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Appraisal Framework Module 13. Cost and Commercial Viability: Cost and Revenue Identification Gatwick Airport Second Runway

Airports Commission

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Executive Summary

This report sets out the assessment of the capital cost to deliver the Gatwick Airport Second Runway scheme, which includes an additional runway, taxiways and terminal infrastructure. The assessment has been undertaken in general accordance with HM Treasury's The Green Book - Appraisal and Evaluation in Central Government, which advises the adjustment of base cost estimates to include risk and optimism bias. The scheme is estimated to cost £9.3 billion with mitigated optimism bias applied and £10.7 billion with unmitigated optimism bias for the construction of all phases, compared to Gatwick Airport Limited's estimate of £7.4 billion (excluding surface access costs. GAL's estimate does not include optimism bias). Under certain demand scenarios forecast demand does not require the construction of all phases reducing the estimated costs to £7.4 and £8.5 billion with mitigated and unmitigated optimism bias respectively.

In order to enable the Cost and Commercial Viability study to consider the viability of the scheme investment, the report also summarises the wider cost and revenue context of that investment. Therefore, assessments were made of the underlying investment in airport infrastructure that would be required irrespective of the second runway investment, the ongoing maintenance and replacement of the existing and developed asset, the ongoing operational expenditure relating to the existing and developed asset, the non-aeronautical revenue the existing and developed asset would generate; and, beyond the airport boundary, the surface access works required to facilitate the scheme (along with the operational and maintenance costs of those surface access improvements).

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Contents

1 Introduction

This report sets out the determination of the capital cost estimate to develop the Gatwick Airport Second Runway scheme (hereafter "the scheme"). Section 2 sets out an overview of the methodology adopted, with the analysis presented in Section 3.

Recognising that it is not possible to determine with accuracy a single cost estimate, the primary aim of the study was to establish an estimate upon which it would be reasonable for the assessments within Appraisal Framework Module 13: Cost and Commercial Viability to be conducted.

Details of the scheme costs and supporting detail are presented in Appendices B and C.

In order to enable the Cost and Commercial Viability study to consider the viability of the investment in the scheme, it was necessary to understand the wider cost and revenue contexts of that investment. Therefore, assessments were also made of the following:

- *the underlying investment in airport infrastructure that would be required irrespective of the second runway investment, referred to as Core works in this report, as discussed in Appendix D;*
- *the ongoing replacement of the existing and developed asset, as also discussed in Appendix D;*
- *ongoing operational expenditure relating to the existing and developed asset, as also discussed in Appendix F;*
- *non-aeronautical revenue the existing and developed asset would generate as discussed in Appendix G; and*
- *beyond the airport boundary, the surface access works required by the scheme along with the operational and maintenance costs of those surface access improvements as discussed in Appendix H.*

Throughout this report a consistent colour scheme has been adopted to present the cost and revenue estimates developed for each demand scenario. With reference to the demand scenarios presented in Section 0, the scenarios and their respective colours are as given in Table 1-1:

	Scenario
	Assessment of Need Carbon Capped
	Assessment of Need Carbon Traded
	Low Cost is King Carbon Traded
	Global Fragmentation Carbon Capped
	Gatwick Airport Ltd
	Airports Commission forecast rebased against Gatwick Airport Ltd traffic forecast

Table 1-1 Demand Scenario Reference Colours

2 Methodology

2.1 Approach

Throughout this report consistent nomenclature has been adopted. Estimates were developed for "Core" and "Scheme" costs, where the "Core" works relate to the investment in the airport irrespective of investment in the additional runway works, the additional cost of which is reported as the "Scheme" cost. The Scheme works were established from the promoter's submission to the Airports Commission. Details of the approach to the Core works and to asset replacement are presented in Appendix D.

2.2 Scheme Capital Cost

The over-arching approach was to assess the reasonableness of the estimate provided by Gatwick Airport Ltd (GAL) in order to reach a view as to an appropriate estimate to be used with the Cost and Commercial Viability assessment. This was undertaken by comparison of the provided costs, or any costs independently determined, against industry expectation. All costs were re-based as necessary to be consistently presented in 2014 values.

The following tasks were undertaken:

- *the scope of work was determined and disaggregated into the greatest level of detail reasonably possible from material provided and appropriate to this stage of analysis;*
- *for each element of the disaggregated works the effective unit rate was determined;*
- *the unit rate was assessed for whether it was in accordance with expectation of a reasonable market rate taking into account the nature, site and location of the works;*
- *amendments were made as appropriate;*
- *the base cost was established and risk and optimism bias were applied as discussed below.*

A 15% project on-cost was added to the base construction cost to allow for design and project management services. This cost was included within the base cost and therefore adjusted for risk and optimism bias. Optimism bias was applied to the risk adjusted base cost.

Noting the inherent nature of capital expenditure projects to exhibit risk and uncertainty the processes and guidance of HM Treasury's The Green Book - Appraisal and Evaluation in Central Government (hereafter referred to as "The Green Book")[1], and supplementary guidance with respect to optimism bias[2] were adopted. The guidance recommends making such adjustments on the basis that there is a demonstrated, systematic tendency for project appraisers to be overly optimistic. A risk premium was applied to address the unknown engineering detail of the identified works which would be expected to lead to an under estimate of the cost despite the scope being reasonably defined. For example, geological surveys may find that the tunnels (if required for baggage or transit systems) need to be

[1] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/220541/green_book_complete.pdf
[2] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/191507/Optimism_bias.pdf

bored through much harder rock than previously expected. Risk premiums of 20% on Scheme costs were adopted to take account of the risk of the costs to deliver the identified scope of works increasing. These allowances are in line with our expectation of typical allowances at this stage of project development.

Scheme costs were assessed in as much detail as possible based upon the extent of information presented by the promoter and as appropriate to this stage of analysis. Engineering judgement and experience were used to assess whether the detailed item rate, or a higher aggregate planning rate, was appropriate for the element of the works, its engineering context and the operational environment within which the works would be constructed. This judgement was based upon Jacobs's experience of similar airport projects within London and within the UK.

The environmental and community impact and mitigation costs are the costs as presented by the promoters. The parallel studies being undertaken on behalf of the Airports Commission have indicated that the scale of the costs proposed are reasonable assumptions, although noting that developing a detailed budget for such costs is difficult at this stage as particular aspects of design can have significant knock on effects and the costs may increase by up to circa 50%. This falls within the range of sensitivities treated within the Commission's financial modelling, further detail of which can be found in 13. Cost and Commercial Viability: Funding and Financing Assessment.

2.2.1 Risk and Optimism Bias

(a) Risk

Based upon our expectation of a reasonable allowance at this stage of project development, a 20% risk premium was applied. We would note that this allowance could be seen as being optimistic and that a higher allowance would not be considered inappropriate. We note however that the individual items of work base costs (the risk and optimism bias unadjusted costs) make due allowance for the environments in which they will be delivered and/or the complexity of the items of work. Therefore, whilst we would observe 20% to be at the lower end of an expected range for projects at this relatively early stage of development, we consider it to be a reasonable base upon which to establish a reasonable cost estimate.

(b) Optimism Bias

HM Treasury's Supplementary Green Book Guidance sets out a detailed calculation method to establish the appropriate level of optimism bias to be applied taking into account a number of factors. Noting that these calculations require judgement across a range of factors, most of which are difficult to establish with accuracy from an external assessment to the organisation reasonable for project delivery, and noting that those assessments are subjective in nature rather than demonstrably objective, the approach to optimism bias was to establish a reasonable allowance, rounded to the nearest 5%, applied consistently to each scheme.

