



# Cost and Commercial Viability: Additional Analysis

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# Contents

<b>1. Risk and Optimism Bias</b>	<b>2</b>
<b>2. Land and Community Compensation Costs</b>	<b>14</b>
<b>3. State aid</b>	<b>19</b>
<b>4. Sources of Finance – UK Guarantee Scheme (UKGS)</b>	<b>23</b>
<b>5. Sources of Finance – European Investment Bank (EIB)</b>	<b>28</b>

# 1. Risk and Optimism Bias

## Introduction

**1.1** The Commission considers that the costs and financial analysis presented to support the assessment of cost and commercial viability are best viewed as representing a range of possible outcomes at this early stage in the development of proposals for airport expansion; to present and make an assessment based on point estimates would neither provide a full understanding nor allow for the level of risk and uncertainty concerning final outturn costs to be properly understood.

**1.2** The cost ranges considered reflect:

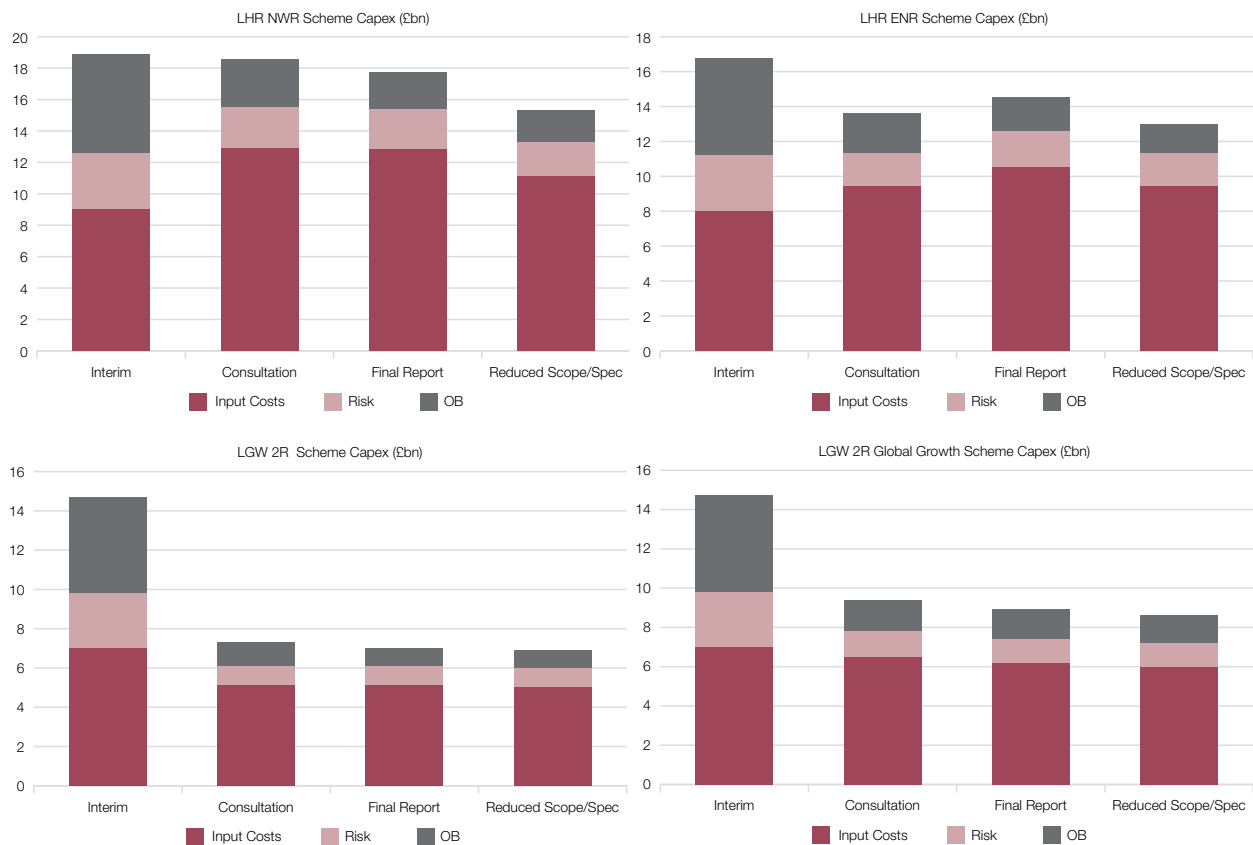
- an elemental cost build up, drawing on primarily information provided by promoters with independent analysis and review by the Commission’s technical consultants who have used their own sector data sources and experience;
- an additional allowance both for project risk and a level of optimism bias applied consistently across the schemes:
  - Risk reflects the observation that there is always likely to be some difference between what is expected and what actually materialises. Appraisers assess an expected value for the risks (e.g. ground conditions, excessive variations, differential changes in input prices, etc.) to consider how exposed each option is to future uncertainty.
  - Optimism bias is applied to respond to the observed tendency for outturn costs to exceed initial estimates; and are supplemented by
- a set of sensitivities including the “standard” sensitivities presented in the *Cost and Commercial Viability: Funding and Financing Update* report and the further analysis responding to consultation presented in the *Cost and Commercial Viability: Additional Sensitivities* report.

- 1.3** Whilst other approaches might have been adopted, the HM Treasury Green Book approach to optimism bias has been used as it is widely understood, particularly in the context of government decision-making on major projects.
- 1.4** This approach provides the Commission with:
- reasonably detailed costings providing sufficient transparency to support meaningful consultation;
  - an appropriate level of contingency to ensure the assessment of commercial viability and financeability is robust in the event that costs are materially higher than planned and/or hoped for; and with the sensitivity analysis,
  - an appreciation of the implications of alternative assumptions.
  - It also provides a better understanding of the financial implications for airport users.
- 1.5** There was extensive consultation feedback on the approach to risk and to optimism bias which the Commission has considered resulting in further work the outcome of which is set out in this paper. Consultation also helped identify a limited number of anomalies which have been adjusted for. Details are set out in *Cost and Commercial Viability: Cost and Revenue Identification Update* report for each scheme.

## Development of costs, risk and optimism bias

- 1.6** The charts below show the evolution of scheme capital costs including risk and optimism bias since the Commission's Interim Report along with an assessment of potential cost reductions.

**Figure 1.1 Development of Scheme Capex since interim report<sup>1</sup>**



**1.7** Whilst manifesting differing capital expenditure (“capex”) cost development profiles the charts illustrate the importance of viewing costs as a range including contingencies at this stage. The following matters are apparent.

