
 - A comprehensive surface access network for the new airport is credible and deliverable at a cost which is comparable to the shortlisted options.
 - There is an increasing body of evidence linking aviation noise with public health; only a new hub airport in the Inner Thames Estuary can address the dire noise exposure of Heathrow.
 - Comparing the options on a credible, like-for-like basis, an ITE airport is both fundable and deliverable.

Figure 1: Key features of a new Inner Thames Estuary hub airport



2. Priorities for the Airports Commission

- 2.1. The Airports Commission is due to make a decision in September as to whether it adds an ITE airport option to its formal shortlist. It will then spend a year assessing, further developing, and consulting on the shortlisted options before making its final recommendations in the Summer of 2015.
- 2.2. Taking a step back from the details and potential impacts of an ITE option for a moment, as the Commission conducts its work, it must:
 - **Consider the bigger picture, by taking into account the challenges London and the UK faces in a wide range of crucial policy areas.** Air transport services and the infrastructure that they use impact upon almost every area of public policy: the environment, the economy, housing, health, tourism and culture, and transport. Wider spatial planning activities must attempt to stitch all these issues together. London and the UK are predicted to experience significant population growth over the coming decades, and our long-term aviation infrastructure planning decisions must take all of these aspects into account.
 - **Take a long term view.** Central Government and the public sector have an obligation to make decisions for the long term, in a way that private businesses are not obliged to do. This is especially true for airport policy, given the timescales for decision-making and new infrastructure implementation. The Commission must look to meet the UK's long-term needs, and it must provide recommendations which look as a minimum to 2050.
 - **Focus on the potential benefits across society.** Whatever financial contribution towards new airport capacity is secured from the private sector, the delivery of any new major runways will require significant Government expenditure. This will include spending on

new road and rail links, and social infrastructure such as schools and hospitals, which will support the communities which will develop and grow as a result of airport growth. The Commission is right to ask that all schemes are affordable and financeable, but must ensure that the wider benefits to society are fully considered and take precedence over private sector interests and gain.

- **Make full use of existing evidence in making its decisions and recommendations.** A significant array of technical reports and evidence has been amassed over the course of the Commission's work. TfL alone submitted more than 25 technical reports to the Commission as evidence to support its outline options submissions in July 2013. Many of the subsequent questions raised by the Commission have been addressed in this work.
- **Assess and compare all options on a like-for-like basis.** A new hub airport in the ITE is a very different proposition to adding one new runway to Heathrow or Gatwick. At times, its benefits are only really revealed when they are seen in the context of the Heathrow and Gatwick schemes. Each option still on the Commission's table caters for different types and levels of demand, for instance. Different approaches have been taken to identify the scale of surface transport provision required. The Commission must be extremely careful and transparent in its assessment of options, and ensure that relative advantages and disadvantages are recognised, and taken into account.
- **Re-evaluate the airspace assumptions.** The conclusions of NATS are liable to significant misinterpretation. It is essential to note that: i) it is very difficult to be absolutely definitive in the absence of detailed airspace simulation modelling but that ii) with over a decade to plan, any of the new runway capacity proposals can be delivered, subject to a major recasting of the London airspace.

Key issues raised by the Commission in its Inner Thames Estuary feasibility study scope

3. Environmental: Habitats and Natura 2000 impacts Commission Study I

AC Issue: Habitats and species affected

- 3.1. The Thames Estuary is a sensitive location in terms of biodiversity. A new hub airport and its associated infrastructure would affect a number of nationally and internationally designated sites, including: Special Protection Areas (SPA), Ramsar sites, Special Areas of Conservation (SAC) and Sites of Special Scientific Interest (SSSI).
- 3.2. A new hub airport would require direct land-take from two sites of European Importance for nature conservation: the Thames Estuary and Marshes SPA/Ramsar; and the Medway Estuary and Marshes SPA/Ramsar. The former qualifies under Article 4.1 of the Wild Birds Directive (79/409/EEC) by supporting populations of European importance of two Annex I species; the latter, by supporting populations of four Annex I species. Both sites also qualify under Article 4.2 by supporting populations of European importance of various migratory species.
- 3.3. It is possible that there would be further indirect effects on a number of other designated sites nearby, including Benfleet and Southend Marshes SPA, Crouch and Roach Estuaries SPA; Foulness SPA; the Swale SPA and the Outer Thames SPA. However, there would be no direct land take from any of these sites. A full analysis of designated sites with the potential to be affected by the proposal is set out in the attached technical notes².
- 3.4. No Priority Habitats and Species, as defined under the Habitats Directive,

are present in the directly affected sites, and hence no impacts are envisaged. A full assessment would be required of indirect, secondary and cumulative impacts.

For further information, see: Technical Note E, Ecology Desk Study Part A: Designated Sites [Atkins]

» A new hub airport in the Inner Thames Estuary would affect a number of nationally and internationally designated sites, though no impacts on priority habitats or species are envisaged.

AC Issue: Impacts, issues and risks

- 3.5. The design of a new hub airport in the ITE would need to take into account the environmentally sensitive location. It would seek where possible to minimise any adverse impacts and where required integrate necessary mitigation and compensatory measures. There would be a direct loss of habitat, primarily comprising inter-tidal habitats such as mud-flats, salt marsh and grazing marsh.
- 3.6. The sites most significantly affected would be the Thames Estuary and Marshes SPA/Ramsar site and the Medway Estuary and Marshes SPA/Ramsar site.
- 3.7. Fourteen species of bird were considered most at risk to impacts associated with the project. These species form the qualifying interests of the relevant SPAs and impacts on them would be the subject of Habitats Regulations Assessment (HRA).
- 3.8. As any airport design developed, an iterative process of design and environmental assessment will be required to understand the full range of impacts of the proposal. Application of the “mitigation hierarchy” would seek to avoid, reduce, ameliorate and compensate for any impacts.

For further information, see: Technical Note A, Waders and Waterfowl [ABPmer]

» *A new airport could impact on the birds of the Thames estuary in a number of ways; the airport design would need to minimise any adverse impacts and where required integrate necessary mitigation and compensatory measures.*

AC Issue: Wider environmental conditions and overall stability of the eco-system

- 3.9. An airport at this location would impact upon existing watercourses and coastal processes including wave climates, sediment transport, tidal currents and existing sandbank features. Detailed modelling of coastal processes will be required to definitively determine these impacts. While such an assessment would serve a useful purpose as part of the subsequent phase of work, there is no reason to believe that the impacts of a new airport and the associated infrastructure could not be accommodated with active management of coastal processes, in much the same manner as today.
- 3.10. Preliminary modelling suggests that the impact of the proposal would be a small reduction in mean high water levels, and a small increase in mean low water levels. This small reduction in tidal range may have indirect effects on sites of nature conservation value along the Thames estuary. These would be taken into account as part of the overall EIA and HRA processes.
- 3.11. The proposal would therefore not be expected to exacerbate the risk of flooding in central London, but it may impact upon the delivery of other policies.
- 3.12. The Environment Agency's Thames Estuary 2100 (TE2100) plan identifies the effects of continuing development (coastal squeeze) and climate

change on the Estuary. Irrespective of a new airport, it estimates a need for £6-7bn of investment in Thames tidal defences over the next 100 years, continuing floodplain management and intertidal habitat replacement. Developing appropriate mitigation and compensation measures for a new airport could contribute to a number of the elements identified in the TE 2100 Plan which are currently unfunded.

- 3.13. With the TE2100 identifying the need for compensatory habitats preparation by 2034 and the majority of additional sea defences to be delivered between 2034 and 2049, the construction of a new airport would be well timed to help bring forward the timely delivery of required flood defences and compensatory habitats.

For further information, see: Technical Note B, Impact Appraisal (hydrodynamic modelling) [ABPmer] and Technical Note F, Ecology Desk Study Part B: Marine and Coastal Baseline [ABPmer]

- » *The airport would have manageable impacts on coastal processes – detailed modelling will be required in subsequent phases to determine their full extent.*
- » *An airport project could support the development of estuarine habitats and flood defences which are required for other reasons.*

AC Issue: The legal process

- 3.14. A new airport would be subject to Habitats Regulations Assessment (HRA) due to its proximity to NATURA 2000 sites. If the project will have significant adverse impact on a designated European site, it has to demonstrate that:
- No alternative solutions exist;
 - The project has imperative reasons of overriding public interest

('IROPI');

- Appropriate compensatory measures have been identified.

3.15. As set out previously, it is likely that the construction of a new ITE hub airport would have a significant impact on designated European sites notwithstanding appropriate mitigation. The matter of alternatives and IROPI must therefore be addressed and in an integrated manner³. The choice between the airport development options is not to be dictated by which does least harm to the SPA; rather, the choice requires careful consideration of all impacts, alternatives and reasons of overriding public interest.

3.16. No feasible alternative option offers the same benefits as an ITE option. For example, of those options remaining, an ITE option is the only one to offer the potential for addressing the serious public health impacts that arise for the large populations currently suffering from aircraft noise. A new runway at Heathrow would exacerbate these impacts, while Gatwick expansion would leave Heathrow's existing impacts to continue. An ITE option offers the prospect of an effective, unconstrained hub that meets the national economic need, while also promoting much needed regeneration in deprived areas of East London and the Thames Gateway. An ITE option is therefore unique amongst the options in front of the Commission in meeting the need for sustainable, long-term future airport capacity.

3.17. The IROPI public interest test can also be deemed to be satisfied, in particular, based on:

- the fact that there is no other comparable alternative in terms of providing long term airport capacity and no other proposal that can offer the same national and regional benefits;
- the very significant public health benefits that arise from relocating Heathrow – a 95% reduction in aircraft noise over Heathrow today
- the national economic benefits from the unique level of connectivity offered by an unconstrained hub, including providing peripheral regions of the UK with vital access to markets;
- the regional development and regeneration benefits, tackling areas of deprivation in the Thames Gateway and wider need for housing capacity for London.

3.18. Given the above, the estuary scheme could lawfully be consented with the provision of compensatory measures ensuring that the overall coherence of the network of European sites is protected. These measures are discussed in more detail below.

» *The legal 'alternatives' test can be met by an ITE airport: of the options remaining under consideration by the Commission. The public health and economic needs that an ITE option uniquely provides for allows it to demonstrate that no feasible alternative exists.*

» *The ITE airport also meets the IROPI public interest test because of its public health (95% reduction in aircraft noise over Heathrow today) and the economic connectivity and regeneration benefits it can deliver.*

» *Subject to a mechanism for providing acceptable compensatory measures, the proposal may be consented in accordance with European law.*

» *In light of the above, European law on birds and habitats provides no basis that should prevent further consideration of the ITE option at this stage.*

AC Issue: Compensatory habitat requirements

3.19. Compensation is required to protect the coherence of the wider Natura 2000 network of protected sites. EU Guidance on implementation of the

Habitats Directive⁴ identifies that compensatory measures in such a situation should:

- Focus on the ecological function played by the site;
- Be located within the same biogeographical region (or migratory pathway) and realistically accessible to birds using the original site.

- 3.20. An ITE airport on could result in a direct loss of approximately 2100 hectares (ha) of intertidal and subtidal habitat (including transitional grassland and brackish standing water).
- 3.21. The majority of protected habitat to be lost is intertidal mud and sandflats, grazing marsh, subtidal sand/mud and to a lesser extent saltmarsh and brackish standing water. These sites are also designated for the valuable bird populations that they support. Compensation will be required for the direct loss.
- 3.22. The remaining parts of the Thames Estuary and Marshes and (to a lesser degree) Medway Estuary and Marshes SPAs will become less suitable to support populations of their qualifying interests, and additional compensation is likely to be required to ensure the integrity of the Natura 2000 network. Similarly, the indirect effects on more distant sites will also require compensation.
- 3.23. There will be indirect changes to the extent of intertidal and subtidal habitats as a result of changes in the hydrodynamic (water levels) and sedimentary regimes (changes in patterns of sediment erosion and accretion). A high level numerical hydrodynamic model has been used to predict this⁵. The indirect effects may represent a loss of a further 70 hectares.
- 3.24. In assessing the requirement for compensatory habitat creation, ratios of between 2:1 and 3:1 are typically applied. Whilst the precise figure would need to be refined once an outline design was available, it is likely that

compensatory habitat creation would be required at a scale of between 4000 and 6500 ha.

For further information, see: Technical Note C, Environmental review (Habitats Directive - Compensation review) [ABPmer] and Technical Note D, Compensation and Mitigation Measures in Relation to Natura 2000 Sites [ABPmer]

» *It is likely that compensatory sites will need to be provided, up to a replacement ratio of between 2:1 and 3:1 in land area. This is likely to amount to between 4000 and 6500 hectares.*

AC Issue: Ensuring a successful outcome for habitats

- 3.25. There are different options for providing compensatory habitats for any species or habitats displaced by the creation of an airport in the ITE. Some options include:
- Intertidal and sub-tidal habitat creation (possibly including managed realignment or sediment reprofiling);
 - Identification of additional sites/areas for SPA designation;
 - Enhancement of habitats within existing designated sites.
- 3.26. Examples of similar compensatory schemes can be found in Europe and elsewhere, including a number of port developments in estuaries around the UK such as the London Gateway Port in the Thames Estuary.
- 3.27. As part of our appraisal, 95 managed re-alignment schemes have been reviewed; two of which are over 500 ha, both in Germany. One is a regulated tidal exchange (RTE) scheme (850 ha) and the second is a breach into a secondary dike (not for defence or people) to allow more effective water removal from the site following overwashing (1750 ha).

- 3.28. Research into the costs of managed realignment schemes has revealed that the average unit cost for all UK schemes implemented up to and including 2011 was about £34,000 per ha.
- 3.29. For any large scale managed realignment scheme, issues associated with land acquisition are likely to be significant. Any large managed realignment will require significant landowner consultation, engagement, and would be greatly facilitated by the availability of compulsory purchase powers, potentially in conjunction with an Act of Parliament.
- 3.30. An Environmental and Social Impact Assessment will likely be required of any proposed compensation site in order to ensure that any impacts on environmental or social receptors are identified, assessed and mitigated appropriately.

For further information, see: Technical Note C, Environmental review (Habitats Directive - Compensation review) [ABPmer]

» *Examples of other habitat compensation schemes points to their feasibility; the cost may be in the region of £34,000 per hectare.*

AC Issue: Possible compensatory sites

- 3.31. A number of site selection exercises have previously been undertaken to determine potentially suitable locations for intertidal habitat creation. These have included the identification of compensatory habitats for individual developments as well as at a more strategic scale for losses typically associated with coastal squeeze. The previous studies that have been used to inform this submission include the Greater Thames Coastal Habitat Management Plan (CHaMP), Thames Estuary 2100 (TE2100), Lappel Bank and Severn Compensatory Measures.
- 3.32. The following criteria were used to identify potential compensation sites for the present proposals: size, location, feasibility of habitat creation and overall ease of implementation.