The works were assessed, at a high level, to determine the types of project(s) applicable and the weighting that should be applied based on their percentage of the total budget. The works were assessed to comprise a mixture of Standard Building and Standard Civil Engineering. However we note that this mixture is open to interpretation and may change as the nature of the scheme develops.

The upper bounds, the starting points for determining the appropriate level of adjustment for optimism bias, are 24% for Standard Buildings and 44% for Standard Civil Engineering. The upper bound figures relate to average historic optimism bias at the outline business case stage for traditionally procured projects. The Green Book approach does not require each component of the scheme to be analysed separately, other than by project type as described above. Based upon a representative distribution between these two construction types, an upper bound of 38% was determined. This rate was adopted as the upper bound/unmitigated estimate of optimism bias.

The upper bound optimism bias can be reduced according to the extent to which various contributory factors have been managed as listed in Appendix B.

The works were assessed to be largely undertaken beyond the current airport boundary, within areas of less well known site conditions, in part out-with extant procurement processes and, given the long time frame and uncertainty of the investment, with a developing business case. The calculations in line with The Green Book are presented in Appendix B. Appendix B also sets out comments and notes of the processes and strategies that the airport would be expected to adopt in support of reducing the optimism bias from the upper bound value. Following this analysis a 20% mitigated optimism bias was adopted.

We note that GAL commented on the applicability of, and methodology for, the adoption of optimism bias. We note GAL's comments and also that The Green Book methodology is in part subjective and open to differing interpretation or assumption on each mitigating factor. We consider the adopted rates (mitigated: 20% and unmitigated: 38%) to be appropriate allowances at this stage of project development within the context of the analyses in which these cost estimates are to be used. It would be expected, however, that as the scheme is developed and reaches more advanced stages of design, the estimates for optimism bias are likely to decrease significantly and ultimately reach next to zero as construction begins and risks either materialise or are no longer relevant.

(c) Summary of Adjustments

In summary, the following adjustments for risk and optimism bias were made:

		Scheme
Risk		20
Optimism Bias	**Mitigated**	20
	Unmitigated	38

Table 2-1 Summary of Risk and Optimism Bias Adjustments to the Base Costs (%)

2.3 Phasing

The Scheme cost estimate was determined in total and by build phase. Reference should be made to the Gatwick Airport Appraisal Module 14: Operational Efficiency Ground Infrastructure report for detail of the individual phases. For the purposes of informing the Cost and Commercial Viability assessments, the capital costs of each build phase were triggered by demand against the requirements of the following four principal demand scenarios and as shown in Figure 2-1:

- *Assessment of Need Carbon Capped*
- *Assessment of Need Carbon Traded*
- *Low Cost is King Carbon Traded*
- *Global Fragmentation Carbon Capped*

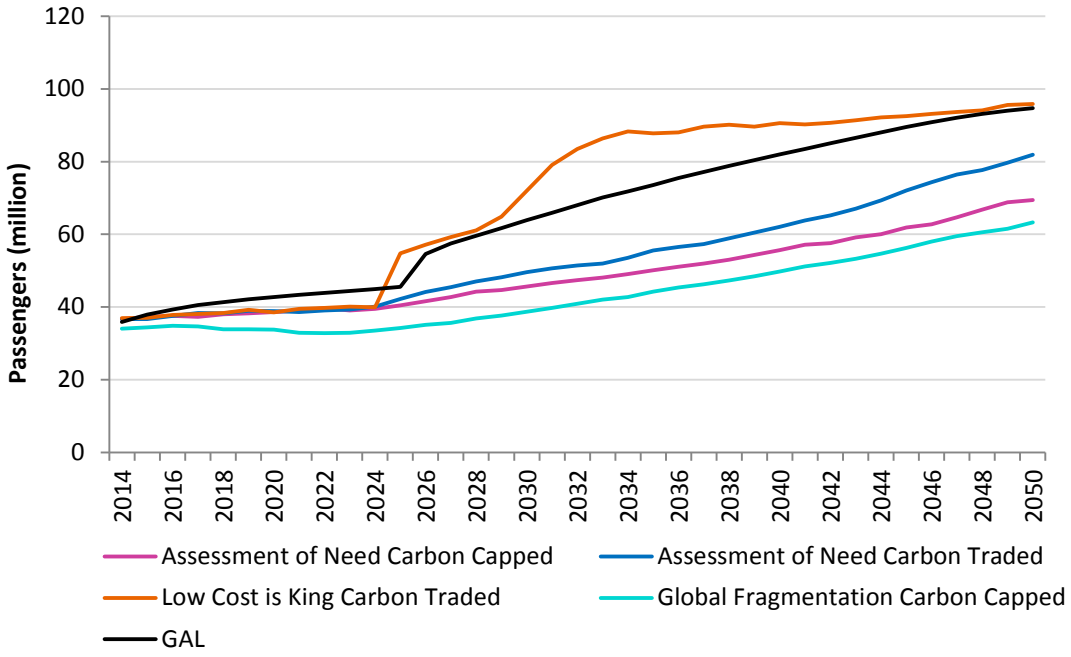

Figure 2-1 Airports Commission Demand Scenarios[3]

In addition the cost estimate was also assessed using GAL's own traffic forecast as also shown in Figure 2-1.

Opening of the second runway was driven by air transport movement (ATM) demand exceeding the current capacity irrespective of passenger demand. Although certain demand scenarios exceeded the 280,000 ATM per annum capacity of the existing runway before 2025, the earliest the second runway was assumed to be opened was 2025, based upon the Airports Commission's view of the likely timescale required for regulatory and planning processes.

Each phase was assumed to open at the end of the year before demand was forecast to exceed capacity. With reference to the Operational Efficiency Ground Infrastructure report, the following phase capacities were adopted.

[3] GAL traffic is presented in financial years, whereas the Airports Commission's demand scenarios are presented in calendar years. As shown on the chart, GAL financial year, for example, 2035/36 is shown in calendar year 2036. Consequently the runway appears to open in different years.

Phase	Capacity (mppa)
Existing	42
Improvements	45
Phase 1	60
Phase 2	75
Phase 3	95

Table 2-2 Capacity Provision by Phase

In the years prior to opening of the phase, the estimated cost of the phase was incurred over a period of five to six years depending upon the value of expenditure, following a simplified, but typical sigmoidal curve (S-curve) profile.

3 Scheme Capital Expenditure

Following the approach set out in Section 2.2, the elements of the scheme were disaggregated based upon the data provided by GAL within its submissions. This enabled a statement of quantity and rate by item. The quantities were confirmed against the scheme master plan and the rates compared to our expectation of a reasonable market rate taking into account the nature, site and location of the works. Risk and optimism bias adjustments were applied to the base case. Appendix C presents the resulting build-up of the Scheme works (including mitigated optimism bias) for all phases. The cost was estimated to be £9.3 billion with mitigated optimism bias applied and £10.7 billion with unmitigated optimism bias, compared to GAL's estimate of £7.4 billion (excluding surface access costs and optimism bias). Under certain demand scenarios forecast demand does not require the construction of the final phase reducing the estimated costs to £7.4 and £8.5 billion with mitigated and unmitigated optimism bias respectively.

Section 3.1 summarises the forecast Scheme capital expenditure by year against each of the Airports Commission's demand scenarios. As certain demand scenarios do not require the full build-out of all phases, the difference between the scenarios is both the profile of expenditure required to deliver capacity in line with the differing demand requirements and the total expenditure, which is dependent upon whether Phase 3 is required before 2050 or not, with the total varying between the values given above.