- Input costs can increase (as is the case for the Heathrow schemes) or decrease (in the case of the LGW 2R scheme) as a result of further analysis and scrutiny, illustrating the difficulty of third party assessment of scheme costs. Reductions in optimism bias can be justified as additional scrutiny reduces uncertainty.
- It is important to consider the impact of different demand scenarios where these impact on cost (whilst phasing varies at Heathrow total capex varies little, whereas at Gatwick capex in the assessment period varies more significantly according to demand).
- There will be opportunities to engineer costs and to involve stakeholders including airlines in the specification and scope of airport provision. While this may achieve savings, particularly at Heathrow, by reductions in scope and

<sup>1</sup> The Scheme Capex under the AoN-CC demand scenario does not require the final phase of the LGW 2R scheme to be constructed in the assessment period. For this reason, Scheme Capex under the Global Growth demand scenario is also included as this requires the construction of all phases of the LGW 2R scheme.

specification of works, some changes will have impacts on the passenger experience.

**1.8** Risk and optimism bias have been reviewed at each stage and the final values take account of consultation responses.

**Table 1.1 Development of optimism bias assumptions from interim to final reports**

Evolution of Risk & OB	Interim		Consultation		Final	
	Risk	OB	Risk	OB (Mitigated)	Risk	OB (Mitigated)
Scheme	40%	50%	20%	20%	20%	15%
Core			<i>Operator Estimate</i>	15%	<i>Operator Estimate</i>	10%
Core and Scheme AR			20%	20%	20%	15%
Incremental Scheme Opex			0.5% pa	20%	0.5% pa	15%
Core Opex			0.5% pa	0%	0.5% pa	0%
Non-Aeronautical Revenue			-0.25% pa	-0.25% pa		-0.25% pa
Surface Access – Road	40%	50%	na	44%	na	44%
Surface Access – Rail (Capex)	40%	50%	na	66%	na	66%
Surface Access – Rail (Opex)			na	41%	na	41%

Note: “Scheme” refers to incremental expenditure supporting the new runway capacity. “Core” refers to expenditure that would be incurred in respect of the current infrastructure and operations. “Asset replacement” is capital expenditure to replace and/or upgrade the assets of the airport as it develops, maintaining and enhancing passenger experience.

**1.9** Optimism bias for the airport capex and operations has reduced since the interim report taking account of consultation responses. A reduction is consistent with the broad expectation that optimism bias will reduce as a greater understanding of costs is obtained, whilst the estimate of defined input costs may increase as cost estimates are refined. And indeed as shown above (and set out in more detail in the *Cost and Commercial Viability: Cost and Revenue Identification Update* report for each scheme) some cost increases have been identified through consultation and incorporated into the base costs; and post consultation Heathrow Airport Ltd and

Gatwick Airport Ltd have identified additional costs relating to community compensation (not included in the charts) which are being considered as sensitivities (See Part 2 of this report and *Cost and Commercial Viability: Additional Sensitivities*).

- 1.10** The approach to optimism bias for Surface Access infrastructure (which will probably not be developed by the Airport Operator, however it is funded) has followed DfT guidance.

## Optimism bias: background

- 1.11** Optimism bias has its origins in the long-observed tendency of scheme promoters (and appraisers) to underestimate the capital required to deliver a built asset. This can be attributed to three broad causes:

- 1) inadequacies in the base estimate, either through failing to appreciate the full scope of the project, or through lack of reliable price data properly applied;
- 2) an under-appreciation of the risks that surround the delivery of the asset;
- 3) an understandable (but potentially distorting) desire on the part of those involved in a project that it should proceed.

- 1.12** Having regard to these factors and based on academic research<sup>2</sup>, supplemented by technical research into the cost outcome of major projects in the UK by Mott McDonald<sup>3</sup>, the Treasury introduced into the Green Book a requirement for project appraisers to apply a factor to scheme costs to counter the tendency to over-optimism, in order to run appraisals on a basis that might be considered more realistic, and therefore more rigorous.

## Applying HM Treasury guidance

- 1.13** Treasury guidance on risk and optimism bias is set out in the Green Book<sup>4</sup> and in supplementary guidance published subsequently<sup>5</sup>. This guidance proposes that the tendency towards optimism should be countered by adding margins for risk/optimism to scheme promoters' base estimates.

<sup>2</sup> *Megaprojects and Risk: An Anatomy of Ambition*, Bent Flyvbjerg, Nils Bruzelius and Werner Rothengatter; published 2003 by Cambridge University Press.

<sup>3</sup> *Review of Large Public Procurement in the UK*, Mott MacDonald (2002).

<sup>4</sup> *The Green Book: Appraisal and Evaluation in Central Government*, 2003 edition amended July 2011, HM Treasury.

<sup>5</sup> *Green Book Supplementary Guidance: Optimism Bias*, HM Treasury, April 2013; and "Early financial cost estimates of infrastructure programmes and projects and the treatment of uncertainty and risk." HM Treasury Update, 26 March 2015

- 1.14** For capital expenditure, the recommended ranges at Outline Business Case stage (with higher adjustments possibly necessary at earlier stages in the appraisal process) are set out in Table 1.2.

**Table 1.2 The Green Book range of Optimism Bias assumptions by project type**

Project type	Upper bound (%)	Lower bound (%)
Standard Buildings	24	2
Non-standard Buildings	51	4
Standard Civil Engineering	44	3
Non-standard Civil Engineering	66	6
Equipment	200	10

- 1.15** In assessing the appropriate level of optimism bias to be applied a further assessment is made of the potential ability of a project developer to mitigate certain risks (e.g. late contractor involvement in design, project management, etc.).
- 1.16** Issues are often raised about the ability to secure reliable project specific evidence to apply optimism bias. The Green Book and particularly the supplementary guidance acknowledges this, though, and makes clear that *“adjustments for optimism may be reduced as more reliable estimates of relevant costs are built up, and project specific risk work is undertaken”* and refers, by example, to optimism bias being reduced so that by final business case stage there may remain *“only a general contingency of 5% for unspecified risk”*.
- 1.17** The guidance therefore sets out a more structured, granular way in which scheme promoters might analyse risk and optimism by reference to a defined set of categories of risk, for each of which different levels of mitigation may be applied suited to the specifics of the project and its circumstances.
- 1.18** Of course, the Commission and its technical consultants are not the scheme promoters and it is acknowledged that this means they have a somewhat less secure evidence base than the promoters themselves. This approach means that in some aspects, and as identified in consultation responses, there may apparently be difficulties in direct comparison of the costs of particular elements between schemes. This is considered to support the approach to risk and optimism bias and does not invalidate the overall results of the approach.