- 3.33. The resulting number of sites and total area available within different distances from a potential ITE location are summarised in the table below. These represent sites which on the basis of information available at this stage, would be suitable for compensatory habitat creation.
- 3.34. Additional site selection criteria would need to be applied to identify which sites offer the best prospect of delivering compensatory habitat and any wider potential benefits associated with each site, for example any enhancements to flood defences.

Table 1: Potential areas suitable for habitat creation and proximity to site

Distance	Minimum Size (ha)	No. of potential sites	Area (ha)
0-50 km	50	8	2,481
50-100 km	250	5	3,364
100-200 km	250	8	31,950
200-500 km	500	21	35,848

- 3.35. This table demonstrates that there is scope to provide compensatory habitat at precautionary ratio of between 2:1 or 3:1 for the impact on protected habitats caused by the ITE proposal.
- 3.36. Given air safeguarding requirements the table only includes sites at least 13km from the airport.
- 3.37. Sufficient compensatory habitat is available within 100km of the airport. Many more opportunities exist between 100 and 500km of the airport, which is an appropriate distance to consider given the scale of migratory movements of the bird species affected. Further work and refinement of options will be undertaken as the project develops.

For further information, see: Technical Note C, Environmental review (Habitats Directive - Compensation review) [ABPmer]

» *A number of potential compensatory site options have been identified; compensation for the same ecological functions on the scale required could be delivered within the migratory pathways of the bird species affected.*

AC Issue: Landscape, historical and archaeological impacts

- 3.38. There are 21 listed buildings within the Isle of Grain site boundary, as per the July submission⁶. Three of these are listed at Grade I, two at Grade II* and sixteen at Grade II. This includes medieval churches with work surviving from the eleventh and twelfth centuries.
- 3.39. Within a 1km corridor of the proposed surface access, there are approximately 249 listed buildings, 55 scheduled monuments and 14 registered parks and gardens. In line with the National Planning Policy Framework, detailed design would seek to avoid and reduce impacts on these assets where possible.
- 3.40. There is a high possibility of there being substantial prehistoric archaeology within the site boundary. Palaeolithic and palaeoenvironmental remains have been found in the area. Later archaeological remains associated with salt production have also been discovered on the Isle of Grain. The potential presence of archaeological deposits associated with tidal activity such as fishing and fouling is high, particularly in the more marshy area of the Isle. As with all waterlogged sites there is a potential for well preserved deposits.
- 3.41. Two adjacent wreck sites located approximately 1km to the north east of the proposed airport site (known respectively as the 'London' and 'King') have been subject to staged archaeological assessment as part of ongoing mitigation for the London Gateway project.
- 3.42. Opportunities for mitigation could be considered as part of the detailed design process:

- Archaeological excavation/historic building recording of assets directly impacted by proposed development or preservation in situ;
- Careful design of new transport links to minimise visual intrusion, direct impacts and noise intrusion;
- Consideration should be given to retaining some buildings or sites with the proposed development;
- Selected buildings of high heritage value or special interest may be moved to new locations.

- 3.43. The cost of these mitigation options is likely to be a relatively small proportion of the overall costs of the project – we would suggest less than one percent.

For further information, see: Technical Note G, Cultural Heritage [Atkins]

» *A number of mitigation options exist for dealing appropriately with listed buildings and archaeological remains which are located on or close to the site. These issues are subject to well understood and frequently employed management and mitigation techniques.*

Environmental: Habitats and Natura 2000 impacts
KEY FINDINGS

- A number of designated sites will be affected by a new airport in the Inner Thames Estuary. Although potentially significant, it is likely that impacts could be minimised, mitigated and appropriately compensated through estuarine habitat creation.
- No priority habitats or species would be affected.
- The 'alternatives' and 'IROPI' public interest legal test would be met, particularly in the context of the airport's economic connectivity and public health benefits. Hence there would be no legal barrier to progressing an ITE option.
- It is likely that compensatory sites will need to be provided, up to a replacement ratio of between 2:1 and 3:1 in land area. The availability of sufficient suitable sites for this has been demonstrated.
- Further work will be required in a number of areas as design developed, for example to fully understand and mitigate potential impacts on coastal processes, and landscape and visual effects including on listed buildings. However, it is highly likely that such impacts could be effectively and efficiently managed and mitigated through the employment of methods and techniques which are tried and tested.
- In summary, there are no environmental constraints that should be an insurmountable barrier to delivery of a new hub airport in the ITE.

4. Operational feasibility and attitudes to moving to a new airport

Commission Study 2

AC Issue: Meteorological and wildlife impacts - Flooding

- 4.1. An inner Thames Estuary Airport can be readily designed to be resistant to sea level rises and flooding⁷. The proposal designed, costed and submitted by TfL to the Airports Commission in July 2013 was resilient to a 1 in 1,000 year flood event, by being surrounded by a bund 8.8m above mean high water level. This is consistent with other critical infrastructure in the local area such as the Grain Liquid Natural Gas (LNG) plant. Other flood defences inside the airport site are designed to protect critical infrastructure and activities taking place underground.
- 4.2. A phased approach to the design and construction of the airport's flooding defences can take into account sea-level rises. A high level review of the Environment Agency's plan for flood risk management along the Thames (TE2100) has identified that there is potential that an ITE airport could supplement and enhance proposed flood risk management in this area in order to keep pace with climate change. This has the potential to provide flood risk benefits to the Isle of Grain, including existing industry and infrastructure. Detailed and much more extensive hydraulic modelling would be required to fully appreciate the potential benefits.
- 4.3. There are a number of other examples of major airports being built in coastal locations. Some, such as Seoul Incheon and Amsterdam Schiphol are below sea level. All have adopted a number of construction methods and techniques that ensure the airports have an appropriately high level of resistance to flooding and sea level rises. A new ITE airport would benefit from a wide range of approaches successfully adopted, and lessons learned elsewhere.

- 4.4. An ITE airport can also be readily designed to reduce the residual surface water flooding risk to neighbouring areas to acceptable levels (1 in 50 year events).
- 4.5. A major airport at any location in the South East of England will require specific flood risk analysis and mitigation, due to the large areas of hardstanding.

For further information, see: Technical Note H, A Flood Resilient Airport Hub for London [Atkins]

- » *The risks of both coastal and surface run-off flooding events can be readily mitigated.*
- » *There is potential for an ITE airport to supplement and enhance proposed flood risk management in the area, consistent with the Environment Agency's TE2100 plan.*

AC Issue: Meteorological and wildlife impacts - Fog

- 4.6. Visibility data for the past 10 years provided by the Met Office shows that low-visibility occurrences at nearby Shoeburyness (as a reasonable approximation for an ITE location) are not appreciably more frequent than at Heathrow or Gatwick⁸.

Table 2: A comparison of low-visibility occurrences (% of time)

	Heathrow <600m	Gatwick <600m	Shoeburyness <600m
Jan	0.4	1.0	1.3
Feb	0.3	1.8	1.1
Mar	0.2	2.0	1.1
Apr	0.1	1.4	0.7
May	0.1	0.6	0.3
Jun	0.0	0.6	0.3
Jul	0.0	0.5	0.3
Aug	0.0	0.8	0.3
Sep	0.2	1.3	1.1
Oct	0.4	1.4	1.5
Nov	1.2	1.7	2.1
Dec	2.5	2.5	3.3
ALL	0.4	1.3	1.2

[Note: This is based on Heathrow's current 600m threshold for implementation of low-visibility procedures]

- 4.7. It is important to note that the impact of fog (thanks to the increased aircraft separation required) is greatly exacerbated at an airport operating above the industry practice 70-75% runway utilisation. This is the case at Heathrow today, where the slightest problem can trigger delays and cancellations. Recently reported examples of fog-induced cancellations include 95 on 1 April 2014, 280 on 11 December 2013 and 40 on 7 October 2013.
- 4.8. However, according to the Airports Commission, shortly after a third runway would open, Heathrow would be operating at 80-90% runway utilisation – i.e. effectively full. As such, the airport's hyper-sensitivity to bad weather would remain and the resilience issues that are a regular feature of Heathrow would continue.
- 4.9. By contrast, a 4-runway airport which had sufficient capacity and resilience would be minimally affected, able to recover quickly from any

adverse weather conditions.

- 4.10. Further technological developments such as the use of Performance Based Navigation approaches will be routine by the time a new hub opens, reducing further the operational impacts of low-visibility conditions. A 4-runway configuration would also allow the airport to more effectively separate aircraft by wake category, maximising throughput in all conditions.

For further information, see: Technical Note 1, Impacts of Low Visibility on the Resilience of Airport Operations [Atkins]

- » A site in the Inner Thames Estuary would not be appreciably more affected by low visibility conditions than Heathrow or Gatwick.
- » Due to lower levels of runway utilisation at a new 4-runway hub airport and upcoming improvements in navigation technology, resilience will improve, with less disruption caused by low visibility conditions and a quicker return to normal operations.

AC Issue: Meteorological and wildlife impacts – Bird strike

- 4.11. Local and migratory bird populations are present around most airports and this applies especially to coastal locations. The CAA requires that airport operators carry out risk assessments and develop a Bird Control Management Plan.
- 4.12. There are a variety of established approaches for addressing bird strike, including habitat management and deterrence and dispersal systems. For example, an advanced noise-based deterrence technology introduced at major airports in New York and Istanbul in 2013 is designed to eliminate 95% of bird strikes within the airport perimeter. This is an issue that can be managed, including at a new hub airport on the Isle of Grain.

For further information, see: Technical Note J, Wildlife Hazards Good Practice [Atkins]

» *Bird strike risk is an issue that would need to be managed and mitigated. There is no evidence to suggest it would be at an unacceptable level.*

AC Issue: Impact of the SS Montgomery

- 4.13. The SS Montgomery wreck poses small risk, irrespective of a new airport. The site is already subject to round-the-clock monitoring and frequently passed at close range by heavy shipping. By comparison, airport construction and operation would take place some 5 kilometres from the site.
- 4.14. It has not been ascertained whether the future condition of the SS Montgomery will need addressing or whether the wreck can be kept in-situ. In any case, this is an issue that the relevant agencies (principally the Ministry of Defence) must decide upon, regardless of whether or not a new airport is built.
- 4.15. The previous report by the former Defence Evaluation and Research Agency (DERA) concluded that the likelihood of an explosion on the ship is remote and would therefore be unlikely to affect the construction or operation of the airport⁹.

» *The SS Montgomery is not a material consideration to the feasibility of a new airport in the Inner Thames Estuary.*

AC Issue: Relocating energy facilities

- 4.16. The Grain and Kingsnorth power stations are both decommissioned; depending on the exact airport alignment, one or both of their chimneys (244 metres and 198 metres respectively) would impinge on the public

safety zone. Both chimneys are scheduled for demolition in 2014.

- 4.17. The Liquefied Natural Gas (LNG) facility on the south east side of Grain makes inefficient use of the land and is spread out over a much larger area than absolutely necessary, as a result of many decades of development. LNG tankers dock at the shipping terminal infrequently. Currently, only 8 berthing slots a month (each lasting several days) are allocated.
- 4.18. A new airport would require rationalisation of the LNG site. This could include decommissioning and relocation of the storage facilities, a significant proportion of which will be nearing the end of its operational life by 2029. The LNG shipping terminal and link to the underground national LNG pipeline structure outside the perimeter fence of the airport could both be retained. These are both reasons to suggest that a new airport, and any consequent relocation of LNG storage facilities, would have a manageable cost.

» *It is likely that a manageable and affordable solution for the energy facilities on the Isle of Grain can be implemented.*

AC Issue: Airspace implications

- 4.19. Given the timeframes for new airport capacity, and the proposed reorganisation of London airspace it is reasonable to assume that a workable airspace solution could be achieved. However, the issue of potential airspace conflicts and the suggested need to close existing airports for reasons of potential conflict have been central to some of the Commission's decisions thus far. The Commission's findings have been based on advice from National Air Traffic Services (NATS), which has tended to differ from the advice it has provided to TfL.
- 4.20. Work undertaken by NATS for the Mayor in 2013 concluded that any airspace implications from airport expansion could be addressed¹⁰, and

that a new ITE airport would not automatically entail the closure of London City or Southend airports.

- 4.21. The particular issue of potential airspace impacts on other airports needs to be considered carefully. We have made a series of observations regarding the Commission and NATS' work on airspace to date.
- 4.22. The Commission should revisit the evidence provided to it by NATS and consider again key questions such as whether London City airport would be required to close if an airport were built on the Isle of Grain.

For further information, see: Technical Note K, Potential Airspace Impacts of a New Hub Airport [Atkins]

» *There are a number of critical airspace issues that the Commission must reconsider as they conduct further work.*

AC Issue: Transition planning

- 4.23. Transferring airport operations to a new site will bring a number of challenges. However, several other countries have successfully opened new airports, and there is every reason to believe that the UK could do so as well.
- 4.24. Short-term teething troubles regarding specific activities such as baggage handling should be expected. However, with comprehensive planning and testing, a new hub airport can be expected to work better and more efficiently than Heathrow today.
- 4.25. A new hub has the luxury of many years of planning for transition. This includes the development of a comprehensive, step-by-step plan to implement these changes, including those which can be done in advance, and those which can be done only on opening day.
- 4.26. The nature of the hub activity – and the mutual dependency of a majority

of routes – suggests that a 'big bang' transition is desirable, where the hub airport operation and associated equipment transfer overnight. This has been the approach taken for the major new hubs in recent decades, Hong Kong, Denver, and Munich and we should be seeking to take advantage of their experience in implementing a complex transition to new airport.

- 4.27. It is worth noting an interesting variation with more recent hub airport relocations, notably the new airports at Dubai and Doha, which are planning 'soft launches'. This sees a small number of primarily low cost airlines and freighter services, not dependent on hub transfer traffic, moving to the new airport and so helping test the facilities, in advance of the 'big bang' move by the majority of the carriers.

For further information, see: Technical Note L, Planning for Transition to a New Hub Airport [Atkins]

» *The transition will not be without its challenges. However, with over a decade to prepare and a comprehensive plan in place, it is entirely feasible. The experience of new hub airports such as Munich, Hong Kong and Denver will provide useful guidance.*

AC issue: Stakeholder views: operators

AC issue: Stakeholder views: airport users

- 4.28. It is undoubtedly difficult to gauge the views of the aviation industry. Naturally, they will be reluctant to engage with a paradigm shift that will transform the industry landscape in the long term.
- 4.29. TfL has commissioned a piece of work that considers both the pronouncements of actors in the current debate, but also considers the perspectives of those who have been through a similar process when other hub airports have moved. For the latter, Munich, Denver, Oslo, Hong Kong and Athens were considered.