Section 3.2 presents the Scheme capital expenditure estimate rebased against GAL's traffic forecast.

For comparison, Section 3.3 presents GAL's Scheme capital expenditure forecast.

Table 3-2 to Table 3-6 in Section 3.4 present the data underlying Figure 3-1 to Figure 3-5 in the preceding sections.

In summary, for each scenario, Scheme capital expenditure is as shown in Table 3-1 with mitigated and unmitigated optimism bias. For reference, GAL's estimate is also stated unadjusted for optimism bias.

Scenario	Optimism Bias	
	Mitigated	Unmitigated
Assessment of Need Carbon Capped	7,387	8,495
Assessment of Need Carbon Traded	9,340	10,740
Low Cost is King Carbon Traded	9,340	10,740
Global Fragmentation Carbon Capped	7,387	8,495
Airports Commission forecast rebased against Gatwick Airport Ltd traffic forecast	9,340	10,740
GAL	7,389	

Table 3-1 Total Scheme Capital Expenditure by Demand Scenario (2014 prices, £'million)

3.1 Airports Commission Demand Scenarios

3.1.1 Assessment of Need Carbon Capped

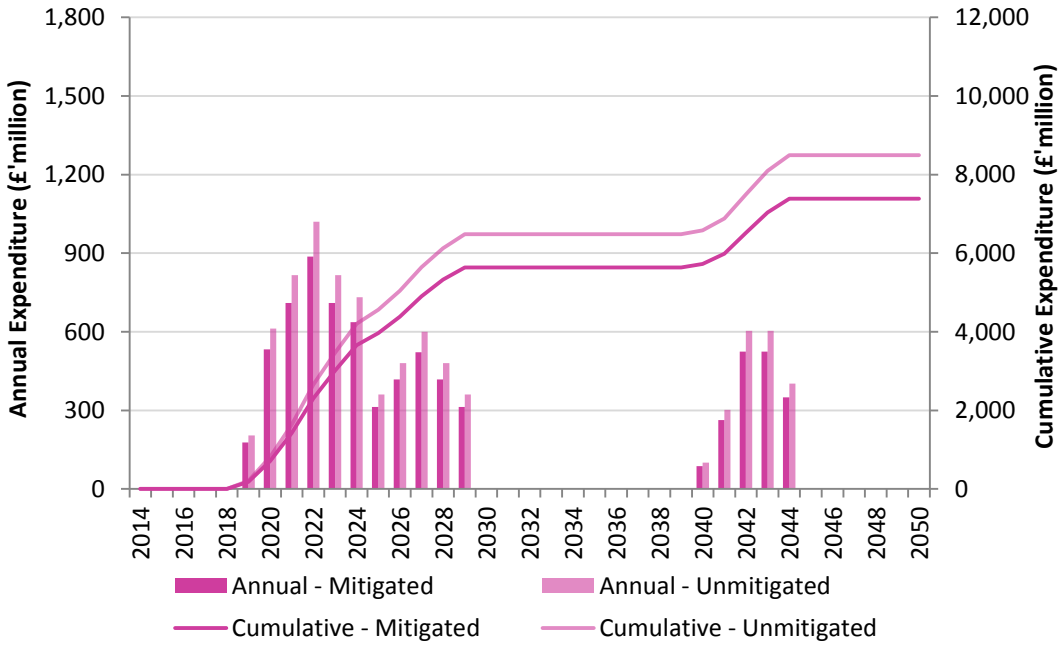