- 1.19** Moreover, although the scheme promoters have the best understanding of their own proposals, the final scheme will be further shaped by the consenting process and there is consequently another layer of uncertainty which it is appropriate to account for. The Commission believes that providing for optimism bias is an appropriate means to address this issue.
- 1.20** The Commission has discussed the approach with HM Treasury and considered recent further guidance. It considers its approach to be consistent with developments in the application of risk and optimism bias to projects in the early stages of development. It is recommended, however, that as the project is taken forward the most recent best practice guidance is adopted, including detailed evidence based risk assessment<sup>6</sup>.

## Technical consultants approach and responses to consultation

- 1.21** In their first consideration of risk and optimism bias, the Commission and its technical consultants sought to follow the supplementary guidance, and produce a weighted assessment by reference to the risk breakdown structure proposed in the guidance. This resulted in the values shown in the table 1.1 including 20% mitigated optimism bias for the scheme capex.
- 1.22** The detailed scheme specific analysis carried out was published as part of the consultation and yielded slightly different results for each scheme but was rounded to the nearest 5%. As the schemes, although differing in size, are inevitably similar in structure the outputs of the calculations were close and as a result the same optimism bias factors were applied to each scheme. This approach (i.e. applying common rounded results across the schemes) has been applied to both the consultation costs and the final base costs.
- 1.23** Optimism bias was discussed with the promoters prior to the formal consultation process and there were subsequently a significant number of consultation responses on the matter (largely from the promoters). The general response from the promoters has been to state that, in respect of their own schemes at least, this approach results in over-pricing. In particular, the grounds they cited against the addition for optimism bias at the level proposed, in addition to an allowance for risk, include the following:
- 1) that they are experienced clients for construction projects;

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<sup>6</sup> *“Early financial cost estimates of infrastructure programmes and projects and the treatment of uncertainty and risk.”* HM Treasury Update, 26 March 2015

- 2) that part of that experience is to have implemented rigorous change/risk management procedures;
- 3) that the application of optimism bias is principally designed to counter the tendency towards optimism where (as in the public sector) there is no commercial incentive to appraise projects on a more sanguine basis, and that it has little application in the private sector as, by contrast, their duty to lenders and shareholders, and the importance of their reputation in respect of both is such that they have no incentive not to present the numbers objectively; and,
- 4) Gatwick Airport Ltd and Heathrow Airport Ltd have criticised the specific application of the principles of the Green Book Supplementary Guidance, particularly the split of costs between categories<sup>7</sup>.

**1.24** The Commission does not agree with the implication of points (1) to (3) that optimism bias is inappropriate to their assessment of the cost and commercial viability of the schemes. The key factors the Commission bases this view on are as follows:

- the early stage of development of the schemes and their level of complexity;
- the fact that, notwithstanding the information in promoters' submissions, the scheme base costs as presented have been developed by the Commission and not the promoters: there is therefore inevitably less site specific knowledge or ability to validate facts/assumptions, in addition to the scheme design issues (e.g. consenting as discussed above) which promoters do not determine and which affect scheme costs;
- that some cost increases have indeed been identified through consultation and incorporated into the base costs and moreover post-consultation Heathrow Airport Ltd and Gatwick Airport Ltd have identified additional costs relating to community compensation suggesting a further increase in costs;
- the importance to the schemes of the involvement of government and regulators; and,
- the broader public sector interest in the schemes being financeable and in the impact of outturn costs on the aero charge cost to airlines and therefore the cost to airport users.

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<sup>7</sup> Having regard to consultation responses and further analysis, the Commission revised the assumptions made in the analysis underlying the optimism bias calculations – for example, the initial split of about 70:30 between civil engineering and standard building work was analysed in a greater level of detail (see Cost and Commercial Viability: Cost and Revenue Identification Update reports for each scheme).

- 1.25** The Commission’s view has been confirmed in discussions with HM Treasury.
- 1.26** On the more detailed criticism concerning the split of costs the Commission reviewed the calculations and made revisions which resulted in the revised lower levels of mitigated optimism bias set out in Table 1.1.
- 1.27** The Commission notes that the revised mitigated optimism bias figures calculated by its technical consultants are close to those obtained by Gatwick Airport Ltd from its own calculations for all schemes of around 14-15%. Heathrow Airport Ltd suggested more granular and lower figures for optimism bias for its own scheme, but did not propose assumptions for other schemes. Heathrow Hub Ltd did not propose any specific alternative assumptions.

### Further commentary on consultation responses

- 1.28** Some respondents commented on the differences in risk profiles between schemes. Although the use of a flat percentages for risk and optimism bias across all schemes may, in its apparent arbitrariness, be subject to the same criticism as the original Treasury approach to optimism bias, it is nonetheless considered to be a practical approach in these circumstances, and at this stage of project development.
- 1.29** The grounds for this are as follows:
  - 1) The base estimates presented by the scheme promoters (all of which were prepared by cost consultants with a track record in airport development) have been reviewed by the Commission’s consultants and judged by them to be a reasonable basis for informing the decision-making process (subject to the limited adjustments deemed to be appropriate<sup>8</sup>).
  - 2) Risk allowances made by the scheme promoters varied between schemes. However, without detailed cross-examination of all three promoters and their consultants, it is not possible to discern with any validity whether these differences reflect a genuine difference of risk profile, or simply a difference of approach/execution so alignment of risk and optimism bias rates is considered by the Commission’s technical consultants to be appropriate. (No changes were made to core capex risk allowances as these are considered to be more developed and subject to greater scrutiny including some degree of regulatory review.)

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<sup>8</sup> See 13. Cost and Commercial Viability: Cost and Revenue Identification report at consultation phase and the following consultation set out in Cost and Commercial Viability: Cost and Revenue Identification Update (N.B. There are three versions of each report, one per short listed scheme).

3) Whilst competing promoters may offer a basis upon which differential judgements might be made, they clearly cannot be considered entirely objective, and may tend to take a partial view.

**1.30** In addition a high level exercise was carried out by the Commission's technical consultants to assess the sensitivity of the scheme capex to differential risk between schemes. Cost lines were classified as higher or lower risk within each scheme. Differential risk rates were then applied to the higher and lower risk categories. This did not show a significant deviation between schemes in the weighted average risk indicating that this would not be a major distinguishing feature. This is perhaps not unexpected given the broadly consistent proportions of types of cost across the schemes<sup>9</sup>.

**1.31** In respect of optimism bias and following consultation, the Commission's technical consultants have reviewed the calculation that underlies the original application of an across-the-board percentage of 20%, applying the following revised principles:

- a recalculation of the split between building and civil engineering;
- a further split between standard and non-standard work (with work off-airport and work below ground generally classified as non-standard);
- a higher level of optimism bias applied to equipment; and
- the use of the same mitigation factors for all other aspects of risk across the three schemes.