4.30. Those issues raised by airlines to tend to fall into four categories:

- *Higher aeronautical fees*

The level of fees is a recurrent theme, despite the commensurate improvements in facilities delivered and the greater resilience. The Commission's report cites an increase of 3.4x (relative to Heathrow's Q6 level) as necessary. However, as is set out in Chapter 9, new analysis by EY demonstrates that this is based on unprecedented and highly questionable assumptions, which are acknowledged as 'arbitrary' by the Commission's own advisors, KPMG, and the analysis as 'highly simplified'. Indeed, KPMG's own report states that, under different assumptions, an increase of just 6% on the opening of the new airport would be needed. Charges will be limited both by the regulatory structure and, to some extent, competitive pressures.

- *Competition considerations*

LAG/British Airways and other airlines have made clear that a key concern about moving to a new airport is being placed at a competitive disadvantage, if rivals are able to remain at Heathrow. This is addressed by the full closure and relocation of Heathrow, which in turn requires strong and clear political will behind any decision.

British Airways also has a particular interest in maintaining its 'Fortress Heathrow': holding a majority of the slots at a capacity constrained airport gives it significant market power. A new hub would erode that, through increased competition. As such BA's short term interest – if those of not the consumer – is against a new hub, though over the long term BA has been suffering from the constraints on its growth.

- *Facilities and service*

This is an important factor and airlines will generally seek facilities

that can support their efficient operations as well as a quality offering to their customer base. This includes a higher degree of resilience and reliability than a constrained Heathrow could ever hope to manage.

- *Catchment*

Airlines are concerned about retaining access to their passenger markets – and in the case of Heathrow, the valuable catchments areas of west London. That is why the surface access proposals, as set out in Chapter 6, are key in providing fast, direct access to west London from the airport. Over time, this becomes less of an issue as the new hub triggers increased economic activity to the east side of London.

What this means for airline views

4.31. The airlines have rational concerns about relocating the hub, though each can be addressed. What is very clear from the international examples is that, post-relocation, the airlines have benefitted from the new airport's success. Even the new Denver airport was able to win round its largest airline, which had been rather hostile prior to opening. A new ITE airport would be much less constrained and more efficient than Heathrow today, and there is no reason not to expect that it too would be successful.

What this means for user views

4.32. The perspective of users is broadly similar, no less daunted by such a fundamental recasting of the London airports system and wider economic geography. The disruption to established patterns will be a concern, including the perceived costs to business; but this should be tempered by the timescales – over a decade from policy decision to opening – with transition support likely made available too.

4.33. Cost and access are likely to be of particular concern for airports users – whether passengers or freight; but demonstrating that a new hub airport

can provide a better facilities – including greatly improved reliability – and increased competition, with a downward pressure on fares, should start to allay the fears of many. Exactly how these issues are addressed is set out across this submission. But, again, the evidence of other new hub airports is that they are accepted by passengers soon after opening.

For further information, see: Technical Note M, Attitudes to Relocating Hub Airports [York Aviation]

- » *Concerns about a new airport with regard to aeronautical fees, competition, facilities and surface access are rational but can be addressed.*
- » *It is nonetheless expected that airlines and users alike will welcome the benefits of a new hub airport following opening – and this is borne out by international experience.*

Operational feasibility and attitudes to moving to a new airport KEY FINDINGS

- Effective strategies can be put in place to address operational issues including fog, flooding, bird strike and the relocation of energy facilities.
- Work undertaken by NATS – and independently verified – has confirmed that there are no insurmountable airspace issues – not least given the time frame – and that a new hub airport at Grain is unlikely to have any significant operational impact on other London airports.
- The transition can be effectively managed to minimise disruption; best practice learning from Munich, Hong Kong, Denver and elsewhere will be instructive in this regard.
- Concerns about a new airport tend to focus on aeronautical fees, competition, facilities and surface access. Not only can each be addressed, but international experience suggests that a successful new airport is achievable and that attitudes will shift following opening.

5. Socio-economic impacts

Commission Study 3

AC issue: *Economic impacts of new hub*

- 5.1. The delivery of a new hub airport in the Inner Thames Estuary has the potential to secure long term economic benefits for the UK, London and the South East. These benefits will be driven by a step change in connectivity and the UK's increased participation in the global economy. The national and local economic benefits of a new ITE hub airport are summarised in the Mayor of London's Isle of Grain submission (July 2013) and a number of supporting documents submitted to the Airports Commission on 27 Sept 2013.
- 5.2. Nationally, an ITE 4-runway hub airport as specified in the Mayor's July 2013 submission and opening in 2029 would support 388,000 gross jobs by 2050 and these would be worth £42.3 billion per annum in GVA terms¹¹.
- 5.3. The ITE hub airport will also trigger a substantial, permanent improvement in economy-wide productivity by 2050 due to improvements in business related connectivity that only results from a having a 4-runway hub airport operating from 2030 onwards. Examining Total Factor Productivity (TFP) and the existing literature, it is estimated¹² that by 2050 these impacts would amount to a permanent 0.5% increase in UK GDP per annum, currently valued at £6.9 billion in today's prices.
- 5.4. Within a local impact area defined by six local authorities in the Thames Estuary (Medway, Swale, Maidstone, Tonbridge and Malling, Gravesham and Dartford), by 2050 an ITE Airport would add 134,000 net additional jobs and these would be worth £16.6 billion in GVA terms per annum¹³. These result from direct, indirect and induced effects.
- 5.5. Pan-regionally, it is considered realistic that the Isle of Grain airport

could trigger up to 138,000 additional catalytic jobs by 2050¹⁴.

International evidence shows that the spatial form of these impacts varies but these jobs can be expected to locate around the airport and across London, Kent and Essex.

The importance of freight

- 5.6. The value of a new hub airport for freight, and for industry and the wider economy generally should also not be underestimated. Air freight accounts for nearly 40% of UK imports and exports by value¹⁵ and as such an ITE hub would play an essential role in supporting UK manufacturing.
- 5.7. Of all the options being considered by the Airports Commission, a new ITE airport could uniquely support the UK economy by enabling new longhaul routes and frequencies which could carry bellyhold freight – as well as new dedicated freighter services, with flexibility about when these services could operate.
- 5.8. Constraints at Heathrow have meant freighters have been all but squeezed out, while growth in longhaul services is curtailed – Britain has fallen behind rivals in terms of access to emerging economies such as China and Brazil, key for future trading prospects. A 3-runway Heathrow would effectively be full shortly after opening, leaving little scope for improved freight connectivity.
- 5.9. Gatwick, as a non-hub airport, cannot support a wide range of longhaul routes because it cannot generate the critical mass of transfer and local catchment demand. Neither can it offer the transshipment opportunities of a hub – so even with a second runway, will not be able to meet the UK's freight needs.

For further information, see: Technical Note N, The Strategic Planning Case for a New Hub Airport in the Inner Thames Estuary [Atkins]

- » A new ITE airport would add 134,000 net additional jobs in the local area by 2050 – equivalent to £16.6bn GVA per annum – and trigger a further 138,000 catalytic jobs across the whole region.
- » Nationally, an ITE airport would support 388,000 gross jobs by 2050, worth £42.3bn per annum in GVA terms.
- » The additional connectivity would improve UK productivity, resulting in a permanent 0.5% increase in GDP – valued at £6.9bn in today's prices.
- » Only a new ITE hub can significantly enhance UK freight connectivity, supporting UK manufacturing and UK trade in general.

AC issue: Supporting the economic growth of all the UK's cities

- 5.10. Having a strong hub airport serving the UK is vital not just to London, but to the economies of the UK regions, providing vital access to global markets. The lack of capacity at Heathrow has seen 12 domestic routes lost since 1990, with a significant impact on regional connectivity – a worrying trend which was also highlighted by the Airports Commission Interim Report¹⁶.
- 5.11. The table below¹⁷ demonstrates the superior access both to London and to global markets that a 4-runway ITE could provide for the regions, many of which currently have no access to the London hub.

Table 3: Comparison of domestic routes from hub in various scenarios

	Today	2050		
	Existing capacity	No new hub capacity	Heathrow 3 rd runway	4 runway ITE hub airport
Routes	7	6	6	15
Daily flights	66	46	60	109

- 5.12. These additional flights would enable over 5 million more passengers to use domestic routes to/from the UK's air hub, generating nearly £570 million of economic benefits to passengers and the airports combined. The wider benefit to the regional economies would be nearly £2.1 billion a year supporting the spatial rebalancing of the UK.
- 5.13. City regions identified as reasonably likely to benefit from new air links thanks to the capacity provided at a 4-runway ITE hub are: **Inverness, Dundee, Cardiff, Durham Tees Valley, Humberside, Liverpool, Plymouth¹⁸ and Newquay.** Leeds Bradford would continue to be served – whereas it is predicted to be lost from Heathrow by 2050 in the other scenarios.

For further information, see: Technical Note O, Regional connectivity [York Aviation and Oxford Economics]

- » A new hub provides enhanced global access to 15 cities across the UK – including 8 new hub routes – contributing £2.1bn per annum in wider economic benefits, supporting spatial rebalancing.

AC issue: Supporting the long term needs of London's growth

- 5.14. The Mayor's Isle of Grain submission in July 2013 highlighted the challenges of accommodating London's forecast growth and the importance of this securing this growth to drive the UK's future economic performance.
- 5.15. More recent statutory documents have further highlighted the extent of this growth challenge and are material considerations against which the benefits of the ITE airport and all short-listed expansion options must be assessed. The draft London Housing Strategy¹⁹ and the draft Further Alterations to the London Plan²⁰ highlight the need for London to provide up to 49,000 houses a year as forecasts show the Capital growing to more than 10 million people by 2041²¹ – effectively adding

the population of Birmingham.

- 5.16. The need for London to plan for the long term and take an integrated approach to meeting its future growth is a high priority for the Mayor of London. A long term Infrastructure Plan for London is to be launched later this year²². This will set out the Capital's strategic infrastructure requirements to 2050 for seven types of infrastructure, including transport. The long term picture should be a key consideration in the Commission's assessment of the airport options.
- 5.17. By supporting the delivery of additional housing in London and the South East, a new ITE airport together with the redevelopment of Heathrow will bring a number of wider long term economic and social benefits:
- Additional construction activity supports on-site and off-site jobs as well as training and apprenticeships and boosts council revenue. More than 92% of the national supply chain for housebuilding is UK based;
 - Increased household expenditure including more than £9,000 in first occupier expenditure in every new home;
 - Increased labour supply especially of the working age population and skilled workers increasing the depth and size of the labour force;
 - Improving affordability of housing to ensure a balanced supply of labour across key occupations;
 - Helping population growth to reduce the problems and costs of an ageing population (e.g. pension contributions, so called 'squeezing' of the labour supply);
 - Reductions in the proportion of people living in crowded or poor conditions;

- Improving home ownership opportunities for younger people.

» *A new hub will enable development both at Heathrow and in East London and the Thames Gateway – helping London meet its need to accommodate a population the size of Birmingham by 2041*

AC issue: Redevelopment potential of Heathrow

- 5.18. Recent work²³ for the Mayor confirms the very significant commercial and residential redevelopment potential of the Heathrow site. Three scenarios were found to offer significant potential for the site and all were financially viable:
- A new **education and technology quarter**²⁴ focused around higher education, research and development parks and including high value manufacturing would provide 100,000 jobs and 42,000 dwellings for 76,000 new residents.
 - A **new town** based on the principles of a higher density Milton Keynes (a balanced city, with freedom of movement). This would accommodate commercial development around transport nodes and some logistics clusters provide 76,000 jobs and 47,000 dwellings for 112,000 new residents.
 - A new **residential quarter** on the scale of Kensington and Chelsea which could provide 55,000 jobs and 85,700 dwellings for 200,000 new residents with a large commuting component.
- 5.19. Blending elements from all three, the Heathrow City concept has the potential to support both 90,000 jobs and 80,000 dwellings for around 190,000 new residents within the developable area of the airport site alone, contributing some £7.5 billion a year to the UK economy. While building 80,000 units may seem ambitious in UK terms it is less than two years of London's required supply of 49,000 units a year and it would be

plausible that a cleared site could be built out within a 20 year period.

- 5.20. The redevelopment could be proactively planned to reduce the delivery risks and the use of a Development Corporation can be expected to ensure rapid implementation following 2-3 years of site remediation and masterplanning which would trigger employment immediately.
- 5.21. There would also be many new job opportunities across West London before the airport relocates with Old Oak Common providing 40,000 new jobs before 2030 and 50,000 thereafter, providing some resilience against the loss of a major employer within the area. More generally London has been creating, on average, 50,000 additional jobs every year for the past 14 years.
- 5.22. Though the London City Airport site is also referenced in the Terms of Reference, NATS have confirmed that the airport would not be impacted by a new hub airport on the Isle of Grain (which, indeed, would be further away from London City than Heathrow). As such, reuse of the London City Airport site is beyond the scope of this submission.

For further information, see: Technical Note P, Heathrow Redevelopment Scenarios [Jones Lang LaSalle and Peter Brett Associates]

» *A redeveloped Heathrow could support 90,000 jobs and 80,000 homes, contributing £7.5 billion a year to the UK economy*

AC issue: Economic impacts of relocating Heathrow

- 5.23. There are some sensible observations in the Heathrow closure report²⁵ undertaken for the Airports Commission. However, the report is rather limited as it judges everything in present day terms rather than how the site can support the on-going development of a World City with growing global importance.
- 5.24. Claims by some reports that West London and the Thames Valley would

suffer some kind of “economic cataclysm” if Heathrow relocated²⁶ are not credible. There is no evidence of this sort of economic collapse at any other city airport relocation anywhere in the world and much more evidence of successful redevelopments in growing cities (e.g. Denver, Stockholm, Washington DC, Oslo, Munich, Edmonton) – though notably none with the economic scale of London. Not only does the evidence suggest that the airport is just one of several locational factors²⁷, this kind of permanent economic deterioration is unlikely to occur in a very economically buoyant area where firms will still be able to access a new four runway hub airport in around 45 minutes (i.e. the locational factors for catalytic jobs are, in effect, unchanged).

- 5.25. Heathrow is part of a wider economic sub-region. While there are about 300 firms and 76,600 direct on-site jobs at Heathrow, there are 1.2 million jobs and more than 100,000 firms within the 15 Local Authorities²⁸ within 20km of the airport and extending into the Thames Valley. West London alone has a diverse economy and with a population of 1.5 million people is larger than Birmingham²⁹. Businesses and employment are spread across a range of economic nodes and town centres in West London. Wembley is one of the largest regeneration opportunities in Europe with more than 60ha of land for development with the potential to support 11,000 additional jobs and 11,500 new homes. Home to 2,000 firms and 40,000 workers, Park Royal is the largest industrial and business location in the UK with the potential to add a further 14,000 new jobs.
- 5.26. Beyond proximity to Heathrow, there are many location factors benefitting the firms that are now “embedded” in along the M4 corridor. In terms of a firm’s corporate performance and cost base for the majority of firm’s access to the supply of high skilled labour is much more important than access to an airport. Integration into a diverse knowledge based economy built up over many decades and supported by on-going public expenditure (e.g. HEI and defence) as well as attractive residential environments are all important locational factors.