Figure 3-1 Assessment of Need Carbon Capped

3.1.2 Assessment of Need Carbon Traded

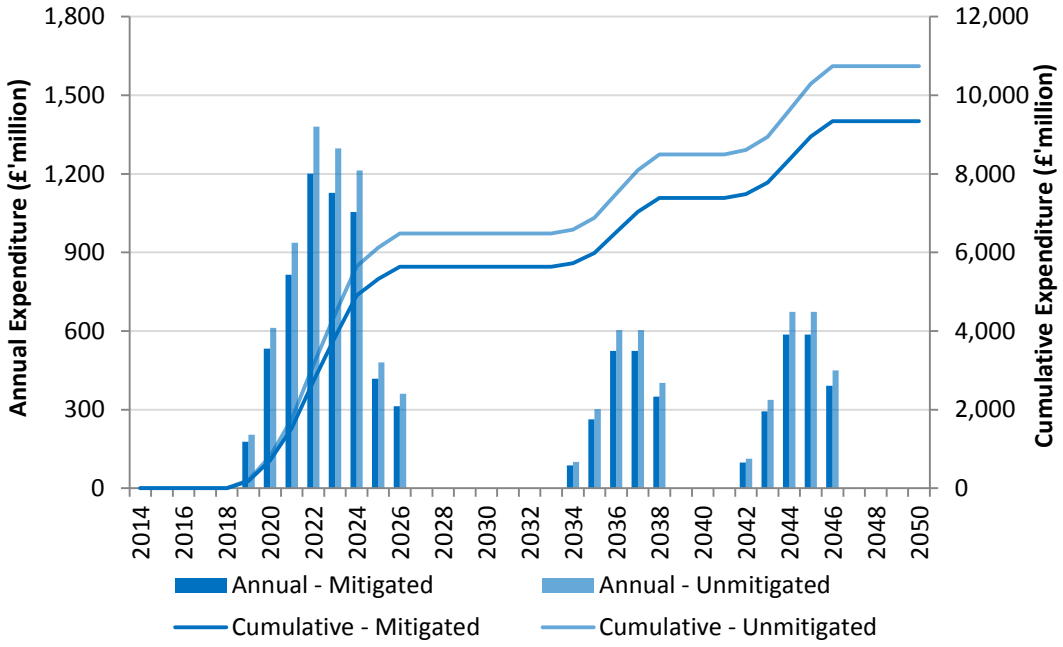

Figure 3-2 Assessment of Need Carbon Traded

3.1.3 Low Cost is King Carbon Traded

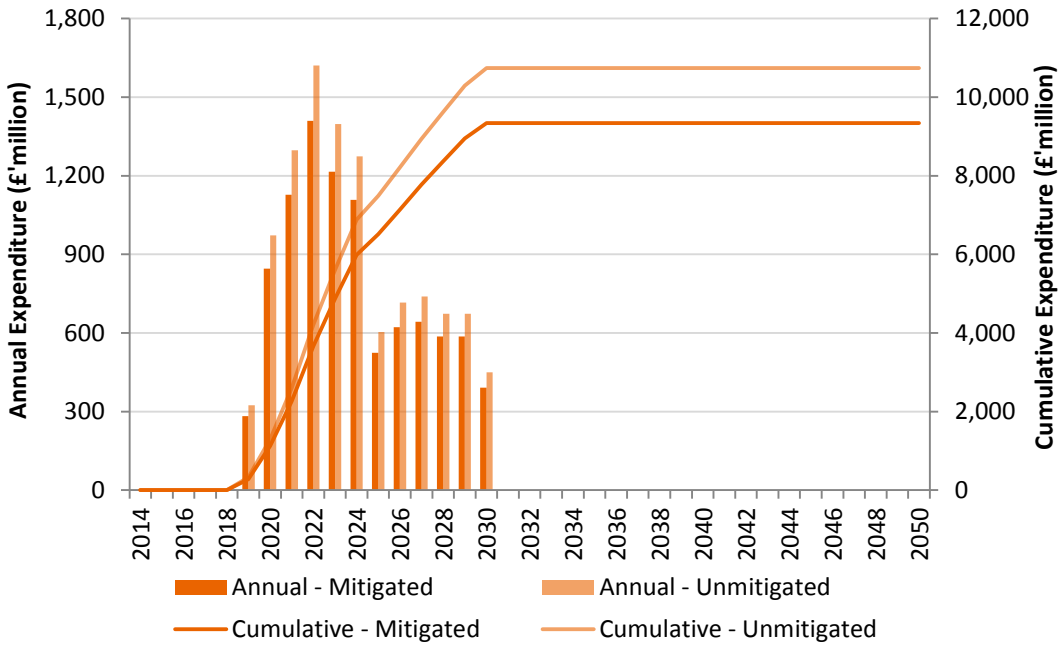

Figure 3-3 Low Cost is King Carbon Traded

3.1.4 Global Fragmentation Carbon Capped

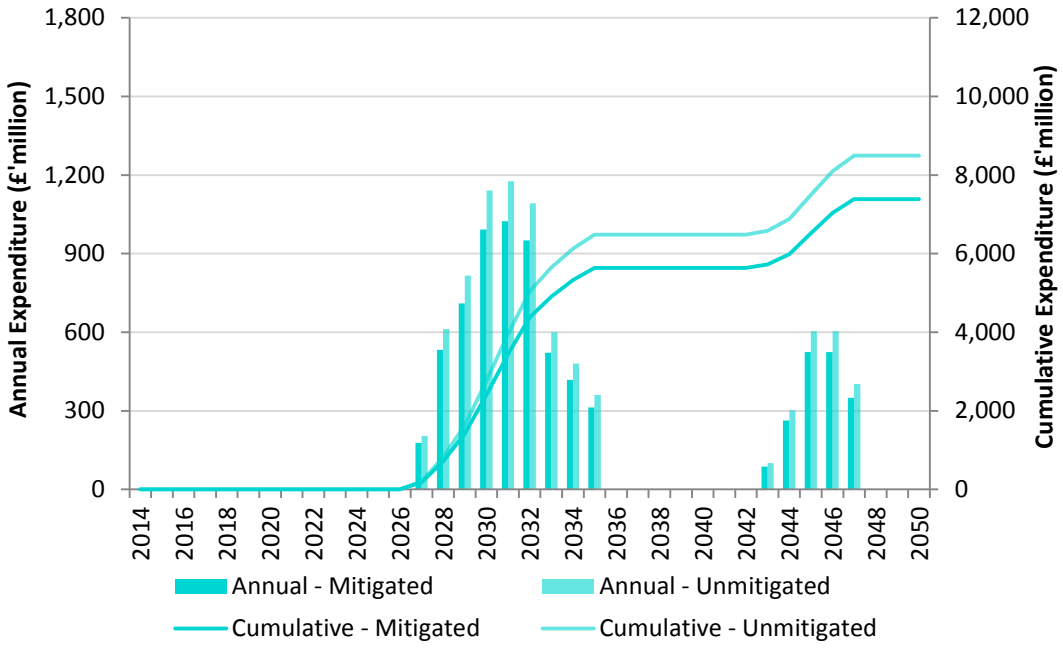

Figure 3-4 Global Fragmentation Carbon Capped

3.2 Rebased Adopting GAL Traffic Forecast

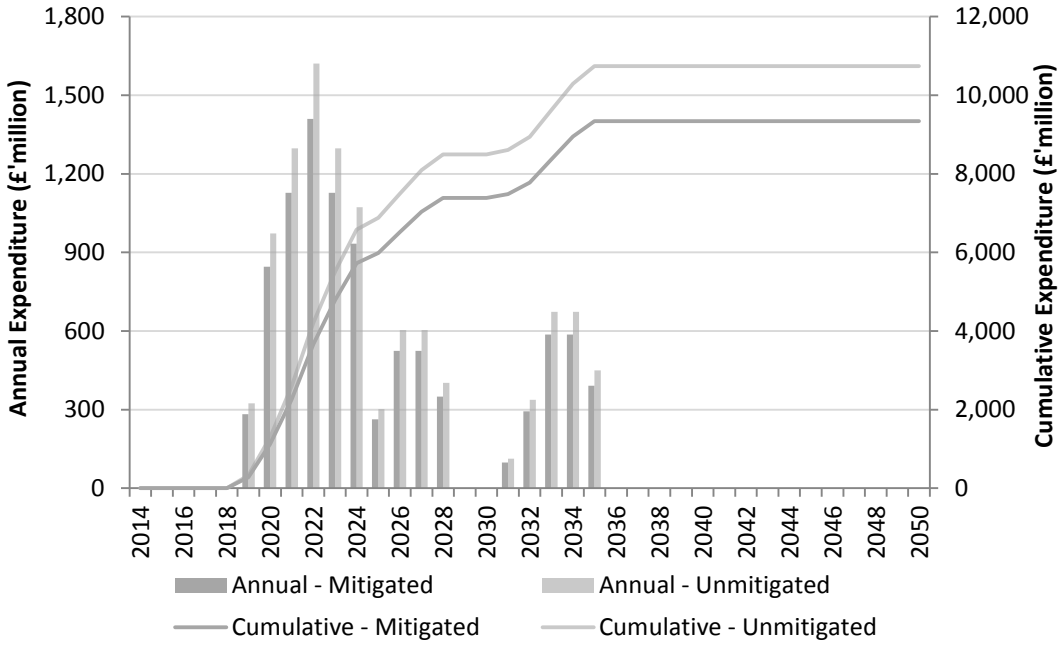

Figure 3-5 Rebased Adopting GAL Traffic Forecast

3.3 Gatwick Airport Ltd Scheme Capital Expenditure

GAL estimates a total Scheme expenditure of £7.4 billion (excluding surface access), incurred across four phases (as discussed in the Operational Efficiency Ground Infrastructure report), with a profile of expenditure as presented in Figure 3-6. No adjustments have been made to this presentation which therefore is unadjusted for optimism bias and includes risk following the methodology adopted by GAL.