**1.32** The principle adopted was that different levels of optimism bias should be applied only where the characteristics of the projects themselves differ on a basis that is capable of objective confirmation (e.g. the building, or civil engineering, standard or non-standard, etc.); but that, in the absence of an evidence base for differentiating between the characteristics of the promoters themselves in developing projects, again on an objective and demonstrable basis, then mitigation factors relating to project delivery should be weighted equally. It is noted for instance that the scheme that is developed is likely to have access to an equivalent pool and quality of skills, advisors and contractors.

**1.33** The detailed revised calculations of optimism bias are set out in the *Cost and Commercial Viability: Cost and Revenue Identification Update report* for each scheme.

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<sup>9</sup> The impacts of varying the level of risk can be understood from the equivalent variation in optimism bias set out in the report *Cost and Commercial Viability: Additional Sensitivities*. Separate sensitivities looking at variations in the risk allowance have therefore not been run.

## Sensitivity analysis

**1.34** The Commission has also carried out sensitivity analysis based on the original consultation rates including 20% for scheme capex and 0% optimism bias.

**Table 1.3: Sensitivity analysis**

	Scheme OB assumption	Weighted Average Aero Charge (2014 prices)	Peak Equity (£billion nominal)	Peak Debt (£billion nominal)
<b>Gatwick Second Runway</b>	15% ( <i>Base</i> )	16	2.7	11.5
	20%	17	2.8	11.9
	0%	14	2.5	10.5
<b>Heathrow Northwest Runway</b>	15% ( <i>Base</i> )	29	8.2	33.8
	20%	30	8.5	35.1
	0%	26	7.4	30.7
<b>Heathrow Extended Northern Runway</b>	15% ( <i>Base</i> )	28	7.3	30.4
	20%	28	7.6	31.5
	0%	25	6.7	27.8

**1.35** Having reviewed the results the conclusions on financeability remain that each of the schemes is financeable. Moreover, the consequential cost relativities remain similar. The detailed results are set out in the PwC report *Cost and Commercial Viability: Additional Sensitivities*.

## Rationale and Methodology

**1.36** The objective of the Cost and Commercial Viability workstream is to assess short listed schemes as to whether or not they are “...affordable and financeable”. Given the early stage of development there is a significant degree of uncertainty over the cost of developing any of the schemes. The Commission therefore needed to develop a methodology to ensure that its assessment was robust to the financial implications of higher outcomes, but nevertheless showed what those financial implications might be, should the schemes be successfully developed with the planned for cost levels.

- 1.37** This paper sets out the rationale for the Commission's approach, i.e. the adoption of an optimism bias approach as set out in the HM Treasury Green Book. Further analysis has also been provided both of the rationale for the approach and how it has been applied, including refinement following consultation. Commentary is also provided on the interpretation of the results taking account of a range of assumptions on the level of optimism bias.
- 1.38** The Commission has consulted with HM Treasury in adopting this approach. As a further point attention is drawn to the importance of taking forward the principles underpinning this approach, having regard to the most recent HM Treasury guidance as the scheme is developed.

## 2. Land and Community Compensation Costs

### Overview

- 2.1** The Promoters provided initial costings for land acquisition (including compensation), and community compensation costs (largely related to noise) and statutory levies arising out of the planning consent process (Community Infrastructure Levy (CIL)/s106 costs in the submissions). These were included based on the Commission’s technical consultants understanding of the costs. Post consultation each promoter provided updated proposals and further clarification. The Commission has run sensitivities to assess the financial impact of the potential changes.
- 2.2** Table 2.1 sets out the costs relating to land acquisition, including compensation and to community compensation.

**Table 2.1 Summary of Land and Community Compensation Costs**

<b>Base Cost – Land and Community Compensation Summary (£m)</b>	<b>Gatwick Second Runway</b>	<b>Heathrow Northwest Runway</b>	<b>Heathrow Extended Northern Runway</b>
Land Acquisition (including residential compensation)	878	2,226	579
Enabling Works and on costs	247	656	654
<b>Land Costs</b>	<b>1,125</b>	<b>2,882</b>	<b>1,233</b>
Risk	225	576	247
Optimism Bias	203	519	222
<b>Total Land Costs</b>	<b>1,553</b>	<b>3,977</b>	<b>1,702</b>
Noise Insulation, Community Compensation	29	256	293
Other (s106, CIL etc.)	111	142	59
<b>Community Compensation Costs</b>	<b>140</b>	<b>398</b>	<b>352</b>
Risk	28	80	70
Optimism Bias	25	72	63
<b>Total Community Compensation Costs</b>	<b>193</b>	<b>550</b>	<b>485</b>

**2.3** The land acquisition costs are based on:

- 125% of Market Value (plus costs) for residential properties; and,
- Promoters cost estimates for other land currently mainly occupied by commercial property including compensation to affected businesses.

**2.4** The Commission's technical consultants have adjusted costs to provide a consistent 20% risk factor and have separately allocated enabling works and 'on costs'. All costs are subject to optimism bias at the revised level of 15%.

## Potential cost increases

**2.5** Further to the original submissions Gatwick Airport Ltd and Heathrow Airport Ltd has each provided updates and clarification of their compensation and financial support offers relating to noise and other impacts on the community. The Heathrow Airport Ltd offer comprised a revised noise compensation offer for insulation and some £250m for voluntary purchase of blighted houses in the wider area. The total additional Heathrow Airport Ltd offer is £715m. In reviewing the further information on land and community compensation a potential further adjustment to land costs of £60m was identified for Heathrow Airport Ltd (there was no adjustment for Heathrow Hub Ltd). This amount has been included in the sensitivity analysis.

**2.6** No detailed compensation offer was made by Heathrow Hub Ltd but the Commission has worked on the assumption that if Heathrow Airport Ltd, as the airport owner, were to develop the Heathrow Extended Northern Runway scheme, it would apply a similar compensation offer as proposed for its own scheme.

**2.7** The updated information/offers were reviewed by the Commission's technical consultants who considered that in the case of Heathrow Northwest Runway, on the basis of analysis of the noise contours and data on the location of households, the assumptions on the numbers of households affected might potentially be underestimated. Therefore, based on the principles stated by Heathrow Airport Ltd on the implied rates of compensation an alternative analysis was carried out on a higher number of affected households. Sensitivities have been run based on both the nominal amount offered by Heathrow Airport Ltd (on the basis it might be viewed as a "budget") and on the recalculated values for Heathrow Airport Ltd and Heathrow Hub Ltd. It is expected that the airport operator will carry out its own review to validate the impact and costs.