5.27. Any additional journey time to a new hub would be balanced by the benefits of the improved reliability of the new airport and improved connectivity offering. Contrasting with much anecdotal evidence, the Commission's report provides further evidence of the actual importance of air transport to firms. With AstraZeneca relocating their HQ to Cambridge and Google building their European HQ at King's Cross, there are clearly many other locational factors at work than just proximity to Heathrow airport.

5.28. In reality, the impacts of Heathrow's closure can be expected to vary depending greatly on the characteristics and aspirations of the individual or the firm concerned. Possible scenarios include:

- A firm or worker could leave the area and move to the new hub. It would be attractive for key suppliers to move their operations to a new, larger facility next to a much larger major customer especially given the planning horizons which exceed the timescales for asset investment plans. Many of these firms are already serving airports around London and across the UK. With improved productivity at the new airport, a worker could expect better wages in an area where houses prices are half those currently in Hounslow.
- A worker could commute to the new hub using the surface access that will connect the area to the Isle of Grain in 45 minutes. Clearly, this would depend on propensity to travel and relative wage levels, but airport staff on the whole can be expected to have above average mobility. Currently, there are 840 Heathrow staff who live in Brighton and more than 16,130 staff of the 76,600 total workforce who live in the "Rest of the UK" away from the immediate commuting catchment of the airport in the home counties. The 'Airport Travelcard' scheme could also be extended to allow cheaper travel for existing employees to the new airport.
- A worker could find new employment inside or outside the local

area and a firm could switch to new markets in these areas. Taking just one site, there will be up to 40,000 new jobs at Old Oak Common before 2032 and a further 50,000 jobs thereafter. This is an area that will be just 15 minutes away from the Heathrow labour market via Crossrail. This would be complemented by the additional background growth in the local areas that the modelling shows. London has added on average 50,000 new jobs every year for the last 14 years – so it should take just 18 months to replace total employment at Heathrow.

- A worker could become unemployed or leave the labour force or a firm could close permanently. The timescales are long enough that many of the current staff will have retired or left their current jobs long before closure.

- » *The airport is just one of several factors driving company location – and West London will still be accessible from the hub, in 45 minutes.*
- » *Staff who chose not to commute or relocate could take advantage of other job opportunities: London has added 50,000 jobs every year for the last 14 years, with 90,000 planned for Old Oak Common alone.*
- » *21% of Heathrow staff live outside the wider region and would likely have a similar journey to the new airport.*

AC issue: Social and regeneration impacts of relocating hub from Heathrow to Inner Thames Estuary

5.29. The Mayor's spatial development strategy, the London Plan, identifies London's 'opportunity areas' and 'areas of intensification'. These are the locations in London that have significant capacity for new homes and jobs on a large scale. The areas in east London are generally the largest in size. They account for nearly half of the new jobs and homes earmarked for these areas London-wide.

- 5.30. Recent work undertaken for TfL looked at the potential strategic planning implications of delivering a new ITE airport. It has been demonstrated that it would offer a number of locational advantages, particularly in the context of the redevelopment and regeneration potential on the east side of London. It would help overcome long standing barriers to development and address wider social issues, such as deprivation and unemployment.
- 5.31. With the potential for approximately 380,000 dwellings, the capacity for development in east London and the Thames Gateway is substantial and unprecedented when compared with other areas in London and the South East. The availability of land would be well in excess of that required to meet the direct additional increase in households (35,000 forecast by Oxford Economics³⁰); development capacity could be increased further by the unblocking of additional sites or enabling higher density around new public transport nodes.
- 5.32. The airport would also be located within an area which has a significant proportion of previously developed land. There is very significant capacity at four key sites, namely the Royal Docks, London Riverside, Bexley Riverside and Ebbsfleet, which would benefit not only from the catalytic employment effects of the airport itself, but also as a direct result of improved transport connectivity and greater demand for residential and employment development.
- 5.33. Beyond the local level, development on this scale offers significant national benefits. Overall it is estimated that the construction of every additional 100,000 dwellings in the UK adds 1% to UK GDP (currently worth £14.7 billion).

For further information, see: Technical Note N, The Strategic Planning Case for a New Hub Airport in the Inner Thames Estuary [Atkins]

» *An ITE airport is uniquely placed to unlock the regeneration potential of East London and the Thames Gateway, including 380,000 new dwellings.*

AC issue: New airport changing the economic geography of London

- 5.34. The potential for a new airport to help London address its key and spatial planning challenges should not be underestimated, both in terms of bridging the gap between the different levels of economic activity in London and making best use of existing infrastructure and available land.
- 5.35. When considering a number of key economic indicators, there are clear differences in economic performance between east and west London Boroughs in terms of unemployment rate, skills and availability of workforce, average earnings and jobs density³¹. West London boroughs account for approximately 60% of London's total GVA output – almost double that of the east London Boroughs.
- 5.36. Whilst it is important to maintain the economic strength of west London (which currently hosts a number of multinational company headquarters and other high value employment) there is also a need to ensure that the benefits of London as a global economic hub are spread more widely across the metropolitan area, by encouraging an increase in high value employment across other parts of London.
- 5.37. As a major generator of jobs, a new hub airport within the ITE would have a significant role in helping to address the economic imbalance that currently exists between east and west London areas. It would help deliver employment opportunities that are more closely aligned to available workforce and would encourage the growth of existing and new employment centres in east London in key locations well placed to capitalise on available land supply and which are capable of accommodating higher value employment.

- 5.38. Despite the relocation of Heathrow airport, it is expected that a new hub airport in the ITE would support the expansion of high value employment sectors in the west of London, given its access to the new hub and its other locational strengths. A bigger, better connected airport could even provide even greater support to these sectors than Heathrow. Furthermore, the relocation of lower value airport operations, would have a positive impact on high value employment growth in west London by reducing potential constraints to expansion associated with the overall availability of employment land.

» *An ITE airport could help bridge the GVA gap between east and west London, encouraging new and enhanced employment centres in the east while helping to address land constraints on employment land in the west.*

AC issue: Competition impacts

- 5.39. The ITE proposals envisage closing and relocating the hub airport from Heathrow to the Isle of Grain; no operational impacts are envisaged for other airports in the South East.
- 5.40. It is important to recognise that a hub airport has no perfect substitutes:
- The other London airports are partial competitors, for point-to-point traffic (i.e. to/from the London and Southeast market), but without benefit of significant transfer traffic or premium passenger traffic to support the viability of their routes.
 - Other hub airports, in Europe and elsewhere, are also partial competitors, for transfer traffic – but alongside their own distinct local origin-destination markets.
- 5.41. This means airlines at the hub are primarily competing against other airlines at the hub. So Heathrow's capacity constraints harm

competition, even when capacity exists elsewhere in the London airports system.

New Inner Thames Estuary hub

- 5.42. In the event that a new 4-runway ITE were established, a few routes might switch to the new hub from other London airports; however, such is the growth in the London aviation market that these routes would largely be backfilled.
- 5.43. The main competitive impact of a new hub would be in providing more competition within the hub; Heathrow's constraints serve as an effective barrier to entry, limiting competition at the hub and keeping fares higher than they would otherwise be. With 4 runways, new entrants and routes would significantly increase competition, driving improved service standards and lower fares. As well as benefitting UK passengers, this would also help improve the London hub's competitive position against foreign rivals, attracting more of their valuable transfer traffic.

Heathrow expansion

- 5.44. By contrast, a 3-runway Heathrow would effectively be full shortly after opening, according to figures from the Airports Commission – with little hope for any competition benefits for consumers.

Gatwick expansion

- 5.45. An expansion of Gatwick would do nothing for the competitive dynamic at the hub, which would become even less competitive as demand outstripped supply, forcing prices up further.
- 5.46. Since Gatwick was sold to new owners and undergone a considerable transformation, it has demonstrated its competitive strengths and weaknesses. It has been very successful at attracting traffic from other non-hub airports, notably Stansted, with high profile defections such as Norwegian. But it has singularly failed to be an effective competitor to the hub – even a weakened hub such as Heathrow – attracting just a handful of seasonal and vulnerable spillover frequencies, and airlines

such as Vietnam Airlines who spent a decade trying to gain access to Heathrow before settling for Gatwick. There is little reason to believe that Gatwick, with even more spare capacity, would serve as an attractive alternative to Heathrow carriers – and without this, it cannot offer much needed competition to carriers at the hub.

Freight

- 5.47. Freight operators would also benefit from the competition offered by a 4-runway ITE hub, particularly in allowing access for more freighter operators who are almost completely excluded from Heathrow today.

For further information, see: Technical Note Q, Competition and Airline needs [TfL]

- » *A hub airport has no perfect substitutes – so Heathrow’s capacity constraints harm competition, even when capacity exists elsewhere in the London airports system.*
- » *Therefore providing extra capacity at Gatwick will be limited in its ability to address the weakening of competition at Heathrow.*
- » *A 3-runway Heathrow will effectively be full shortly after opening, dampening competition at the hub.*
- » *Only a 4-runway ITE airport could offer genuine competition at the hub, offering a better deal for the consumer and attracting valuable transfer traffic currently lost to hub airports abroad.*

Socio-economic impacts KEY FINDINGS

- The delivery of a new hub airport in the ITE has the potential to secure long term economic benefits for the UK, London and the South East – supporting up to 388,000 jobs nationally worth £42.3 billion in GVA terms by 2050.
- At the local level, a new ITE hub airport would generate 134,000 net additional jobs worth £16.6 billion in GVA terms and would generate up to 138,000 catalytic jobs across the wider city-region.
- A new hub airport in the ITE would have a positive impact on regional connectivity, generating regional economic benefits of £2.1 billion per annum.
- An new hub airport in the ITE would help secure the long term sustainable growth of London, acting as a catalyst for key development and regeneration areas, as well as releasing additional development capacity around key transport interchanges at redundant airport sites.
- A new hub airport in the ITE could help address the existing economic imbalances between east and west London, helping to support the growth of existing, and development of new employment areas.
- A new ITE hub airport would be the best option for promoting competition between airlines, offering a better deal for consumers and attracting valuable transfer traffic from foreign rivals.

6. Surface access impacts

Commission Study 4

AC issue: New infrastructure required

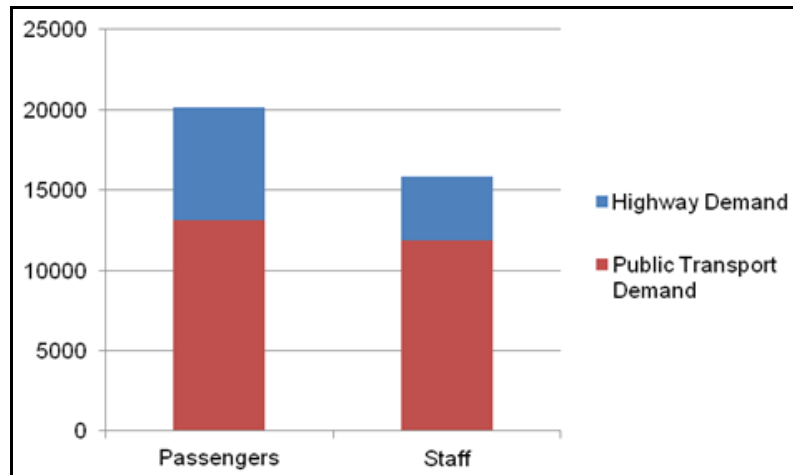
- 6.1. The surface access provision to support any new airport infrastructure has to meet a set of fundamental requirements:
- sufficient capacity;
 - excellent connectivity;
 - attractive and reliable journey times;
 - high public transport mode share;
 - world class level of comfort and service;
 - minimal impact on future non-airport users; and
 - support wider economic and social objectives.
- 6.2. A surface access appraisal of airport capacity expansion must apply a consistent approach to all options being considered. TfL therefore insists that all airport proposals should be evaluated on a 'level playing field' underpinned by the above requirements.
- 6.3. Also essential to airport surface access appraisal is that the full costs (and benefits) whether borne by the taxpayer, developer or by non-airport users experiencing additional congestion, are included. This should be in line with the methodology recommended in the DfT's guidance on transport appraisal best practice (WebTAG).
- 6.4. TfL suggests low, intermediate, high and optimal performing scenarios should be developed and assessed against the requirements for airport

surface access. A low performance may have lower costs – and appear superficially attractive – but will not enable the objectives to be met. An optimal performing scenario will meet the objectives but is likely to have higher costs.

Background Demand

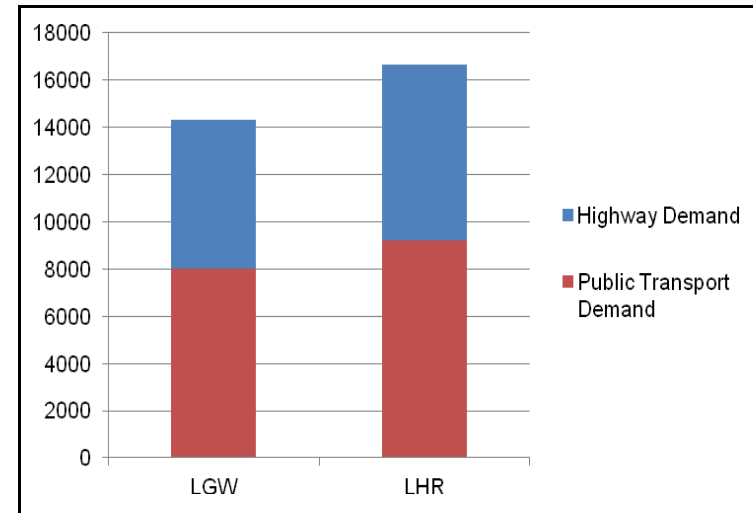
- 6.5. Levels of population and employment in south east England are forecast to continue to grow rapidly over the next two decades. This is predicted to put pressure on already congested road and rail networks. Capacity enhancements such as Crossrail and the Piccadilly Line and Thameslink upgrades are planned to accommodate some of the growth but even these services are forecast to be operating at capacity by 2025-30.
- 6.6. TfL considers it essential that forecast background growth in demand is fully accounted for in the appraisal of airport surface access expansion together with the impact additional airport demand will have on the network.
- 6.7. TfL's core surface access proposition for a 150mppa ITE airport is largely the same as submitted in July 2013 for 180mppa, with a handful of design and cost refinements. This is because we believe any proposal for airport expansion should be able to accommodate the airport's ultimate traffic numbers (as per figure below) together with future background growth. One notable difference is that they include new flight profiling and different patterns of staff travel based on new Heathrow survey data.