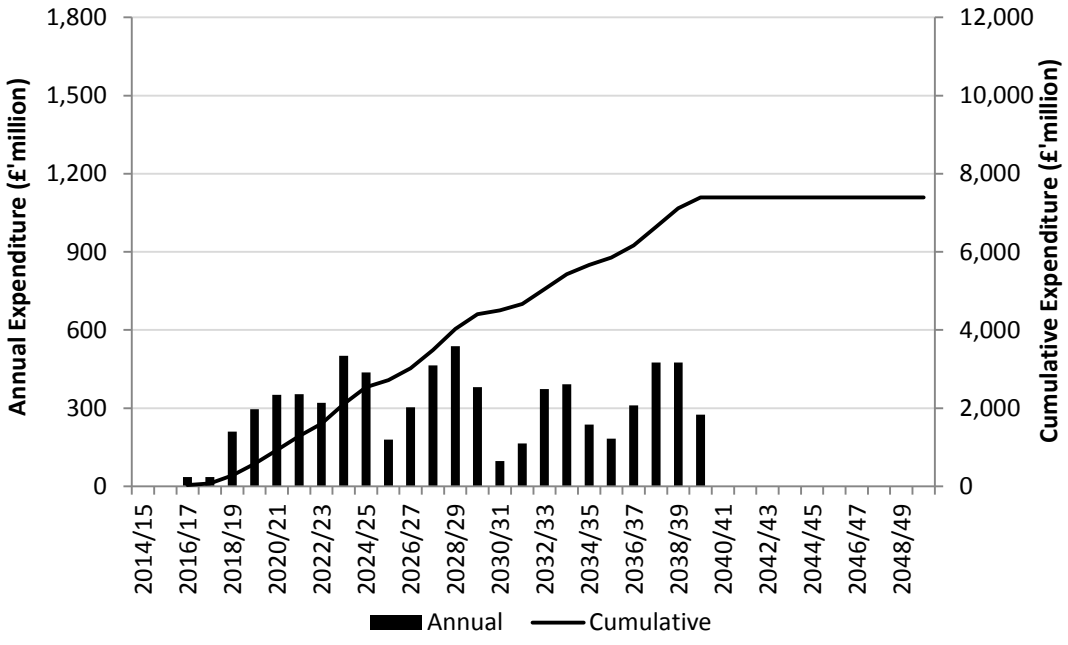

Figure 3-6 GAL Scheme Capital Expenditure

3.4 Annual Scheme Capital Expenditure Summaries

The tables on the following pages present the data underlying the previous figures with mitigated optimism bias. These tables are based upon the detailed breakdown presented in Appendix C, but, for the purpose of enabling the assessment of depreciation, summarises the total expenditure into the following headings. General costs itemised separately with the breakdown presented in Appendix C (enabling works, project management on-cost, etc), are distributed across the below headings in the following tables in proportion to the underlying cost of each cost heading to the total cost.

- *Terminal buildings: passenger terminal buildings including piers and satellites*
- *Plant: building plant (e.g. air conditioning, etc) including utilities and power generation*
- *Transit systems: passenger transit systems above or below ground*
- *Runways: runway and associated instrument landing systems*
- *Taxiways and aprons: taxiways, aprons and their associated systems*
- *Equipment: mobile equipment and baggage handling installations*
- *Land: acquisition of land including commercial businesses and residential properties*
- *Airfield ancillary: other infrastructure elements for example control tower, rescue and fire fighting facilities, fencing, airside roads, etc*
- *Car parks: all car parks whether multi-storey or surface*
- *Third party land users: provision of serviced plots for third party development*
- *Environment: river diversions and environmental compensation and mitigation*
- *Community: community impact compensation*

2014, real prices in £'million - Mitigated optimism bias

	Total	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Terminal buildings	***1,160***	-	-	-	-	-	-	-	-	-	-	*41*	*122*	*163*	*204*	*163*	*122*	-	-	-	-	-	-	-	-	-	-	*17*	*51*	*103*	*103*	*69*	-	-	-	-	-	-
Plant	***295***	-	-	-	-	-	*8*	*25*	*33*	*41*	*33*	*29*	*14*	*18*	*23*	*18*	*14*	-	-	-	-	-	-	-	-	-	-	*2*	*6*	*11*	*11*	*8*	-	-	-	-	-	-
Transit systems	***638***	-	-	-	-	-	-	-	-	-	-	*10*	*31*	*41*	*51*	*41*	*31*	-	-	-	-	-	-	-	-	-	-	*22*	*65*	*130*	*130*	*87*	-	-	-	-	-	-
Runways	***131***	-	-	-	-	-	*7*	*20*	*26*	*33*	*26*	*20*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Taxiways and aprons	***754***	-	-	-	-	-	*19*	*57*	*76*	*96*	*76*	*63*	*16*	*22*	*27*	*22*	*16*	-	-	-	-	-	-	-	-	-	-	*13*	*39*	*79*	*79*	*53*	-	-	-	-	-	-
Equipment	***158***	-	-	-	-	-	*0*	*1*	*1*	*1*	*1*	*6*	*14*	*19*	*24*	*19*	*14*	-	-	-	-	-	-	-	-	-	-	*3*	*9*	*17*	*17*	*12*	-	-	-	-	-	-
Land	***1,161***	-	-	-	-	-	*58*	*174*	*232*	*290*	*232*	*174*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Airfield Ancillary	***257***	-	-	-	-	-	*8*	*24*	*32*	*41*	*32*	*28*	*12*	*16*	*20*	*16*	*12*	-	-	-	-	-	-	-	-	-	-	*1*	*2*	*4*	*4*	*3*	-	-	-	-	-	-
Car Parks	***109***	-	-	-	-	-	-	-	-	-	-	*3*	*8*	*10*	*13*	*10*	*8*	-	-	-	-	-	-	-	-	-	-	*3*	*9*	*18*	*18*	*12*	-	-	-	-	-	-
Third Party Land Users	***17***	-	-	-	-	-	*0*	*1*	*1*	*2*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	-	-	-	-	-	-	-	-	-	-	*0*	*1*	*2*	*2*	*1*	-	-	-	-	-	-
Environment	***329***	-	-	-	-	-	*16*	*49*	*66*	*82*	*66*	*49*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Community	***122***	-	-	-	-	-	*6*	*18*	*24*	*30*	*24*	*18*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Risk	**1,026**	-	-	-	-	-	25	74	99	123	99	88	44	58	73	58	44	-	-	-	-	-	-	-	-	-	-	12	36	73	73	49	-	-	-	-	-	-
Optimism Bias	**1,231**	-	-	-	-	-	30	89	118	148	118	106	52	70	87	70	52	-	-	-	-	-	-	-	-	-	-	15	44	87	87	58	-	-	-	-	-	-
Total	**7,387**	**-**	**-**	**-**	**-**	**-**	**177**	**532**	**710**	**887**	**710**	**637**	**313**	**418**	**522**	**418**	**313**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**87**	**262**	**525**	**525**	**350**	**-**	**-**	**-**	**-**	**-**	**-**

Table 3-2 Assessment of Need Carbon Capped

2014, real prices in £'million - Mitigated optimism bias

Scheme	Total	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Terminal buildings	***2,018***	-	-	-	-	-	-	-	*41*	*122*	*163*	*204*	*163*	*122*	-	-	-	-	-	-	-	*17*	*51*	*103*	*103*	*69*	-	-	-	*43*	*129*	*258*	*258*	*172*	-	-	-	-
Plant	***390***	-	-	-	-	-	*8*	*25*	*38*	*55*	*51*	*48*	*18*	*14*	-	-	-	-	-	-	-	*2*	*6*	*11*	*11*	*8*	-	-	-	*5*	*14*	*29*	*29*	*19*	-	-	-	-
Transit systems	***638***	-	-	-	-	-	-	-	*10*	*31*	*41*	*51*	*41*	*31*	-	-	-	-	-	-	-	*22*	*65*	*130*	*130*	*87*	-	-	-	-	-	-	-	-	-	-	-	-
Runways	***131***	-	-	-	-	-	*7*	*20*	*26*	*33*	*26*	*20*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Taxiways and aprons	***970***	-	-	-	-	-	*19*	*57*	*82*	*112*	*98*	*85*	*22*	*16*	-	-	-	-	-	-	-	*13*	*39*	*79*	*79*	*53*	-	-	-	*11*	*32*	*65*	*65*	*43*	-	-	-	-
Equipment	***281***	-	-	-	-	-	*0*	*1*	*6*	*16*	*20*	*25*	*19*	*14*	-	-	-	-	-	-	-	*3*	*9*	*17*	*17*	*12*	-	-	-	*6*	*18*	*37*	*37*	*24*	-	-	-	-
Land	***1,161***	-	-	-	-	-	*58*	*174*	*232*	*290*	*232*	*174*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Airfield Ancillary	***257***	-	-	-	-	-	*8*	*24*	*36*	*53*	*49*	*44*	*16*	*12*	-	-	-	-	-	-	-	*1*	*2*	*4*	*4*	*3*	-	-	-	-	-	-	-	-	-	-	-	-
Car Parks	***168***	-	-	-	-	-	-	-	*3*	*8*	*10*	*13*	*10*	*8*	-	-	-	-	-	-	-	*3*	*9*	*18*	*18*	*12*	-	-	-	*3*	*9*	*18*	*18*	*12*	-	-	-	-
Third Party Land Users	***22***	-	-	-	-	-	*0*	*1*	*1*	*2*	*2*	*2*	*1*	*1*	-	-	-	-	-	-	-	*0*	*1*	*2*	*2*	*1*	-	-	-	*0*	*1*	*2*	*2*	*1*	-	-	-	-
Environment	***329***	-	-	-	-	-	*16*	*49*	*66*	*82*	*66*	*49*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Community	***122***	-	-	-	-	-	*6*	*18*	*24*	*30*	*24*	*18*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Risk	**1,297**	-	-	-	-	-	25	74	113	167	157	146	58	44	-	-	-	-	-	-	-	12	36	73	73	49	-	-	-	14	41	81	81	54	-	-	-	-
Optimism Bias	**1,557**	-	-	-	-	-	30	89	136	200	188	176	70	52	-	-	-	-	-	-	-	15	44	87	87	58	-	-	-	16	49	98	98	65	-	-	-	-
Total	**9,340**	**-**	**-**	**-**	**-**	**-**	**177**	**532**	**814**	**1,201**	**1,128**	**1,054**	**418**	**313**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**87**	**262**	**525**	**525**	**350**	**-**	**-**	**-**	**98**	**293**	**586**	**586**	**391**	**-**	**-**	**-**	**-**