- 2.8** In the case of the Gatwick Second Runway scheme the Commission’s technical consultants have reviewed the amounts they originally included in the base costs with updated information and consider that an additional £114m of costs might arise. This includes increased offers in respect of its community infrastructure pledge, a contribution to Council Tax for some affected households not included in the Commission’s original costings, a contribution to local apprenticeships and amounts for local roads. In reviewing the further information on land and community compensation a potential adjustments to land costs of £19m for the Gatwick Second Runway was also identified. These amounts have been included in the sensitivity analysis<sup>10</sup>.
- 2.9** The package of compensation will ultimately be determined by the Promoter but the Commission considers that delivering at least the measures currently on offer will be important not only to those affected but in securing wider political and community support.

## Assumptions for sensitivity analysis

- 2.10** The sensitivities in respect of each scheme are set out in tables 2.2 to 2.4.
- 2.11** Sensitivity 1 directly reflects the Promoters post consultation proposals. Sensitivity 2 for Heathrow Airport Ltd and Heathrow Hub Ltd are based on the reworking by the Commission’s technical consultants of the Heathrow Airport Ltd proposal with revised household numbers.
- 2.12** It was noted during consultation that it was suggested that the original risk and optimism bias allowances would cover additional offers in any case. On the basis that this expenditure may be viewed as strictly speaking a “discretionary” budget offer (i.e. the Airport Operator may ultimately form its own view on the level of compensation) no additional risk or optimism bias has been added for the purpose of running the sensitivity analysis. It is still considered to be reasonable however to retain existing risk and optimism bias allowances on the amounts included in base costs given the inherent uncertainties associated with statutory compensation issues.

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<sup>10</sup> There have been a number of slight differences in the presentation of revised compensation proposals from Gatwick Airport Ltd in its response to consultation. For the purposes of the sensitivity analysis conducted, the Commission’s technical consultants consider the amount used as a reasonable basis for the level of compensation proposed.

**Table 2.2 Heathrow Northwest Runway: Sensitivity Analysis Assumptions – Land and Community Compensation**

	£m
<b>Sensitivity 1 (Additional proposed £715m compensation)</b>	
Full Insulation Noise Compensation (60+ LAeq)	235
Noise Insulation Allowance (55 Lden)	230
Voluntary Purchase	250
<b>Total Compensation</b>	<b>715</b>
<b>Additional land cost</b>	<b>60</b>
<b>Sensitivity 2 (Higher additional proposed compensation)</b>	
Full Insulation Noise Compensation (60+ LAeq)	246
Noise Insulation Allowance (55 Lden)	355
Voluntary Purchase	250
<b>Total Compensation</b>	<b>851</b>
<b>Additional land cost</b>	<b>60</b>

**Table 2.3 Heathrow Extended Northern Runway: Sensitivity Analysis Assumptions – Land and Community Compensation**

	£m
<b>Sensitivity 1 (Additional proposed £715m compensation)</b>	
Full Insulation Noise Compensation (60+ LAeq)	235
Noise Insulation Allowance (55 Lden)	230
Voluntary Purchase	250
<b>Total Compensation</b>	<b>715</b>
<b>Sensitivity 2 (Higher additional proposed compensation)</b>	
Full Insulation Noise Compensation (60+ LAeq)	351
Noise Insulation Allowance (55 Lden)	336
Voluntary Purchase	250
<b>Total Compensation</b>	<b>937</b>

**Table 2.4 Gatwick Second Runway: Sensitivity Analysis Assumptions – Land and Community Compensation**

	£m
<b>Sensitivity 1 (Additional proposed £114m compensation)</b>	
<b>Total Compensation</b>	<b>114</b>
<b>Additional land cost</b>	<b>19</b>

## Results of sensitivity analysis

**2.13** The inclusion of these costs do not impact on the conclusion that the schemes are all commercially viable and financeable. The impact on weighted average aero charges for each scheme is less than one pound. The full results of the sensitivities are set out in *Cost and Commercial Viability: Additional Sensitivities*.

## Rationale and methodology

**2.14** The objective of the Cost and Commercial Viability workstream is to assess short listed schemes as to whether or not they are “...affordable and financeable, including any public expenditure that may be required.” The most significant potential implication around public expenditure is in the provision of surface access infrastructure to the short-listed schemes and how this should be funded which is addressed separately<sup>11</sup>. As part of this assessment, the appraisal framework also looked to consider the adequacy of provision in the proposals for the three shortlisted schemes for compensation to affected households and communities.

**2.15** In its assessment, the consultation documentation the Commission included amounts based on the promoters proposal, with additional provisions where required including in respect of risk and optimism bias<sup>12</sup>. Following consideration of consultation responses and having regard to the further information and updated proposals from the scheme promoters, the Commission has analysed the impact of such updated offers on affordability and financeability. The basis and results of the analysis is set out in this paper.

<sup>11</sup> The costs of surface access have been assessed and a sensitivity run to demonstrate that these would be affordable and financeable in full by the private sector if this was the course of action decided by government.

<sup>12</sup> See report “13. Cost and Commercial Viability: Financial Modelling Input Costs”, November 2014.

## 3. State aid

### Overview

- 3.1** State aid is defined as an advantage in any form whatsoever conferred on a selective basis to undertakings by national public authorities. Article 107 of The Treaty on the Functioning of the European Union (TFEU) states that “*save as otherwise provided in the Treaties, any aid granted by a Member State or through State resources in any form whatsoever which distorts or threatens to distort competition by favouring certain undertakings or the production of certain goods shall, in so far as it affects trade between Member States, be incompatible with the internal market.*” Furthermore, the European Commission has the power to recover incompatible State aid.
- 3.2** In terms of determining what is a State aid, at a ‘first principles’ level, Article 107(1) of the Treaty on the Functioning of the European Union (TFEU) sets out five criteria, all of which must be fulfilled for there to be State aid present:
- 1) ‘State resources’ have been involved;
  - 2) The resources have been given to ‘certain undertakings’ (i.e. it is selective);
  - 3) The effect is one of ‘favouring’ those undertakings (i.e. it conveys an advantage);
  - 4) It “distorts or threatens to distort competition”; and
  - 5) It ‘affects trade between Member States’.
- 3.3** Subsidies granted to individuals or general measures open to all enterprises are not covered by this prohibition and do not constitute State aid (examples here would include general taxation measures or employment legislation).
- 3.4** Furthermore, where provisions are using state resources, but the entity receiving support is paying a market price for that support, the entity concerned is not receiving a favourable benefit or undertaking, and therefore is not receiving State aid. This is the market economy investor principle<sup>13</sup>.

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13 The market economy investor principle is discussed further in section 4 of this report, as the principle is a key feature of the UKGS product.