Figure 2: Forecast 150mppa ITE 2-way AM peak hour surface access demand



- 6.8. TfL has similarly also considered the potential increase in surface access demand that expansion of Heathrow and Gatwick will generate.
- 6.9. Using the trip forecasting methodology adopted for ITE, it is estimated that Gatwick expansion will generate around 14,500 new trips in the AM peak hour – while the figure for Heathrow expansion is around 16,500. This new traffic will have considerable impact on an already congested transport network. TfL strongly advise the Commission to account for the full cost of the additional congestion – or the enhancement schemes to accommodate this demand – in their appraisal.

Figure 3: Forecast 84mppa Gatwick and 130mppa Heathrow: additional 2-way AM peak hour surface access demand



[TfL estimates]

Low, Intermediate, High and Optimum Appraisal Scenarios

- 6.10. Recognising that there has been a wide divergence of approaches to estimating the surface access costs, TfL have attempted to capture these with four scenarios that entail increasing levels of new infrastructure. The principles are set out in the table below.

Table 4: Low, Intermediate, High and Optimal performance appraisal scenarios

Scenario	Assumptions	Performance
Low	A 'bare minimum' approach to surface access provision and costs. Strategy simply provides access to existing network and assumes additional airport demand can be absorbed on the existing and committed network.	<ul style="list-style-type: none"> - Severe negative impacts on existing and future non-airport users of the network. - Severe congestion at peak times and very low network resilience. - Often unworkable. - Few new rail connections or improvements in journey time to key destinations. - Will not deliver sustainable mode share.
Intermediate	Approach enhances the rail and highway network in line with increase in demand, and an effort is made to meet fundamental requirements.	<ul style="list-style-type: none"> - Workable surface access provision, albeit with significant compromise on fundamental requirements (described in para 6.1). - Will require further investment to accommodate future growth in airport-related and background demand and to achieve a sustainable mode share.
High	Fundamental requirements and the Commission's surface access objectives can be met satisfactorily, with some degree of compromise. The costs of all schemes required to do this are included.	<ul style="list-style-type: none"> - Proposition is able to accommodate growth in airport and background demand up to 2050 - Compromise on fundamental requirements will occur. - Sustainable mode share can be maximised and achieved
Optimal	Appraisal fully meets Mayoral and AC objectives, with further network enhancements that benefit both airport and non-airport users of London's transport network.	<ul style="list-style-type: none"> - Maximises quality and journey experience for airport-related travel - World class connectivity, journey times and sustainable mode share - Substantial benefits also delivered for non-airport users, while maximising regeneration and wider policy objectives

6.11. Using the assumption that all costs, whether borne by the taxpayer, developer or user of the transport network are accounted for in a robust appraisal, costs for low, intermediate, high and optimal scenarios can be estimated. The table below shows TfL's cost estimates for these scenarios.

6.12. The allocation of schemes to scenario levels is underpinned by the demand assessment of airport and background demand and measured against the objectives set out in section 6.1 above. A full list of the schemes envisaged under each scenario is set out in the corresponding technical note.

Table 5: Low, Intermediate, High and Optimal performance appraisal scenarios

Design Appraisal Scenario: Costs [£bn]							
Low		Intermediate		High		Optimal	
HEATHROW*							
Highway	-	Highway	3.2	Highway	4.3	Highway	4.3
Rail	-	Rail	1.4	Rail	2.7	Rail	13.3
TOTAL	2.1	TOTAL	4.6	TOTAL	7.0	TOTAL	17.6
GATWICK							
Highway	-	Highway	1.6	Highway	2.0	Highway	2.4
Rail	-	Rail	1.3	Rail	9.7	Rail	10.0
TOTAL	0.4	TOTAL	2.9	TOTAL	11.6	TOTAL	12.4
INNER THAMES ESTUARY							
Highway	1.0	Highway	2.5	Highway	4.0	Highway	4.0
Rail	1.5	Rail	4.2	Rail	6.9	Rail	15.0
TOTAL	2.5	TOTAL	6.8	TOTAL	10.9	TOTAL	19.1

* for the purposes of this analysis we have assumed that a new runway at Heathrow, whether as per Heathrow Ltd's north west runway plans or as per Heathrow hubs end-to-end runway plans, will generate a similar requirement on the surface access network.

6.13. When appraising the surface access provision required for all schemes, it

is essential that a comparable scenario is applied.

- 6.14. Heathrow's and Gatwick's most recently published surface access proposals³² equate to the 'low' scenarios. We have added the costs that the airports have said that they will pay, as well as the costs that they are looking for Government to pay, to calculate these figures. A breakdown of highway and rail costs has not been possible to ascertain.
- 6.15. Foster+Partners' proposal is broadly comparable to the ITE 'intermediate' scenario. TfL's July 2013 'Isle of Grain' submission is in line with the 'optimal' scenario, albeit the total cost we now forecast for this level of provision is significantly less than it was in July 2013, as a result of a re-evaluation of the local rail and road connections required [In July 2013, a surface access cost figure of £25.8bn was reported. We now believe that the infrastructure could be delivered for a figure of less than £20bn, including risk and optimism bias].
- 6.16. A workable surface access proposition for an ITE airport on opening day could be delivered for around £6-10bn (as defined in the intermediate and high scenarios). It must be understood however, that this level of investment will lead to significant and wide-ranging compromises having to be made on a number of the fundamental requirements described at the beginning of this chapter. In particular, public transport connectivity to some key catchment areas would be compromised, and we would expect to see high levels of crowding on key rail services, with a large number of airport passengers having to stand.

ITE surface access plans – an 'optimal' strategy

- 6.17. It is TfL's aspiration to deliver an 'optimal' strategy which can meet and exceed Mayoral and Commission objectives, ensuring sustainable airport access whilst also delivering long term benefits to non-airport users and enabling regeneration.
- 6.18. It is possible the Commission might also consider a phasing approach, that, for example, focused on the 'intermediate' or 'high' scenarios for

opening, with full build out to 'optimal' as the airport grows. Set out below are the key components of the 'optimal' ITE surface access strategy.

- 6.19. The proposed ITE rail strategy integrates existing and planned infrastructure to maximise airport connectivity across London and the UK. It also delivers significant benefits to non-airport users. The components are described below.

Table 6: A new hub airport at the ITE – 'optimal' scenario. The rail connections

Rail strategy component	Connectivity impact
Central London Airport Express	High speed connectivity to key London destinations - Waterloo (28mins) Riverside (14mins), Canary Wharf (20mins) and London Bridge (24mins)
HS1-HS2 link	Direct high speed connections to St Pancras, Old Oak Common (29 minutes) and onward connectivity via HS2 to Birmingham and the North
Crossrail extension	Extensions from Abbey Wood via Dartford and Gravesend to provide an additional rail alternative to/from Central London
Local rail connections	Connections to South Essex (via the Thames Crossing), North Kent and South East London, including radically enhanced connectivity to growth and regeneration areas such as City and Fringe, Riverside and Thames Gateway

- 6.20. A phased enhancement of the highway network has been assumed to accommodate the needs generated by the airport's construction and growth. The interventions proposed are described below.

Table 7: A new hub airport at the ITE – ‘optimal’ scenario. The road connections

Road strategy component	Purpose
Airport access roads	New access roads and widening of existing roads, to provide efficient access, with two links to provide resilience
Lower Thames Crossing (LTC)	Building on existing proposals for LTC (Option C) to ensure sufficient capacity for peak airport demand.
Capacity enhancements to the M25 and the A2	Widening and enhancement to mitigate against delay and congestion for airport and non-airport users.

For further information, see: Technical Note R, Surface Access [Atkins] and Technical Note S, Surface access scenarios: Cost Appraisal [TfL]

- » Airport surface access must meet key requirements with regards to capacity, connectivity, service, sustainability, background demand, and wider socio-economic benefits.
- » In comparing airport surface access proposals, it is essential that performance against key objectives and appraisal methodology should be aligned. A ‘high’ performing scenario cannot be compared to a ‘low’.

AC issue: Surface access construction costs

6.21. The costs of TfL’s ‘optimal network proposition are as follows:

Table 8: Summary of surface access costs for an ITE airport

£bn, 2014 prices	TOTAL
Airport rail links	8.6
Airport road links	2.7
Total investment, excl risk	11.3
Allowance for risk	7.8
Total investment	19.1

For further information, please see Technical Note S, Surface access scenarios: Cost Appraisal [TfL]

- » An ‘optimal’ surface access solution for a new ITE airport will fully meet the Commission’s objectives and the fundamental surface access requirements. It would cost less than £20bn, including risk. This is comparable to the costs of delivering ‘optimal’ surface access solutions at Heathrow and Gatwick.
- » The costs of lesser performing surface access solutions are also comparable between a new ITE airport, and new runways at Heathrow and Gatwick.

AC issue: Implications for current infrastructure

AC issue: Resilience of links with non-airport demand growth

AC issue: Implications at London’s rail termini

AC issue: New infrastructure in context of other major schemes

- 6.22. TfL’s optimal surface access proposition takes into account the full extent of future background transport demand as well as the demand from the new airport. The proposition has been designed to have no impacts on non-airport related network users, as well as maximising and

creating additional benefits for all future network users. All costs of this proposition have been included in our long-term, 'optimal' appraisal which we are confident will generate a wide range of wider benefits.

- 6.23. Wider benefits include major crowding relief on the Jubilee Line between Waterloo and Canary Wharf and the creation of a new link between East London/Riverside to Canary Wharf through to SW London, substantially reducing journey times. Furthermore, the proposition includes improving rail links from between Central London and Dartford, Ebbsfleet, Gravesend and the Medway towns through the Crossrail extension and enhancement of local services.
- 6.24. The proposal is also designed to have several different road and rail connections to maximise resilience should some connections be lost, with four rail corridors linking the airport with central London and two alternative road access routes.
- 6.25. TfL's research shows sufficient train paths and platforms are available in the future to accommodate its ITE surface access proposition, including on Crossrail, HS1, HS2 and at St. Pancras.
- 6.26. The ITE proposition is designed to fit and not conflict with planned new infrastructure such as Crossrail 1, HS2 and the Lower Thames Crossing. Any impact on these schemes and where enhancements are required have been fully costed in our 'optimal' scenario.

» *The optimal ITE surface access proposition can be accommodated alongside existing and planned infrastructure without adverse impacts to other services. Lesser performing scenarios will have impacts, which will vary in their severity.*

AC issue: Travel times for airport users

- 6.27. The table below sets out the population within a one hour journey time

of the airport. Airports Commission Interim Report estimates are presented, as are the figures submitted by scheme promoters in July 2013.

- 6.28. It is striking to note that the three airports have broadly similar catchments (13-16m).

Table 9: Comparison of airport accessibility within 1hr travel time

Airport	Number of People within 1 hour from Airport (Public Transport and Highway)	
	Airports Commission's figure	July 2013 submissions
ITE	13m	10.7m [PT only]
Heathrow	16m	11.75m [current]
Gatwick	14m	approx. 15m [current]

[ITE figure is from TfL July submission]

- 6.29. It is important to understand what surface access network assumptions have been made. The Airports Commission figure includes a spur from HS2 to Heathrow, but not the HS2-HS1 link. Neither scheme is currently part of the current HS2 bill. For the analysis undertaken, both schemes should either be included, or both excluded.
- 6.30. These catchment areas are predicated on a substantial surface access intervention to ensure the airports have fast, direct routes to the key locations which do not impinge on – and are not crowded out by – non-airport services and passengers.
- 6.31. It should also be noted however, that the figures presented here rely on a current population distribution. London's geography is changing, with a steady shift eastwards; in the event of a new ITE Airport, a greater rate of population and employment growth in areas with high accessibility to the new airport location could be expected.
- 6.32. For other parts of the UK, HS2 will have an important role to play: when

direct rail access is provided to HS2, all options have the potential to provide access to several UK regions, with reasonable journey times.

» *The size of the catchment within one hour of a new ITE hub airport is broadly comparable to that of Heathrow and Gatwick.*

AC issue: Wider benefits for region of surface access investment

AC issue: Meeting wider demand from developments associated with airport

6.33. It is widely acknowledged that properly planned rail schemes can deliver very significant economic and social benefits over and above journey time savings and crowding relief. It is also acknowledged that it is hard to capture and monetise these benefits in order to compare with costs of construction. However, methods of estimating these wider economic benefits (WEBs) have been advanced and applied to recent rail schemes.

6.34. TfL's ITE surface access proposition is designed to maximise wider economic and agglomeration benefits whilst unlocking regeneration with the following initiatives:

- High-speed Riverside to Waterloo link will deliver benefits at least of a similar magnitude to Crossrail. Initial modelling tests have shown it delivers large crowding and journey time benefits³³ and, due to its alignment from East to West London via Canary Wharf and London Bridge, is likely to achieve similar regeneration, economic and agglomeration benefits;
- Crossrail extension and local rail improvements linking Central London to Dartford, Ebbsfleet the Medway towns will promote economic activity over and above that from the ITE airport;
- New and enhanced local rail connections between East London, South Essex and North Kent will create new links between large

population and employment centres;

- ITE's rail proposition is designed to connect specific urban growth and regeneration areas associated with the airport including the Medway Towns, Ebbsfleet and Barking Riverside.

6.35. A review of the benefits, not just the costs, of all major airport related transport proposals should be undertaken as part of a 'level playing field' appraisal. This includes schemes such as Western Rail Access to Heathrow, a Heathrow Southern Rail Link and the high-speed links to Central London necessary for Gatwick and Heathrow to achieve a 'high' or 'optimum' level of performance against surface access objectives.

» *The ITE surface access proposition is designed to maximise economic and social benefits delivering new connections that unlock the regeneration potential of the area*

» *The Commission should consider the benefits as well as the costs of airport surface access proposals*

AC: Funding surface access infrastructure

6.36. TfL's assumption is that airport surface access proposals will be individually appraised using DfT guidance to assess their viability. Following a successful completion of this, funding mechanisms currently used for similar schemes can be sought: local and Central Government funding, contributions from developers and using other mechanisms like the Community Infrastructure Levy (CIL).

6.37. In applying this process, the full costs of all surface access schemes that are required to support airport expansion, whether borne by taxpayer, developer or by non-airport users experiencing additional congestion, should be included in the assessment. A subsequent judgement about the potential proportion of the scheme (in terms of demand and costs)

that airport-related activity is responsible should then be made.

- » *A number of potential funding mechanisms are available, which have been used for other road and rail schemes.*
- » *The full costs of all surface access schemes required should be included in any assessment.*

AC issue: Impact of surface access links on protected sites and habitats

- 6.38. At this stage of design it is difficult to accurately predict the site specific impacts on designated sites as the detailed design would seek, where possible, to avoid direct impacts on such areas, in line with the National Planning Policy Framework and the draft National Policy Statement for National Road and Rail Networks.
- 6.39. Baseline information covering the proposed surface access corridors and designated sites has been obtained, and likely potential impacts, at a generic level, identified. Any potential direct and indirect impacts would need due consideration and assessment as part of any future Habitats Regulations Assessment, and appropriate mitigation/compensatory measures identified to ensure the overall integrity of the network of sites is maintained.