Table 3-3 Assessment of Need Carbon Traded

2014, real prices in £'million - Mitigated optimism bias

Scheme	Total	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Terminal buildings	***2,018***	-	-	-	-	-	*41*	*122*	*163*	*204*	*180*	*174*	*103*	*146*	*197*	*258*	*258*	*172*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Plant	***390***	-	-	-	-	-	*13*	*38*	*51*	*64*	*53*	*44*	*11*	*16*	*22*	*29*	*29*	*19*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transit systems	***638***	-	-	-	-	-	*10*	*31*	*41*	*51*	*62*	*96*	*130*	*130*	*87*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Runways	***131***	-	-	-	-	-	*7*	*20*	*26*	*33*	*26*	*20*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Taxiways and aprons	***970***	-	-	-	-	-	*25*	*74*	*98*	*123*	*111*	*113*	*79*	*90*	*85*	*65*	*65*	*43*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Equipment	***281***	-	-	-	-	-	*5*	*15*	*20*	*25*	*23*	*24*	*17*	*23*	*30*	*37*	*37*	*24*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Land	***1,161***	-	-	-	-	-	*58*	*174*	*232*	*290*	*232*	*174*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Airfield Ancillary	***257***	-	-	-	-	-	*12*	*36*	*49*	*61*	*49*	*39*	*4*	*4*	*3*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Car Parks	***168***	-	-	-	-	-	*3*	*8*	*10*	*13*	*13*	*16*	*18*	*21*	*21*	*18*	*18*	*12*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Third Party Land Users	***22***	-	-	-	-	-	*1*	*2*	*2*	*3*	*3*	*3*	*2*	*2*	*2*	*2*	*2*	*1*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Environment	***329***	-	-	-	-	-	*16*	*49*	*66*	*82*	*66*	*49*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Community	***122***	-	-	-	-	-	*6*	*18*	*24*	*30*	*24*	*18*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Risk	**1,297**	-	-	-	-	-	39	117	157	196	169	154	73	86	89	81	81	54	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Optimism Bias	**1,557**	-	-	-	-	-	47	141	188	235	202	185	87	104	107	98	98	65	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	**9,340**	**-**	**-**	**-**	**-**	**-**	**282**	**846**	**1,128**	**1,409**	**1,215**	**1,108**	**525**	**622**	**643**	**586**	**586**	**391**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

Table 3-4 Low Cost is King Carbon Traded

2014, real prices in £'million - Mitigated optimism bias

Scheme	Total	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Terminal buildings	***1,160***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*41*	*122*	*163*	*204*	*163*	*122*	-	-	-	-	-	-	-	*17*	*51*	*103*	*103*	*69*	-	-	-
Plant	***295***	-	-	-	-	-	-	-	-	-	-	-	-	-	*8*	*25*	*33*	*46*	*47*	*43*	*23*	*18*	*14*	-	-	-	-	-	-	-	*2*	*6*	*11*	*11*	*8*	-	-	-
Transit systems	***638***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*10*	*31*	*41*	*51*	*41*	*31*	-	-	-	-	-	-	-	*22*	*65*	*130*	*130*	*87*	-	-	-
Runways	***131***	-	-	-	-	-	-	-	-	-	-	-	-	-	*7*	*20*	*26*	*33*	*26*	*20*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Taxiways and aprons	***754***	-	-	-	-	-	-	-	-	-	-	-	-	-	*19*	*57*	*76*	*101*	*93*	*79*	*27*	*22*	*16*	-	-	-	-	-	-	-	*13*	*39*	*79*	*79*	*53*	-	-	-
Equipment	***158***	-	-	-	-	-	-	-	-	-	-	-	-	-	*0*	*1*	*1*	*6*	*15*	*20*	*24*	*19*	*14*	-	-	-	-	-	-	-	*3*	*9*	*17*	*17*	*12*	-	-	-
Land	***1,161***	-	-	-	-	-	-	-	-	-	-	-	-	-	*58*	*174*	*232*	*290*	*232*	*174*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Airfield Ancillary	***257***	-	-	-	-	-	-	-	-	-	-	-	-	-	*8*	*24*	*32*	*45*	*45*	*40*	*20*	*16*	*12*	-	-	-	-	-	-	-	*1*	*2*	*4*	*4*	*3*	-	-	-
Car Parks	***109***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*3*	*8*	*10*	*13*	*10*	*8*	-	-	-	-	-	-	-	*3*	*9*	*18*	*18*	*12*	-	-	-
Third Party Land Users	***17***	-	-	-	-	-	-	-	-	-	-	-	-	-	*0*	*1*	*1*	*2*	*2*	*2*	*1*	*1*	*1*	-	-	-	-	-	-	-	*0*	*1*	*2*	*2*	*1*	-	-	-
Environment	***329***	-	-	-	-	-	-	-	-	-	-	-	-	-	*16*	*49*	*66*	*82*	*66*	*49*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Community	***122***	-	-	-	-	-	-	-	-	-	-	-	-	-	*6*	*18*	*24*	*30*	*24*	*18*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Risk	**1,026**	-	-	-	-	-	-	-	-	-	-	-	-	-	25	74	99	138	142	132	73	58	44	-	-	-	-	-	-	-	12	36	73	73	49	-	-	-
Optimism Bias	**1,231**	-	-	-	-	-	-	-	-	-	-	-	-	-	30	89	118	165	171	158	87	70	52	-	-	-	-	-	-	-	15	44	87	87	58	-	-	-
Total	**7,387**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**177**	**532**	**710**	**992**	**1,023**	**950**	**522**	**418**	**313**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**87**	**262**	**525**	**525**	**350**	**-**	**-**	**-**