**3.5** Finally, there may be occasions where State aid is deemed to be compatible with the internal market (Article 107(3) of TFEU). These include “(b) aid to promote the execution of an important project of common European interest or to remedy a serious disturbance in the economy of a Member State”; and “(c) aid to facilitate the development of certain economic activities or of certain economic areas, where such aid does not adversely affect trading conditions to an extent contrary to the common interest”.

## The Airports Commission context

- 3.6** On 4th April, 2014 The European Commission published new Guidelines on State aid to airports and airlines<sup>14</sup>. The guidelines recognise *“the need for public funding to finance infrastructure investments will, due to fixed costs, vary according to the size of an airport and will normally be greater for smaller airports. The European Commission considers that, under current market conditions, the following categories of airports, and their relative financial viabilities, can be identified.... (e) airports with annual passenger traffic above 5 million are usually profitable and are able to cover all of their costs, except in very exceptional circumstances.”* The implication of this is that the development of the scheme itself (the Scheme Capex as identified in the Cost and Commercial Viability Assessment) would need to be funded from private sources (i.e. the aero and non aero charges in the Commission’s assessment of commercial viability). This would apply whether or not the airport were owned and run publicly (as is more common in other EU Member States) as the State aid test also applies to any public sector organisation that operates within a commercial market. This position reflects the 2012 European Court of Justice ruling on proposed funding for a runway at Leipzig-Halle airport<sup>15</sup>.
- 3.7** With regards to the provision of surface access outside the boundary of the airport, to avoid a State aid there will need to be an appropriate amount of funding responsibility allocated to the delivery body benefitting from the improved surface access. This is an inherently more difficult area to judge and as not all traffic using the adjoining surface access (e.g. the M25 or the London to Brighton railway line) are making use of the airport. Furthermore these additions form part of national transport networks.
- 3.8** On the basis of discussions with the European Commission, the UK Government should engage with it at an early stage in the development of the supporting surface

<sup>14</sup> “Guidelines on State aid to airports and airlines”, Communication from the Commission (2014/C 99/03), April 2014.

<sup>15</sup> European Court of Justice ruling, 19<sup>th</sup> December 2012  
<http://curia.europa.eu/juris/document/document.jsf?docid=131967&doclang=EN>

access schemes to assess the appropriate level of contribution by the airport operator as well as the proposed structure to deliver the infrastructure to minimise the risk of State aid.

- 3.9** In summary, the assessment of the Cost and Commercial Viability workstream is that the development of the short listed schemes (the Scheme Capex) should be deliverable without the need for public expenditure and therefore the risk of establishing a State aid. Furthermore, either airport operator should be able to fund surface access costs with appropriate regulatory support and remain commercially viable. The extent of any private sector contribution will ultimately be a matter for negotiation between the delivery body and government, and early engagement is advised between the UK Government and the European Commission in ensuring the structure of any support and level of private sector contribution made is consistent with State aid obligations. State aid implications do not on the basis of this analysis alter the Commission’s view of the commercial viability and financeability of the short listed schemes.

## Rationale and Methodology

- 3.10** The objective of the Cost and Commercial Viability workstream is to assess short listed schemes as to whether or not they are “...*affordable and financeable, including any public expenditure that may be required and taking account of the needs of airport users*”. As part of this assessment, the appraisal framework looked to assess “*whether any public support can plausibly be delivered in line with European rules regarding State aid*”<sup>16</sup>. The main implication around public expenditure is in the provision of surface access infrastructure to the short-listed schemes and how this should be funded.
- 3.11** In its assessment, in the consultation documentation the implications of State aid were considered<sup>17</sup>, along with the scale and timing of surface access costs that were identified for the three short listed schemes<sup>18</sup>. While it would be expected that there would be a contribution to these costs by those parties benefitting from the infrastructure, the level of this contribution would be a matter for negotiation between government and the delivery organisation. As such, the analysis presented in the consultation documents looked to assess the range of funding outcomes from a full private sector contribution to surface access costs to full public funding of the cost profile<sup>19</sup>. Following responses to consultation, market soundings were

16 See report “Airports Commission: Appraisal Framework”, April 2014.

17 See report “13. Cost and Commercial Viability: Literature Review”, November 2014.

18 See report “13. Cost and Commercial Viability: Financial Modelling Input Costs”, November 2014.

19 See report “13. Cost and Commercial Viability: Funding and Financing”, November 2014.

taken on the commercial viability and financeability of the short listed schemes<sup>20</sup>. One of the findings of this analysis was that all short listed schemes were considered to be commercially viable and financeable on the basis of the sensitivities modelled at consultation (i.e. including the sensitivity where the delivery body made a full contribution to the surface access costs).

- 3.12** It is recognised however that market conditions may be less buoyant by the time a recommended scheme is looking to raise finance and that there may be a need for the involvement of government in facilitating the financing of surface access costs (See also Sections 4 and 5 of this report). In light of consultation responses on the topic of State aid, additional analysis has therefore been undertaken on the subject to further enhance the evidence base.
- 3.13** The Commission has taken further legal advice on the topic as well as meeting with the official responsible for State aid within the European Commission with further follow up.

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20 See report “Cost and Commercial Viability: Sources of Finance”, July 2015.

## 4. Sources of Finance – UK Guarantee Scheme (UKGS)

### Overview

- 4.1** The UK Guarantee Scheme (UKGS) was launched in July 2012, with subsequent enabling legislation in the Infrastructure (Financial Assistance) Act 2012 to give financial assistance (loans, guarantees or indemnities) for the provision of infrastructure<sup>21</sup>. While the legislation operates within an expenditure and liability envelope of £50bn, the UKGS element of this is £40bn.
- 4.2** The government rationale for establishing UKGS was to avoid delays to infrastructure projects caused by a lack of availability of long-term financing. The approach taken minimises the impact on the government's finances while encouraging new sources of liquidity (especially UK pension funds) to consider the infrastructure asset class. Finally the approach has looked to avoid crowding out private sector initiatives where they are able to meet the requirements of infrastructure developers.
- 4.3** The UKGS product provides credit substitution to lenders. In simplified terms, this means that the borrower (the infrastructure project) receives funds from the lenders, but risks associated with repayment are borne, for a fee, by the third party providing the guarantee, which in the case of the UKGS is the UK Government. There are still sovereign credit risks associated with the UK Government, but there are a broader pool of investors prepared to invest on a sovereign risk basis to an infrastructure project with risks relating to the project guaranteed by the UKGS product. The UKGS product follows a similar commercial precedent offered by monoline insurers.
- 4.4** The UKGS support is managed by a team of 10-12 commercial staff with a commercial finance background who assess lending opportunities through a two stage process:

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21 "Infrastructure (Financial Assistance) Act 2012 (Chapter 16)", TSO, October 2012.