For further information, see: Technical Note E, Ecology Desk Study Part A: Designated Sites [Atkins]

- » *High level environmental impact assessment of the ITE airport surface assess proposal uncovered no major concerns.*
- » *The surface access unit costs are based on scheme outturn costs and as such make allowance for likely environmental mitigation costs; this should be subject to detailed investigation as part of the next phase.*

AC issue: Local environmental impacts of surface access links

- 6.40. All new surface access infrastructure, and the scheduling and routing of services will be designed so as to avoid noise-sensitive locations where possible. Every effort will be made to avoid or limiting noise and impacts along the route.
- Rail: Operational noise will be reduced at source through the design and specification of the trains and track, ensuring the railway is as low as possible where practicable and avoids sharp bends. Noise barriers in the form of bunds, screening and landscaping will also be incorporated where appropriate along the route to attenuate noise.
 - Road: New highway links will be designed to incorporate noise reducing technologies such as low noise road surfacing. Noise barriers will also be constructed along the route where necessary to protect nearby receptors.
- 6.41. Insulation will be offered to qualifying homes and other noise sensitive buildings, such as schools. Insulation measures, for example double glazing and second doors, will help to reduce or avoid the impacts of any increase in noise.
- 6.42. During construction of the surface access links, screening along the edge of the worksites, the use of quiet and low-vibration equipment and restricted working hours will be employed. Where required, noise insulation or temporary relocation for qualifying residents will avoid significant adverse effects in terms of indoor noise levels from the construction activity.

- » *Established mitigation measures will be implemented to ensure the local environmental impacts of surface access links will be minimised.*

Surface access impacts
KEY FINDINGS

- A full assessment of the impact of surface access demand for any airport expansion scheme should be undertaken.
- The same appraisal methodology should be applied to all airport expansion options and measured against Mayoral and the Airport Commission's objectives for surface access.
- The full cost of any new surface access scheme that enables airport expansion must be included in that airport's transport appraisal, whether ultimately borne by the taxpayer or developer.
- A workable surface access proposition for an ITE airport on opening day could be delivered for around £6-10bn. It must be understood however, that this level of investment will lead to significant and wide-ranging compromises having to be made on a number of fundamental surface access network requirements.
- Given the wider benefits of the surface access arrangements with regards to supporting strategic growth locations along the Thames Gateway area, it is reasonable to assume that additional public sector funding would be available.

Key issues the Commission must also address which are not included in the ITE feasibility study scope

7. Environmental: Noise and public health impacts

Population exposed to aircraft noise

- 7.1. A new hub airport on the Isle of Grain accommodating 180 million passengers per year, on around 1 million air traffic movements would expose 31,500 people to noise in excess of 55dB L_{den} ³⁴. This would represent more than doubling the size of the UK's hub airport, yet achieving a reduction of more than 95% in the number of people that are exposed to excess levels of aviation noise (versus Heathrow today, which exposes 725,100³⁵ people to noise levels of 55dB L_{den}). This would be fully compatible with the Government's Aviation Framework Policy objective, and the Commission's noise objective – to minimise and where possible reduce aviation noise impacts.
- 7.2. 55dB L_{den} is a far better indicator of noise impacts than 57dB L_{Aeq} because:
- it is the noise intensity level which the World Health Organisation (WHO) believes is a fair approximation to represent the onset of annoyance from exposure to noise
 - An L_{den} measure averages noise exposure over the day evening and night periods, acknowledging the increased sensitivity of people to exposure during the evening and the night. An L_{Aeq} measure only averages over a daytime period with no evening and night weightings.
 - 55dB L_{den} is the measure that the European Commission ask

member states' airports to report the number of people exposed to.

- 7.3. It is noted that 55dB L_{den} is one of a number of metrics that the Airports Commission have said they will assess their shortlisted schemes against. It should also be noted that the impacts of aviation noise are felt far beyond the boundaries of Heathrow's 55dB L_{den} contour. The Mayor regularly receives complaints from people outside of this area.

» A new ITE airport would allow for a doubling of hub capacity while cutting the number of people exposed to aircraft noise by over 95%.

Population exposed to aircraft noise: comparison with Heathrow

- 7.4. To ensure informed comparison, TfL have commissioned detailed noise modelling on a third runway to the north west of Heathrow. The following assumptions have been used:
- 2050 demand and traffic mix;
 - new runway fully utilised (740,000 ATMs);
 - realistic fleet mix assumptions³⁶ (in line with recent orders);
 - runway thresholds displaced 300m west from current;
 - westerly preference retained;
 - 3.2 degree approach glide slope;
 - operating hours as today (no additional movements in the night quota period 23:30 to 06:00).
- 7.5. These differ from Heathrow's own modelling, in part a result of very optimistic assumptions about new technology: both in terms of the rate of technological progress (in the face of a slowing in noise improvements over the last decade) – and the rate of fleet replacement.
- 7.6. But perhaps most contentious, it would appear that Heathrow's

modelling has assumed just 570,000 ATMs annually – effectively the third runway operating less than a third full. This is clearly not tenable if one is seeking to assess the full noise impacts of an additional runway. Based on these highly questionable assumptions, Heathrow concluded a third runway would lead to a reduction in noise exposure.

- 7.7. The modelling undertaken for this submission shows that with a third runway to the north west of the site, **Heathrow would expose 1,097,200 people to aviation noise above 55dB_{Lden}**. This is an increase of 372,100³⁷ people on today. New areas which would fall within the 55dB_{Lden} contour include Chiswick, Hammersmith, Chelsea, Pimlico, Kennington, Camberwell, Peckham, New Cross and Deptford.
- 7.8. It is worth noting that this figure does not account for the significant population growth expected in these areas. It derives from placing the contour over a 2012 population base. Current Greater London Authority (GLA) population growth projections for London are for a 20% increase by 2030, and a 36% increase to 2050,
- 7.9. The maps below set out the noise contour profile for a 3-runway Heathrow and how it compares (at 55dB_{Lden}) to Heathrow today.

For further information, see: Technical Note T, Aviation Noise Modelling: Heathrow options [CAA ERCD]

Figure 4: Noise contours (db Lden) for a 3-Runway Heathrow (NW) 2050

[740k ATMs]

[Westerly Preference assumed]

[2012 Population base – conservative population estimate]

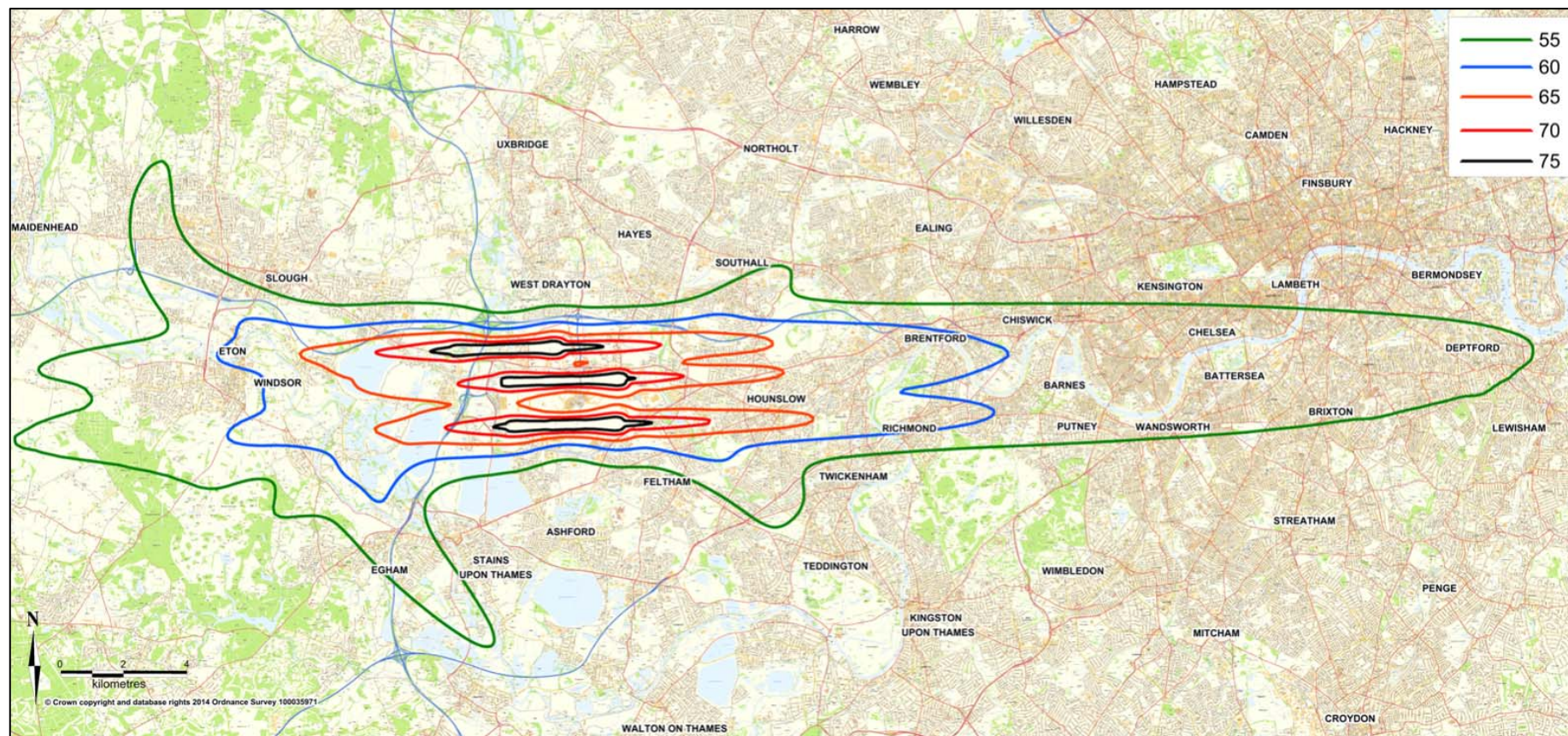
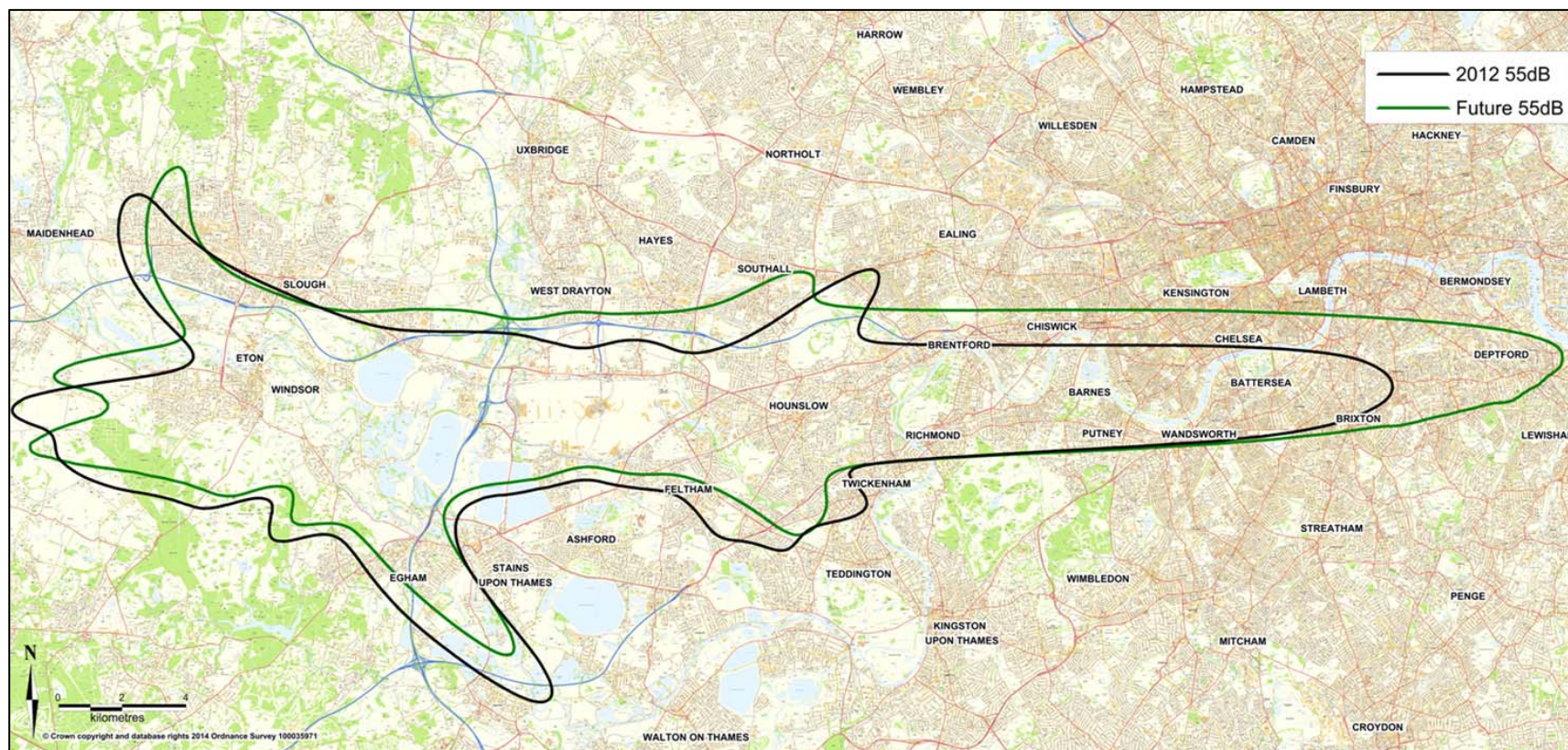


Figure 5: Comparison of 2012 (two-runway airport) and 2050 (third runway north west) noise contours



- » *A 3-runway Heathrow would expose over 1.1 million people to noise above 55db_{Lden}, an increase of 50% on today.*
- » *Heathrow's own modelling is based on highly questionable assumptions, including a third runway operating less than a third full.*

Mixed mode and the impact on respite

- 7.10. One of the few aspects of the current noise regime at Heathrow that affords local residents any relief from aircraft noise are the periods of respite that are secured by operating the airport in 'segregated alternate mode'. With one runway used for departures and the other for arrivals before being switched round at 3pm, this gives local residents half a day without aircraft overhead.
- 7.11. However, Heathrow Airport have made clear that their three runway proposals would require at least one runway to operate in mixed mode at all times. For the majority of affected residents, that will mean just 4½ hours of respite a day within operating hours – half the respite offered to local communities today. For many that will mean facing over 13 hours of constant aircraft noise.
- 7.12. This arrangement means there will constantly be two streams of traffic landing (usually over London) and two streams departing at all times. It is highly likely that, given the proximity of the runways, even those nominally in a respite phase will be disturbed by one of the four streams of aircraft approaching or leaving Heathrow.