Table 3-5 Global Fragmentation Carbon Capped

2014, real prices in £'million - Mitigated optimism bias

Scheme	Total	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Terminal buildings	***2,018***	-	-	-	-	-	*41*	*122*	*163*	*204*	*163*	*140*	*51*	*103*	*103*	*69*	-	-	*43*	*129*	*258*	*258*	*172*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Plant	***390***	-	-	-	-	-	*13*	*38*	*51*	*64*	*51*	*40*	*6*	*11*	*11*	*8*	-	-	*5*	*14*	*29*	*29*	*19*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transit systems	***638***	-	-	-	-	-	*10*	*31*	*41*	*51*	*41*	*52*	*65*	*130*	*130*	*87*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Runways	***131***	-	-	-	-	-	*7*	*20*	*26*	*33*	*26*	*20*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Taxiways and aprons	***970***	-	-	-	-	-	*25*	*74*	*98*	*123*	*98*	*87*	*39*	*79*	*79*	*53*	-	-	*11*	*32*	*65*	*65*	*43*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Equipment	***281***	-	-	-	-	-	*5*	*15*	*20*	*25*	*20*	*18*	*9*	*17*	*17*	*12*	-	-	*6*	*18*	*37*	*37*	*24*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Land	***1,161***	-	-	-	-	-	*58*	*174*	*232*	*290*	*232*	*174*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Airfield Ancillary	***257***	-	-	-	-	-	*12*	*36*	*49*	*61*	*49*	*37*	*2*	*4*	*4*	*3*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Car Parks	***168***	-	-	-	-	-	*3*	*8*	*10*	*13*	*10*	*10*	*9*	*18*	*18*	*12*	-	-	*3*	*9*	*18*	*18*	*12*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Third Party Land Users	***22***	-	-	-	-	-	*1*	*2*	*2*	*3*	*2*	*2*	*1*	*2*	*2*	*1*	-	-	*0*	*1*	*2*	*2*	*1*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Environment	***329***	-	-	-	-	-	*16*	*49*	*66*	*82*	*66*	*49*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Community	***122***	-	-	-	-	-	*6*	*18*	*24*	*30*	*24*	*18*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Risk	**1,297**	-	-	-	-	-	39	117	157	196	157	130	36	73	73	49	-	-	14	41	81	81	54	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Optimism Bias	**1,557**	-	-	-	-	-	47	141	188	235	188	156	44	87	87	58	-	-	16	49	98	98	65	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	**9,340**	**-**	**-**	**-**	**-**	**-**	**282**	**846**	**1,128**	**1,409**	**1,128**	**933**	**262**	**525**	**525**	**350**	**-**	**-**	**98**	**293**	**586**	**586**	**391**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

Table 3-6 Rebased Adopting GAL Traffic Forecast

Appendix A Glossary

ATM	Air transport movement
CAA	UK Civil Aviation Authority
CAGR	Compound annual growth rate
COPI	Construction price output index
Core	Investment in the airport irrespective of investment in the additional runway works
CPI	Consumer prices index
CUTE	Common user terminal equipment
DfT	Department for Transport
EAC	Electrification access charge
EASA	European Aviation Safety Agency
EC4T	Electric current for traction
GAL	Gatwick Airport Limited
IMF	International Monetary Fund
IPP	Income per passenger
mppa	million passengers per annum
PRM	Passengers with reduced mobility
Q6	Quinquennium 6 (2014 to 2018)
Q7	Quinquennium 7 (2019 to 2023)
RPI	Retail prices index
Scheme	Investment in the additional runway works
tph	Trains per hour
VTA	Variable track access
WebTAG	Web-based Transport Analysis Guidance

Appendix B Optimism Bias

Upper bound values for combined projects

Project Type	CAPEX (%)	Upper bound OB (%)	OB contribution (%)	Resultant OB (%)
Standard Building	50%	24	12	
Standard Civil Engineering	50%	44	22	
Combined				34.0

Contributory Factors		Standard Building optimism bias (%)	Mitigation Factor (0<x<1)	Reduction in optimism bias	Mitigated optimism bias (%)	Engineering optimism bias (%)	Mitigation Factor (0<x<1)	Reduction in optimism bias	Mitigated optimism bias (%)
Procurement	Late Contractor Involvement in Design	2	0.90	1.8	0.2	3	0.90	2.7	0.3
	Poor contractor Capabilities	9	0.95	8.6	0.5				
	Dispute and Claims Occurred	29	0.70	20.3	8.7	21	0.70	14.7	6.3
Project Specific	Design Complexity	1	0.80	0.8	0.2				
	Degree of Innovation	4	0.80	3.2	0.8				
	Environmental Impact					22	0.50	11.0	11.0
	Other					18	0.50	9.0	9.0
Client Specific	Inadequacy of the Business Case	34	0.70	23.8	10.2	10	0.70	7.0	3.0
	Project Management Team	1	0.90	0.9	0.1				
	Poor Project Intelligence	2	0.70	1.4	0.6	7	0.70	4.9	2.1
	Other - omitted (<1)								
Environment	Public Relations	2	0.50	1.0	1.0	9	0.50	4.5	4.5
	Site Characteristics	2	0.90	1.8	0.2	3	0.90	2.7	0.3
	Permits/Consents/Approvals								
External Influences	Economic	11	0.20	2.2	8.8	7	0.20	1.4	5.6
	Legislation/Regulations	3	0.70	2.1	0.9				
Weighted Total		100			32.2	100			42.1

Adjusted Optimism Bias

Project Type	Percentage of CAPEX (%)	Mitigated OB (%)	OB contribution (%)	Resultant OB (%)
Standard Building	50%	7.7	3.9	
Standard Civil Engineering	50%	18.5	9.3	
Combined				13.1

Figure B-1 Core Works

Upper bound values for combined projects

Project Type	CAPEX (%)	Upper bound OB (%)	OB contribution (%)	Resultant OB (%)
Standard Building	30%	24	7.2	
Standard Civil Engineering	70%	44	30.8	
Combined				38.0

Contributory Factors		Standard Building optimism bias (%)	Mitigation Factor (0<x<1)	Reduction in optimism bias	Mitigated optimism bias (%)	Standard Civil Engineering optimism bias (%)	Mitigation Factor (0<x<1)	Reduction in optimism bias	Mitigated optimism bias (%)
Procurement	Late Contractor Involvement in Design	2	0.80	1.6	0.4	3	0.80	2.4	0.6
	Poor contractor Capabilities	9	0.95	8.6	0.5				
	Dispute and Claims Occurred	29	0.60	17.4	11.6	21	0.60	12.6	8.4
Project Specific	Design Complexity	1	0.90	0.9	0.1				
	Degree of Innovation	4	0.90	3.6	0.4				
	Environmental Impact					22	0.30	6.6	15.4
	Other					18	0.25	4.5	13.5
Client Specific	Inadequacy of the Business Case	34	0.70	23.8	10.2	10	0.70	7.0	3.0
	Project Management Team	1	0.70	0.7	0.3				
	Poor Project Intelligence	2	0.60	1.2	0.8	7	0.60	4.2	2.8
	Other - omitted (<1)								
Environment	Public Relations	2	0.20	0.4	1.6	9	0.20	1.8	7.2
	Site Characteristics	2	0.80	1.6	0.4	3	0.80	2.4	0.6
	Permits/Consents/Approvals								
External Influences	Economic	11	0.20	2.2	8.8	7	0.20	1.4	5.6
	Legislation/Regulations	3	0.70	2.1	0.9				
Weighted Total		100			36.0	100			57.1