## Infrastructure UK

### Application and approval process

#### Stage 1 – Pre-qualification



#### Stage 2 – Approval



- 4.5** Since its establishment, the UKGS team have received approaches from the over 200 infrastructure projects of which 39 have been pre-qualified. The UKGS team has not yet received an approach from a commercial airport operator. To date, seven guarantees have been issued, with a total value of approximately £2bn. These cover a range of sectors including energy, transport, waste management and higher education. They have also been issued on a range of transactions including green-field project finance transactions (e.g. Mersey Gateway Bridge) and brown-field corporate finance transactions (e.g. Drax Power Station).
- 4.6** In addition to the guarantees issued, a further 12 projects have pre-qualified, undergone detailed assessment by the UKGS team, but have ultimately been able to raise funds without the need of the guarantee. This reflects the aim of the UKGS approach to not crowd out private sector activity, and market feedback from project developers is that the additional liquidity available has been supportive to them obtaining the best market terms available for debt finance.

- 4.7** By acting as a guarantor, in the event that the borrower defaults (i.e. the infrastructure project were not able to service its debt repayment schedule), then the UK Government will pay guaranteed lenders the scheduled interest and the principal on the underlying guaranteed debt. The approach could therefore be a mechanism for State aid, however for this to occur, there would need to be demonstrated that a business receives a selective advantage or benefit from the guarantee being provided.
- 4.8** In developing the UKGS, the structure has been established along what is referred to as the market economy investor principle. In very simplified terms, if the person receiving support from a government pays a market price for that support, then it does not get an advantage or a benefit and therefore does not receive State aid. It also means that were a project not commercially viable, it would not be able to receive support from the UKGS product in the same way that the project would not be able to raise funds on the commercial market.
- 4.9** In establishing what a market price would be, there are a number of options available to the UKGS product. One mechanism by which this is achieved is by co-lending to a project on identical terms to a commercial lender. Another approach is to have the risks of a particular investment assessed by an independent rating agency, and then price the guarantee based on debt of similar credit quality and maturity with an adjustment for liquidity.
- 4.10** The approach does not eliminate the risk of challenge to a guarantee issued by UKGS on the grounds of illegal State aid. The specific nature of a challenge would relate to the terms of an individual guarantee, however the template form for the guarantee has been independently assessed by one of the ratings agencies, Moody's, confirming that the approach proposed is similar to that of a commercial third party guarantor<sup>22</sup>, and subsequent assessment of the risks around successful State aid challenge is considered by the rating agency to be remote<sup>23</sup>.

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22 "UK Guarantee Template Expected to Achieve Credit Substitution", Moody's Investors Service Special Comment, July 2013.

23 "Q&A: State Aid Risk and the UK Guarantees Scheme", Moody's Investors Service Special Comment, June 2014.

## Future developments

- 4.11** The current scheme can provide support to projects achieving financial close by 31st December 2016. The scope for extending the scheme and how it might be applied beyond this date is currently the subject of evidence gathering with market participants, including government departments, but no decisions on the future of the scheme have been made at this time.
- 4.12** There are a number of infrastructure projects actively going through their assessment by the UKGS team within the current scheme. By far the largest of these in value is the guarantee in support of the Hinckley Point C nuclear power station, a project with an estimated capital expenditure of £16bn. The use of the guarantee in this context will be to support the full debt financing package.
- 4.13** Since the launch of the scheme, there have also been developments within the commercial bank market. Appetite has recovered for certain types of transactions, especially for brown-field, lower risk operational assets. In addition, there has been a change in the UK infrastructure pipeline in recent years with an increasing emphasis from social towards economic infrastructure projects, which tend to be higher risk (complex construction), larger, one-off projects. The consequence of this that current requests to use the UKGS are more around risk and scale, rather than a lack of availability of long term debt.

## The Airports Commission context

- 4.14** The current scheme provides additional liquidity to projects looking to seek debt finance, with over 50 investors having invested in the underlying debt instruments supported by the guarantees. Guarantees have been issued successfully across a range of sectors and different transaction types, including to corporates looking to develop infrastructure on existing operational assets, the approach that has been modelled in the Cost and Commercial Viability workstream. While not issued at this time, the scale of the proposed guarantee for the Hinckley Point C nuclear power station is of the same order of magnitude as the short listed schemes under consideration by the Commission.
- 4.15** The main issue with the current UKGS, is the planned expiry in December 2016. The current delivery timetable for all short listed schemes would not conclude within this timescale. To be eligible for a product such as the UKGS, its availability would need to be extended beyond its current horizon.

**4.16** Were there to be an extension, it is likely that a project such as new runway capacity would be an appropriate candidate for support, based on the existing UKGS product:

- It would be providing support to a nationally significant infrastructure project;
- While market sounding discussions suggest that there is sufficient capacity to finance the short listed schemes, future market conditions may be less buoyant resulting in liquidity issues nearer to the time when finance is to be raised<sup>24</sup>.
- The current airport operators both have existing ratings for their senior debt. While future development would require further assessment by the rating agencies, there are established benchmarks for pricing of debt at the two airports where the short listed schemes are located;
- Flexibility in the product allows for guarantees against different types of debt products, including higher risk, mezzanine, tranches. Combined with the scale of financing required, especially for the Heathrow-based schemes, this reflects current developments in the use of the existing UKGS product.

**4.17** Finally it is noted that none of the scheme promoters have approached the UKGS team to date.

**4.18** In summary, while the availability of a product such as that provided by the UKGS is not a requirement on the basis of soft market testing conducted by the Commission, a product of this nature would add further resilience to the financeability of the short listed schemes given their inherent commercial viability.

## Rationale and methodology

**4.19** Following responses to consultation, further research was conducted to augment the evidence base of the Commission as part of the Cost and Commercial Viability workstream, which has the objective of assessing the short listed schemes “*to be affordable and financeable, including any public expenditure that may be required and taking account of the needs of airport users*”. The UKGS approach is currently a source of finance to infrastructure projects and its availability to support new runway capacity would support the financeability of any scheme that were to be developed.

**4.20** The Commission and its financial advisers have interviewed members of the UKGS team. There has been follow up correspondence with the UKGS team as well as reviewing independent research on the scheme.

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24 Further details of this analysis are provided in the PwC technical report “Cost and Commercial Viability: Sources of Finance.”