- » *Heathrow Airport's proposals for a third runway mean the introduction of mixed mode, severely eroding respite from noise for local people.*
- » *For the majority of affected residents, that will mean just 4½ hours of respite a day – half the respite offered to local communities today.*

Increasing numbers of flights

- 7.13. Noise is presented on contour maps as average noise over a year. However, aircraft noise is not experienced in an average manner. It often has 'flood' or 'famine' qualities. This is particularly relevant in light of new technology enabling aircraft to keep to more specific routes or 'tracks' in the sky, and current moves to encourage aircraft to do this. There will be periods where the intensity is very high. This also means that people who are overflowed some of the time and are potentially exposed to significant noise event levels intermittently will not appear within the contours.
- 7.14. Upon reviewing the ANASE 2007 Study, the Chief Economist noted that the study provided evidence to suggest that people may be more concerned about the numbers of aircraft (and slightly less concerned about the sound level of an individual aircraft) than the present L_{Aeq} indicator assumes³⁸. He concluded that there should be further work done on numbers and aircraft and noise. This issue was also discussed at length at the Heathrow Terminal 5 public inquiry³⁹.
- 7.15. Heathrow admit that 'whilst the noise created by individual aircraft has fallen, many people are now concerned about the increased numbers of aircraft and the routes they fly'⁴⁰.
- 7.16. Research around aircraft noise impacts is increasingly focusing on the high numbers of noise events. Many people believe that an increase in the numbers of aircraft events would be far more noticeable than a dB change in the average sound levels assumed by L_{Aeq} type metrics and might significantly contribute to annoyance^{41, 42}.
- 7.17. The Heathrow night noise respite trial (November 2012 – March 2013) enabled 1,211,600 people within and outside of the trial zones to receive 'a degree of respite', 597,900 people were overflowed more during the trial. Heathrow is surrounded by such a large number of people that the application of concentration or dispersal of noise will still either expose a

lot of people to an awful lot of noise (concentration), or an awful lot of people to a lot of noise (dispersal). Both are unacceptable.

7.18. 'A level of volume which may be tolerable in isolation, may become intolerable when it is recurrent – a similar effect to a dripping tap⁴³'. This quote, taken from the Senate Select Committee on Aircraft Noise in Sydney after the implementation of a third runway at Sydney Airport (1994), reveals local attitudes to increased flights over the city.

7.19. Alternative noise metrics have been developed that capture the frequency of noise occurrences as experienced by local communities. The 'Number above' contours describe the number of noise events (N) exceeding an outdoor maximum noise level:

- N70 – 70 dBA L_{max} based on an average summer's 16-hour day;
- N60 – 60 dBA L_{max} based on an average summer's 8-hour night.

At Heathrow today, more than 340,000 people experience more than 20 noise events exceeding 70dBA during the day (N70).

» *Local communities are increasingly concerned by the number of aircraft noise events.*

Impact of rescinding Westerly preference

7.20. In its Interim Report, the Commission supports introducing a 'no preference policy' to replace the current westerly preference arrangement to takeoffs. It claims aircraft technology has improved over time and takeoffs are no longer significantly louder than arrivals. TfL's modelling shows that removing the westerly preference would increase the population impacted by noise. It would expose 60,000 more people to more than 20 occurrences of N70 per day.

Table 10: People exposed to more than 20 occurrences of N70 per day

Airport Scenario	Westerly preference (77% westerly operations)	No westerly preference (67% westerly operations)
Heathrow 2-runway [today] 480,000 ATMs	345,300	406,000

» *Ending Westerly preference at Heathrow means an additional 60,000 people experiencing more than 20 noise events exceeding 70 dbA outdoors during the day (N70).*

Night Noise impacts

7.21. The greatest proportionate increase in impact of a third runway at Heathrow will be those who are exposed to noise during the night. TfL forecast one million people to experience more than 25 occurrences of N60 over the 8 hour night period (11pm-7am). This equates to a fourfold increase on today's figures.

7.22. Heathrow state they have strict limits on operations between 11pm and 6am which would not change if the airport is expanded. But this is only part of the night noise period set out in WHO guidelines and the EU Environmental Noise Directive⁴⁴. Even this, less thorough, limit is currently breached almost every day due to delayed flights arriving beyond 11pm. TfL has modelled realistic assumptions accounting for inevitable delays beyond 11pm.

Table 11: Exposure to night noise at Heathrow and ITE

Airport Scenario	Population 48dB 8Hr Night LAeq	Population > 25 occurrences N60 8 hour Night
Heathrow 2-runway [today]	368,800	228,000

480,000 ATMs		
Heathrow 3-runway [today+NW] 740,000 ATMs	782,500	971,000
Isle of Grain 4-runway 1 million ATMs ⁴⁵	1,600	Not available

- 7.23. It is noted that the Commission's Interim Report recommended 'smoothing' early morning flights, resulting in a potential increase in movements between 5 and 6am. This has not been incorporated into the modelling – though it would likely further worsen the impact of night noise on Londoners. Ninety per cent of people are sleeping at 06:00 and around two thirds are still asleep at 07:00 – to encroach even further into this night period would deny Londoners their right to a good night's sleep⁴⁶.

Gatwick

- 7.24. The proposals for a new runway at Gatwick at first glance expose fewer people to noise; but by leaving Heathrow operating as currently, Gatwick expansion ensures that the severe noise impacts at Heathrow are not addressed.

» *With a 3-runway Heathrow, four times as many people will experience more than 25 noise events exceeding 60 dbA outdoors during the night (N60) compared to today – almost a million people in total.*

Public health impacts of aviation noise

- 7.25. The Noise Policy Statement for England states that 'noise exposure can cause annoyance and sleep disturbance both of which impact on quality of life. It is also agreed by many experts that annoyance and sleep disturbance can give rise to adverse health effects'⁴⁷.
- 7.26. The stress associated with long term noise exposure can lead to long

term health effects such as hypertension, acute myocardial infarctions, strokes and dementia⁴⁸. The World Health Organisation⁴⁹ and other recent UK⁵⁰, US⁵¹ and European⁵² studies have outlined a link between cardiovascular disorders and exposure to aircraft noise. The risk of stroke, coronary heart disease and other cardiovascular disease increases by to 10-20% in areas plagued by aircraft noise⁵³.

- 7.27. The Mayor believes the growing evidence points to a causal link and that further research should be conducted. The Mayor is particularly concerned about recent evidence which links noise to significantly reduced reading comprehension and memory recall in school children. A five decibel increase in exposure to school-age children was seen to correspond to a two month delay in reading age among UK pupils⁵⁴.
- 7.28. Any increase in noise from increased flights at Heathrow flies in the face of the Noise Policy Statement for England⁵⁵: 'Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development'.
- 7.29. Noise exposure at night results in sleep disturbance, which leads to reduced work output and quality⁵⁶. Studies have found that aircraft noise can increase the time taken to fall asleep⁵⁷ and that during the hours of 04:00 and 07:00, sleepers keeping conventional hours are both more easily awakened by ambient noise, and have more difficulty going back to sleep. This is because the noise threshold for awakening is lower in shallow sleep than in deep sleep⁵⁸.
- 7.30. Consideration of the impacts on health, wellbeing and productivity should be taken into account by the Airports Commission to protect the health of hundreds of thousands of Londoners who are impacted by Heathrow's aviation noise over 55dB Lden⁵⁹.
- 7.31. By contrast, a new hub airport to the east of London, away from populated areas, will transform the health and well-being of the hundreds of thousands of Londoners who are exposed to the adverse

impacts of aviation noise – while growing London’s connectivity and supporting its position in the global economy.

- » *Evidence is mounting for the serious public health impacts of aviation noise, which can include an up to 20% increased risk of stroke and cardiovascular disease for those exposed to very high levels.*
- » *a five decibel increase in aviation noise exposure to school-age children has been observed to correspond to a two month delay in reading age.*

Environmental: Noise and public health impacts KEY FINDINGS

- The evidence of the link between aviation noise and public health is mounting and clear links are emerging between aircraft noise, public health and wider child development issues within London.
- Building a new hub airport in the ITE would result in a decrease of more than 95% in the number of people exposed to aviation noise above 55dB Lden.
- A 3-runway Heathrow would expose over a million people to noise above 55db Lden – over 50% more than today.
- Heathrow Airport’s expansion proposals mean the introduction of mixed mode on one runway, severely eroding respite from noise for local people to just 4½ hours a day for the majority of affected people.
- With a third runway at the number of people who experience more than 25 noise events exceeding 60 dbA outdoors during the night (N60) will increase fourfold – to nearly one million.
- Given significant variation in the noise exposure figures released by different stakeholders, it is imperative that the Commission undertake a consistent and transparent approach to noise assessment as part of the next phase.

8. Demand, capacity and connectivity

Runway utilisation

- 8.1. Runway utilisation is a vital metric for the effective operation of an airport. International best practice – including London’s rival European hub airports – is for average runway utilisation of 70-75% and is also in line with IATA industry guidelines for 70%⁶⁰.
- 8.2. When runway utilisation exceeds this level, resilience is substantially eroded as the airport has less slack to recover from periods of minor and major disruption. As a result delays become more commonplace and increased use of stacking is required, resulting in increased emissions.
- 8.3. When average runway utilisation is above 75% average over the traffic day, slots are generally pretty scarce during peak periods. This constrains the abilities of airlines to operate routes at the times they need – in certain cases fundamentally undermining their viability. These constraints also limit the airport’s potential to operate as an effective hub, normally underpinned by waves of incoming and outgoing flights, optimising transfer options – as such, the very attractiveness of the hub, to transfer passengers, is undermined.
- 8.4. Heathrow airport today operates at over 95% runway capacity and suffers acutely in terms of resilience and lack of slots; a solution for new airport capacity must address this.

Implications for scenarios

- 8.5. Even based on the lower demand forecasts the Commission has adopted, the Interim Report identified that a three runway Heathrow would be at 80-90% runway utilisation shortly after opening, in 2030. This means the airport will be effectively be full, with significant impacts on resilience and slot availability, particularly during peak periods. All the problems associated with constrained airport capacity at Heathrow today

would remain.

- 8.6. Of the options being considered, only a 4-runway hub airport would have sufficient capacity for runway utilisation to remain below 75%, ensuring effective operation, with strong resilience, few delays and availability of slots supporting an optimised and attractive hub.

For further information, see: Technical Note U, Runway utilisation [Atkins]

- » *Runway utilisation of 70-75%, in line with international best practice, can ensure an airport is resilient and optimised for transfers.*
- » *The Airports Commission identify that a 3-runway Heathrow will have 80-90% runway utilisation shortly after opening – leaving it prone to severe problems of resilience and slot availability.*
- » *Only a new 4-runway ITE hub has the capacity to maintain runway utilisation below 75% and operate effectively, with minimal delays.*

Credibility of demand and capacity assumptions

- 8.7. A new hub airport in the ITE offers the scale of new capacity necessary for London and which is much greater than that on offer from the shortlisted schemes. Work undertaken by Atkins has identified that four fully independent runways could accommodate a million annual air traffic movements each year – an increase of 520,000 movements over Heathrow today. Crucially, not only could a much greater number of movements be accommodated at a new hub than by single new runways elsewhere, but the new airport would be far more efficient and resilient. It would operate at a much lower level of utilisation and enable far more operational flexibility.
- 8.8. The Airports Commission’s demand forecasts show that demand at

Heathrow will exceed 130million passengers per annum (the absolute maximum capacity the Commission identify for a three runway Heathrow) by 2037. A third runway would be full soon after opening, and the Commission must be looking further ahead. The Mayor's emerging Infrastructure Plan is looking to 2050 for example. The benefits of any airport investment will only be maximised if the Commission look to the long-term future too.

8.9. In any case, it is questionable whether a three runway Heathrow can satisfactorily accommodate 130mppa. Three runways will mean that one runway will have to operate in mixed mode at any one time to ensure an even balance of arrivals and departures. But mixed mode on any runway at Heathrow will have a profound negative impact, and operating constraints could be necessitated. Additionally, Atkins observes that the Northwest runway scheme currently proposed appears to make insufficient stand provision.

8.10. As the Commission define and assess options, it needs to take careful account of the capacity of the many different airport infrastructure components – runways, taxiways, stands, terminals, and airspace – and it must begin to distinguish the far greater capacity increment a new hub airport offers.

For further information, see: Technical Note V, Hub Airport Capacity [Atkins]

- » *It is essential that a timeframe beyond 2030 is considered. Only a new ITE hub airport is able to meet the capacity requirements in the long term.*
- » *In assessing capacity, careful account must be taken of all the components: taxiways, stands, terminals, and airspace – as well as runways.*

Global connectivity

8.11. Work undertaken by York Aviation for TfL⁶¹ last year set out to understand the connectivity impacts of different capacity scenarios. The key findings are set out in the table below.

Table 12: London Airports System – Destinations under various scenarios

	2013	2050	2050	2050	2050
	Existing	Do Nothing	2-Runway Gatwick*	3-Runway Heathrow	4-Runway ITE hub
Shorthaul	270	220	240	224	247
Longhaul	115	110	117	126	191
Worldwide	385	330	357	350	438

[*2 runway Gatwick scenario also included 2nd runway at Stansted]

- 8.12. Because a 3-runway Heathrow will remain constrained, the ability of airlines to obtain the slots to launch new routes is heavily curtailed – and this is reflected in the relatively weak longhaul connectivity for London.
- 8.13. By contrast, a unconstrained 4-runway hub which can support new routes and frequencies and as such is able to offer London 50% more longhaul destinations – and more than double the number of UK cities directly connected to the hub.
- 8.14. Gatwick's inability to compete effectively with Heathrow for hub traffic – both now and were it to have a second runway – limits its connectivity potential and, even together with a second runway at Stansted (as was modelled), would offer very little improvement in longhaul connectivity.
- 8.15. These connectivity findings are critical to the airports debate because they underpin the very purpose of what the Commission is seeking to achieve with the provision of new capacity. If an option for new airport capacity is shown unable to resolve today's hub capacity constraints and deliver the global connectivity that the UK economy needs, then it serves no useful purpose and does not merit further consideration.

- » *Only a new 4-runway hub airport can provide the connectivity to meet the needs of the UK. It would enable 191 longhaul destinations served from London, 50% more than a 3-runway Heathrow would ensure.*
- » *Nor does an expanded Gatwick, unable to compete with Heathrow for hub traffic, have the potential to offer the connectivity required.*

Demand and connectivity
KEY FINDINGS

- International best practice is for runway utilisation at 70-75%; this can be achieved with a 4-runway airport, ensuring resilience and efficient, hub-focused operations.
- A 3-runway Heathrow, operating at up to 90% capacity in 2030, would effectively be full, suffering from poor resilience and slot availability.
- A new hub airport would achieve superior global connectivity, ensuring London was connected to 191 longhaul destinations – versus 126 for a 3-runway Heathrow.