## 5. Sources of Finance – European Investment Bank (EIB)

### Overview

- 5.1** The European Investment Bank (EIB) is the European Union’s bank. It is a multilateral institution owned by and representing the interests of the European Union Member States with over 90% of its activity focussed in Europe.
- 5.2** The support provided by the EIB to EU Member States is primarily through loans, although other lending products (e.g. guarantees) are also available. Engagement is often as part of a blended package of support alongside other sources of funding and finance (e.g. EU Structural Funds) to develop a commercially viable package for a given project, with lending generally of the order of one-third of the total requirement, although it can be as much as 50%.
- 5.3** As a multilateral institution, support is provided to promote growth and employment in Europe, with focus around four priority areas:
- Innovation and Skills
  - Access to finance for smaller businesses
  - Climate Action; and
  - Strategic Infrastructure
- 5.4** As well as the need to be commercially viable loans supporting the policy goals of members, loans are also required to meet economic, technical, environmental and social standards as part of the accountability to EU citizens beyond that of a purely commercial lending institution.
- 5.5** The EIB is the largest multilateral institution globally by lending volume (EUR 77 billion was loaned in 2014). The majority of this lending is financed by EIB bond issues on the international capital markets. With the backing of the EU Member States as owners, the EIB credit rating is very high quality (triple-A) allowing the institution to borrow at lower rates which in turn should be reflected in the terms they are able to offer to the projects supported.

## The UK context

**5.6** As with other EU member states, projects based in the UK are recipients of EIB support. Lending activity to the UK reached a new high point in 2014 at around £6bn, a 50% increase on 2013. Recent activity by the EIB with UK borrowers has included a number of larger loans in recent years:

Loan Amount	Borrower	Date
£1.5bn	National Grid <sup>25</sup>	November 2014
£0.7bn	London Array Offshore Windfarm <sup>26</sup>	June 2010
£1.0bn	Thames Tideway Tunnel <sup>27</sup>	Not yet committed (transaction scheduled to close in 2015)

**5.7** The loan to the National Grid is the single largest loan made by the EIB and while able to achieve these spikes in individual loans to a particular sector/country, the EIB looks to balance its exposure when assessing credit risk within the context of its portfolio of loans.

**5.8** While it would be the responsibility of the developer looking to raise funds to approach the EIB, there would be a role for the UK appointed director at the EIB to support the case for the spike in lending. Given the timescales associated with large infrastructure projects, early engagement, 2-3 years in advance of the need for the loan, between the EIB and the UK government would be constructive as part of supporting the financeability of the scheme.

**5.9** Further to this support and as part of managing its overall credit risk, government may also support financeability through credit enhancement and there has been active engagement between the EIB and the UK Guarantee Scheme (UKGS). In this context, the EIB is able to invest in the underlying debt instrument, with the UKGS product pricing for project risks (see section 4 of this report for further details of the UKGS product).

25 <http://www.eib.org/infocentre/press/releases/all/2014/2014-248-largest-ever-eib-loan-provides-gbp-1-5-billion-for-national-grid-investment.htm>

26 <http://www.eib.org/projects/pipeline/2009/20090108.htm>

27 <http://www.eib.org/projects/pipeline/2012/20120306.htm>

## The Airports Commission context

**5.10** At a sector level, transport is a priority lending area for the bank under the policy defined in the “EIB Transport Lending Policy” (December 2011)<sup>28</sup>. Airports form part of this policy and the EIB has made a number of recent loans in the sector including the following examples:

Loan Amount	Borrower	Project	Date
EUR 140m	Esercizi Aeroportuali Sea	Development and upgrading of Malpensa Airport (Milan) including terminal redevelopment and rail connection <sup>29</sup>	December 2014
EUR 100m	Aéroports de la Côte d’Azur	Redevelopment of airside and landside facilities at Nice airport <sup>30</sup>	November 2014
EUR 80m	Medjunarodna zračna luka Zagreb	Design and construction of a new passenger terminal building at Zagreb Airport <sup>31</sup>	December 2013
EUR 200m	Schipol Airport	Development of central security facility <sup>32</sup>	September 2013
EUR 140m	Aéroports de Lyon	New passenger terminal development and reconfiguration of existing terminals and taxiways to improve capacity <sup>33</sup>	July 2013

**5.11** While the EIB has been active in lending to airports across Europe, the scale is less than some of the more recent EIB loans to UK borrowers. This would need to be recognised in the context of any lending request from an airport operator or other delivery body to the EIB.

**5.12** In addition, recent lending is for supporting infrastructure at the airports in question, rather than the building of additional runway capacity. The EIB considers applications against its lending criteria. Beyond the economic viability of any loan

28 <http://www.eib.org/infocentre/publications/all/eib-transport-lending-policy.htm>

29 <http://www.eib.org/projects/pipeline/2013/20130486.htm>

30 <http://www.eib.org/infocentre/press/releases/all/2014/2014-259-leurope-soutient-a-hauteur-de-100-meur-lextension-et-la-modernisation-de-laeroport-nice-cote-dazur.htm>

31 <http://www.eib.org/infocentre/press/releases/all/2013/2013-215-eib-supports-zagreb-airport-expansion-ppp-project-with-eur-80-million.htm>

32 <http://www.eib.org/infocentre/press/releases/all/2013/2013-150-eib-provides-eur-200m-to-schiphol-airport-terminal-transformation-and-ending-gate-security-checks.htm>

33 <http://www.eib.org/infocentre/press/releases/all/2013/2013-108-leurope-finance-le-developpement-daerports-de-lyon-a-hauteur-de-140-meur.htm>

application, the proposal must also meet additional criteria that include technical robustness, procurement practices and environmental impact. In terms of environmental impact, projects should demonstrate improved environmental outcomes such as improved ability to access an airport by public transport, as is the case of an existing EIB loan to HAL in support of the Heathrow Express rail link.

- 5.13** In summary, while soft market testing conducted as part of the Cost and Commercial Viability assessment would suggest that there is sufficient debt finance capacity, market conditions may be less buoyant at the point then significant finance needs to be raised to support the delivery of additional runway capacity. The availability of EIB finance provides additional liquidity to support this. Loans of around £1bn have been achieved by UK infrastructure borrowers recently, but loans of this scale would benefit from UK government signalling and facilitation 2-3 years in advance of the requirement. Further consideration would also need to be given to structuring any loan application to meet the policy-based lending criteria of EIB, especially around environmental impact.

## Rationale and methodology

- 5.14** In response to consultation, it has been decided to conduct further research to support the evidence base of the Commission as part of the Cost and Commercial Viability workstream. The objective of this workstream is looking assess the short listed schemes *“to be affordable and financeable, including any public expenditure that may be required and taking account of the needs of airport users”*. Within this objective, the availability of finance is a key consideration and a number of workstreams have looked at this issue in further detail, including this assessment of the potential availability of finance from the EIB.
- 5.15** In conducting this analysis, the Commission and its financial consultants have interviewed officials of the EIB. There has also been follow up correspondence with the EIB as well as desk-based research of publicly available data sources.