9. Cost and financing

Importance of understanding cost and comparability

- 9.1. Cost and financing were raised as a key area of concern in the Airports Commission's Interim Report. The Report concluded that the costs of a new Isle of Grain airport would be *"extremely high ... as much as £82-112 billion by 2030, including surface access costs and allowances for risk and optimism bias. This is around five times the estimated cost of a new runway at Heathrow, and does not include any costs related to the acquisition or closure of Heathrow."* The report also noted that *"these high costs would present very significant challenges in terms of financeability"*, and that *"the costs and risks attached to such plans are so high that they present serious challenges to the credibility of these options"*. The report stated that *"In order to repay the debt required to finance the project, aeronautical charges would need to be set around three times the Heathrow Q6 level set by the CAA⁶²"*.
- 9.2. These conclusions are in stark contrast to the conclusions drawn in TfL's submission to the Airports Commission in July 2013, which was the product of a large amount of detailed work undertaken by TfL and its advisors looking at delivery structures, financial and commercial implications for a new Hub.
- 9.3. Further analysis undertaken for TfL by EY⁶³, raises concerns about some of the assumptions the Airports Commission have used to reach its conclusions around the required increase in landing charges. This analysis shows the effect on landing charges of adjusting those assumptions to bring them into line with national and international benchmarks.
- 9.4. Given the importance of affordability and commercial viability in assessing an ITE option, it is imperative that a number of cost and financing issues are revisited by the Commission. This will enable each of the airport options still on the table to be compared on a level playing

field and so ensure the comparison is credible, in deciding whether to shortlist the ITE option.

- 9.5. Chapter 8 of this submission sets out TfL's analysis that a 4-runway airport is needed to ensure a resilient airport with the long term capacity to meet forecast growth to 2050 and beyond.
- 9.6. The cost of a 4-runway Heathrow is not known. It is reasonable to assume that any fourth runway would likely be in a South Westerly location, the challenges of which are set out in the Commission's report. Jacobs' Interim Report sift sheet for the Heathrow SW Runway option shows a cost of £8-10bn to 2050 (excluding risk) for the core airport infrastructure. Although some of these costs (e.g. terminal capacity) would already have been provided as part of the third runway, it seems likely that the cost of a 4-runway solution at Heathrow would be not dissimilar to the cost of a new 4-runway airport in the ITE, particularly when compensation and risk are taken into account.
- 9.7. TfL urges the Commission to undertake its own analysis of the true costs and deliverability of a 4 runway Heathrow, over a period to at least 2050, to ensure a like for like comparison of cost.

» *A fairer assessment of costs, underpinned by assumptions more aligned with industry norms and schemes which have a more comparable offer, is required. This will ensure that the Commission's analysis of the options has sufficient credibility.*

Key concerns with Commission approach to cost and financing

Timeframe

- 9.8. There are significant weaknesses in the Commission's interpretation of its remit, focusing on the period to 2030. Given the long-term and strategic nature of investment in airport infrastructure, TfL believes that assessment over a longer period – at least to 2050, if not beyond – is

required.

Risk and Optimism bias

- 9.9. The Airports Commission's assumptions on risk and optimism bias – together 110% – are highly cautious. They take no account of how TfL's cost estimates were built up, the UK's recent successes in delivering large infrastructure projects, or, for surface access, applicable Government guidance. This pessimism compounds the perceived cost differential of a new hub airport that results from taking a short term view.
- 9.10. TfL's estimates for the cost of a new Hub airport with a capacity of up to 180million passengers per annum were developed in conjunction with Atkins and Faithful & Gould. The costs are based on outturn costs for recent projects (including T5), plus a further 15% allowance for risk. Costs were calculated through the identification of relevant unit rates, lump sums, outturn costs and outputs. Cost data was benchmarked against major international construction programmes and airport schemes involving large scale civils packages. Data was normalised for the south east of the UK.
- 9.11. Private sector promoters of a new Hub airport on the Isle of Grain, notably Fosters & Partners, have included estimates of cost (including risk) that are significantly less than TfL's.
- 9.12. A key advantage of the Isle of Grain proposals is the opportunities presented by building a new airport from scratch in a non-operational environment, as against trying to build an extension to an existing facility adjacent to two live operational runways operating at capacity. The expansive nature of the Estuary site provides suitable areas for working, delivery, off-loading, storage, logistics and contractor accommodation / management. The new airport would be constructed using established technology and building techniques, albeit on an unprecedented scale.
- 9.13. The Commission should undertake its own research into the above. It

should also take account of the UK's recent experience in delivering large scale infrastructure projects (e.g. T5, the Olympics, Crossrail, HS1), which TfL believes are more relevant than 'failures' dating from over a decade ago such as the West Coast Main Line modernisation mentioned in KPMG's report.

Indexation of aeronautical revenues

- 9.14. The assumption underpinning the analysis in the Interim Report is that aeronautical revenues are not inflation linked. This is contrary to the standard model for regulated companies; they are typically allowed to gradually increase charges to recover their investment in capital expenditure and in line with inflationary pressure on operating and maintenance costs. The 'RPI ±x' model for airport regulation reflects this approach, without which revenues are reduced in real terms over time. The Commission needs to review its assumption.

Debt duration

- 9.15. The analysis for the Interim Report assumed that debt incurred to construct the new airport and surface access should be repaid by 2050. KPMG's report for the Commission admits that this was an "arbitrary choice" applied as part of "a highly simplified approach" across all options to allow comparison. EY's analysis demonstrates that it is out of kilter with standard practice among regulated utilities. It has a disproportionate impact on schemes with higher capital expenditure, the benefits of which will be experienced by both current and future generations.
- 9.16. Regulated utilities typically retain an appropriate capital structure with an ongoing level of debt. The CAA's guidance targets debt as 60% of the Regulated Asset Base (RAB). These are inconsistent with an assumption of full debt repayment by 2050.
- 9.17. It would not be credible for the Commission's analysis to remain predicated on a repayment period on little over 20 years.

Role of Government

- 9.18. A focus on private sector delivery limits the Commission's flexibility in determining the optimum strategic solution for London and the UK. The Interim Report at the same time makes clear that *"all the options considered therefore would be expected to require some level of public support."* Government will also have a vital role to play in securing the appropriate political and legal basis for any airport expansion project, essential to securing private sector investment. The expected role for Government is described in detail in TfL's submission to the Commission in July 2013.

Surface access

- 9.19. In making a fair and accurate determination of the scope of surface access costs, it is essential not to:
- Assume (as committed) schemes that would not proceed without airport expansion.
 - Rely on schemes that have been designed to meet existing (non-airport) challenges,
- 9.20. If the surface access provision is inadequate – factoring in background demand – this would result in significant congestion, eroding journey reliability. For rail, this would fundamentally undermine mode shift, harming sustainability and placing even greater strain on the road network.
- 9.21. There is an especially strong case for the majority of the surface access measures to be taxpayer funded for a new ITE airport. This would reflect the contribution of the surface access works to the achievement of a series of wider objectives, such as regeneration and housing growth. The recent CAA decision on Crossrail⁶⁴ has also highlighted the need for surface access costs to be added to the RAB only to the extent that they are of direct benefit to airport users. It is imperative that the Commission revisit a number of the assumptions around cost, including risk and

optimism bias, indexation of aeronautical charges, debt repayment period and treatment of surface access.

Implication for aeronautical charges

- 9.22. To support TfL's submission in response to this call for evidence, TfL has commissioned further analysis from EY. This work examines the key assumptions adopted by KPMG and the Commission in modelling the increase in aeronautical revenues, before undertaking a high level sensitivity analysis to demonstrate the impact of adjusting those assumptions to bring them into line with a more usual approach for funding airports and other regulated utilities.
- 9.23. This analysis indicates that the threefold increase in landing charges claimed by the Airports Commission is a significant overestimate, and based on highly questionable financial and commercial assumptions – assumptions which KPMG, the Commission's own financial advisers, describe as "arbitrary" and "highly simplified". Indeed, KPMG's report acknowledges that, under different assumptions, an increase of just 6% on the opening of the new airport is needed.

For further information, see: Commercial and Financial Analysis of the loG option based on KPMG's analysis [EY]

- » *Using sensible best practice assumptions, aeronautical charges will rise no more than 1.4 times existing, broadly in line with Heathrow Airport Limited's proposal for Q6.*
- » *On the basis of assumptions set out in detail in TfL's submission, a new hub airport is assessed on a standalone basis as commercially viable.*

Cost and financing
KEY FINDINGS

- TfL urges the Commission to fully review its assumptions on cost (including surface access) and financing, before making its decision on whether to shortlist an Inner Thames Estuary option later this year.
- The Commission should ensure that they compare the costs and commercial deliverability of a new hub airport against a 4-runway Heathrow, before making its decision. The future hub airport we need requires a 4-runway solution.
- The Commission should adopt a more sophisticated approach to risk and optimism bias.
- A new analysis carried out by Ernst & Young indicates that the threefold increase in landing charges claimed by the Airports Commission is a significant overestimate, and based on flawed financial and commercial assumptions.
- There is a strong case for a new hub airports surface access costs to be taxpayer funded. This reflects the unique contribution of a new hub airport to wider objectives, such as regeneration and housing growth.

Conclusions

10. Comparison with shortlisted options

- 10.1. The evidence presented in this submission needs to be seen in the context of the shortlisted schemes. TfL has not gone into the detail behind any one specific proposition for an ITE Airport here. There are a number of different credible visions for a new hub airport in this location that would be compatible with our national requirements and needs.
- 10.2. The table below sets out how an ITE option compares to the other shortlisted schemes, setting out the findings from the technical work undertaken by or on behalf of TfL, as well as from other submissions to the Airports Commission and the Commission's own conclusions. The approach taken seeks to level the playing field between options, and make comparable, credible assumptions about issues such as airport capacity and runway utilisation, and surface access provision.
- 10.3. A number of important observations can be made:
- A. A new hub airport in the ITE offers the scale of new capacity necessary for London and the UK in the long term. It offers much more capacity than each of the shortlisted schemes.
 - B. Across all options, the capital costs of new airport infrastructure are proportionate to the additional capacity which would be made available. Crucially, a new hub airport in the ITE would have extra advantages which are not reflected in any such cost per unit of capacity measure, such as:
 - Flexibility and resilience that comes from operating below 75% runway utilisation; by contrast, in all the other options, Heathrow will effectively be full, frustrating new routes and services and lacking resilience in the face of disruption;
 - Exposing to noise just 3% of the number that would be exposed by a three runway Heathrow and offering by far the best London airport system-wide solution. Gatwick expansion fails to address the problem by leaving Heathrow in situ. Only relocating the hub from Heathrow to a new site to the east of London can tackle the noise challenge, and end the severe public health impacts of Heathrow.
 - C. The surface access costs associated with each option are comparable – as long as a consistent approach between options is adopted.
 - A 'low' level of provision would provide physical connections, but result in untenably poor levels of capacity, connectivity and journey experience. It would also fail to meet the Commission's surface access objectives. Heathrow and Gatwick's submitted cost figures of less than £1bn compare to a £2.5bn figure for the ITE.
 - At the other end of the scale, an 'optimal' level of provision, would fully meet the Commission's surface access objectives; to maximise sustainable mode share, minimise the impacts on background travel, and enable access from a wide catchment area. It would also enable capacity, connectivity and journey experience requirements to be fully met. The comparable figures here are around £17bn for a Heathrow solution, £12bn for a Gatwick solution, and £19bn for a new hub airport in the Inner Thames Estuary.
 - D. All options could be delivered around the same time (mid to late 2020s). It must however be noted that each of the shortlisted schemes only comprise single new runway solutions; Heathrow will effectively be full by 2030 and Gatwick a few years later.

Table 13: Comparison of an ITE airport against schemes currently shortlisted

		Inner Thames Estuary Airport	Schemes currently shortlisted			Source
			Heathrow NW runway	Heathrow 'Hub'	Gatwick second runway	
Net new runways		2	1	1	1	All
Net additional capacity increment (air traffic movements / yr)		520k	280k	190k	222.5k	AC /TfL
Airport Cost (£bn, 2013 prices, AC figures excl. risk and OB)		18-25	7-9	6-8	5-7	AC
Surface Access Infrastructure Cost (£bn, 2013 prices, TfL figures incl risk and OB)*	Low	2.5	2.1		0.4	TfL
	Intermediate	6.8	4.6		2.9	TfL
	Capable	10.9	7.0		11.6	TfL
	Optimal	19.1	17.6		12.4	TfL
Airport: people exposed to aircraft noise (55db _{Lden}), 2012 population base, runways fully utilised		31,500 (1m ATMs)	1,097,200 (740k ATMs)	n/a	n/a	ERCD /TfL
London system: people exposed to aircraft noise (55db _{Lden})		~50k	~1.2m	~1m	~600k	TfL est.
Opening year		2029	2026	2026	2025	All
Longhaul destinations from London system (2050)		191	126	126	112-119#	YA
UK destinations from London hub (2050)		16	7	7	7	YA
Capacity utilisation at hub		<75%	80-90% (full)	80-90% (full)	80-90% (full)	AC
Population catchment within 1 hour (millions)		14	15	15	14	TfL

Source

AC = Airports Commission Interim Report

TfL = TfL estimates

All = According to the individual submissions to the Airports Commission

YA = York Aviation study commissioned by TfL to inform submission

= scenario modelled also included second runway at Stansted

* = surface access options for Heathrow NW runway and Heathrow hub are assumed the same. We have made the simple assumption that a single new runway at Heathrow (in either NW or 'hub' configuration) will place comparable pressures on the surface access network.

- 10.4. TfL has also attempted to identify and compare the relative performance of each of the options against the Commission's Appraisal Framework objectives; this can be found in the associated technical note.
- 10.5. Each option has been scored from 1 to 5 against each of the Commission's objectives. The purpose of this exercise is to provide an indication of how well an ITE airport could perform in relation to the shortlisted options. The answer is competitively.
- 10.6. The assessment has been conducted at a relatively high level based on available evidence and we also explain the reasoning behind the scores that we have assigned. Clearly, this analysis is subjective and open to interpretation. We look forward to the Commission's own rigorous assessment of its objectives, against the specific measures and metrics described in the appraisal framework's appraisal modules.
- 10.7. The assessment has been conducted at a relatively high level using evidence currently available and also includes a rationale behind the scores that have been assigned. Clearly, this analysis is subjective and open to interpretation, but illustrates the potential merits of an ITE option. It demonstrates the importance for it to be considered in further detail as part of the Airports Commission's own rigorous assessment of its objectives, against the specific measures and metrics described in the appraisal framework's appraisal modules.
- 10.8. We trust that the Commission will conclude as we have: that an Inner Thames Estuary hub airport option, while more expensive – though not prohibitively so – is deliverable and far more capable of meeting the majority of the Commission's objectives; and as such that its inclusion on the shortlist is compelling.

For further information, see: Technical Note X, Performance of Options against Commission's Assessment Framework Objectives [TfL]

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