Adjusted Capital Expenditure Optimism Bias

Project Type	Percentage of CAPEX (%)	Mitigated OB (%)	OB contribution (%)	Resultant OB (%)
Standard Building	30%	8.6	2.6	
Standard Civil Engineering	70%	25.1	17.6	
Combined				20.2

Figure B-2 Scheme Works

Potential actions/processes likely to be adopted by GAL to enable the mitigated optimism bias include:

- *GAL supply chain in place and contractors will be selected that are familiar with procurement procedures, existing facilities and with details of different phases of the scheme.*
- *Contractors to have a proven track record working at airports, excellent health and safety standards and an exceptional record following GAL procedures, reflected by good key performance indicator scores.*
- *Contractors are selected from existing frameworks and a list of preferred contractors that will have extensive knowledge of working on the airport.*
- *GAL has detailed processes to manage the different phases of a project and associated risks.*
- *New staff with relevant expertise expected to be recruited to accommodate project scope.*
- *No innovative architectural, structural or civils designs proposed and there are no unusual site conditions expected that would call for an innovate solution.*
- *Significant investment made by GAL into environmental mitigation schemes.*
- *Experienced and proven PM team to be appointed.*
- *Extensive surveys are to be carried out in areas of proposed construction and extensive record information for the airport is available electronically to the designers and contractors.*
- *Most construction to be carried out on a greenfield site and away from residential areas.*
- *Dispensations from EASA may be required.*

Appendix C Scheme Capital Cost Estimate Breakdown

The table on the following pages sets out the breakdown of the total Scheme cost, for all phases. The breakdown includes mitigated optimism bias.

As discussed in Section 3, certain demand scenarios do not require the build-out of all phases, with the third phase presented in Table 2-2 not required in certain demand scenarios. The works not required relate to the final phase of the terminal buildings (including satellite and piers) and the associated taxiway, apron and car parking infrastructure.

Ref No	Description	Quantity	Unit	Rate	Total (£)
GAL	**Gatwick Airport (Jacobs Estimate)**				**9,339,576,314**
01.	**Investment Costs**				**6,485,816,885**
01.01.	**Airport Infrastructure Construction**				**4,366,220,079**
01.01.01.	Enabling Works				*149,302,409*
01.01.01.0001.	Site preparation comprising topsoil strip and breaking out existing landside roads and parking areas				*45,248,193*
01.01.01.0001.0010	Site strip of soft ground and remove to spoil for reuse	6,398,000	m2	3	17,146,640
01.01.01.0001.0020	Break up and disposal Staff car parks X, V, Z overflow, R G	40,611	m2	21	832,932
01.01.01.0001.0030	Break up and disposal Public car parks; Long stay zones A-G & U-Z, Holiday, Courtlands & Summer special, Coach park, Valet south, including access roads	577,000	m2	21	11,834,270
01.01.01.0001.0040	Break up and disposal of paved areas in City Place Area	155,170	m2	21	3,182,537
01.01.01.0001.0050	Break up and disposal of paved areas in Lowfield Heath Place Area	102,102	m2	21	2,094,112
01.01.01.0001.0060	Break up and disposal of paved areas in Gatwick Manor Place Area	8,580	m2	21	175,976
01.01.01.0001.0070	Break up and disposal of paved areas in BCP Airparks Area at west end - approx. 350mx125m	43,750	m2	21	897,313
01.01.01.0001.0080	Break up and disposal of paved areas in Gatwick Road North Area	26,100	m2	21	535,311
01.01.01.0001.0090	Break-out and dispose of existing A23 including all associated infrastructure, 3.6km	108,000	m2	21	2,215,080
01.01.01.0001.0100	Break-out and dispose of existing Charlwood Road, 950m	5,700	m2	21	116,907
01.01.01.0001.0110	Strip Balcombe Road from Radford Road to M23 spur road – Assumption – Allowance; 1800m	10,800	m2	21	221,508
01.01.01.0001.0120	Strip Steers Lane – 600m	3,720	m2	21	76,297
01.01.01.0001.0130	Strip Antlands Lane – 550m	4,400	m2	21	90,244
01.01.01.0001.0140	Strip Peeks Brook Lane – 1200m	7,200	m2	21	147,672
01.01.01.0001.0150	Strip Church Lane – 250m	1,500	m2	21	30,765
01.01.01.0001.0160	Strip Fernihill Road – 700m	4,200	m2	21	86,142
01.01.01.0001.0170	Strip Donkey Lane – 200m	206	m2	21	4,225
01.01.01.0001.0180	Strip Bonnets Lane – 1200m	12,000	m2	21	246,120
01.01.01.0001.0190	Strip out existing utilities beneath redundant road surfaces	15,736	m	53	827,714
01.01.01.0001.0200	Allowance for disposal of contaminated material off site comprising asphalt surfaces at 33% of the road thickness	100,796	m3	45	4,486,430
01.01.01.0002.	Demolitions - within GAL boundary				*10,911,081*
01.01.01.0002.0010	22018 NT LSCP Admin Building	1	sum	28,404	28,404
01.01.01.0002.0020	20603 NT LSCP Block Park Admin Building	1	sum	14,202	14,202
01.01.01.0002.0030	22085 Summer Special Admin Building	1	sum	18,936	18,936
01.01.01.0002.0040	41209 Viking House	1	sum	260,370	260,370
01.01.01.0002.0050	20020 Building 583A	1	sum	18,936	18,936
01.01.01.0002.0060	20021 Building 583B	1	sum	28,404	28,404
01.01.01.0002.0070	20023 Building 583C	1	sum	14,202	14,202
01.01.01.0002.0080	20025 Building 583D	1	sum	23,670	23,670
01.01.01.0002.0090	20534 Bomb Defusing Building	1	sum	2,367	2,367
01.01.01.0002.0100	41208 Tinsley House	1	sum	175,158	175,158
01.01.01.0002.0110	20063 New Engineering Stores	1	sum	94,680	94,680
01.01.01.0002.0120	20238 & 20062 Marco Workshop & Admin Building	1	sum	23,670	23,670
01.01.01.0002.0130	20706 Coached Departures Building	1	sum	246,168	246,168
01.01.01.0002.0140	20222 ST Sanitation Block	1	sum	4,734	4,734
01.01.01.0002.0150	20515 Sub-station J	1	sum	52,600	52,600
01.01.01.0002.0160	20266 Sub-station L	1	sum	52,600	52,600
01.01.01.0002.0170	20331 Sub-station H	1	sum	52,600	52,600
01.01.01.0002.0180	20591 Sub-station AS	1	sum	52,600	52,600
01.01.01.0002.0190	20230 Sub-station G	1	sum	52,600	52,600
01.01.01.0002.0200	20228 Sub-station E	1	sum	52,600	52,600

Ref No	Description	Quantity	Unit	Rate	Total (£)
01.01.01.0002.0210	22020 Sub-station BTF (BE)	1	sum	52,600	52,600
01.01.01.0002.0220	22128 Pumping Station 07	1	sum	31,560	31,560
01.01.01.0002.0230	22127 Pumping Station 06	1	sum	31,560	31,560
01.01.01.0002.0240	22204 Pumping Station 45	1	sum	31,560	31,560
01.01.01.0002.0250	22199 Pumping Station 41	1	sum	31,560	31,560
01.01.01.0002.0260	2142 Pumping Station 25	1	sum	31,560	31,560
01.01.01.0002.0270	22201 Pumping Station 42	1	sum	31,560	31,560
01.01.01.0002.0280	20229 Pumping Station 24	1	sum	31,560	31,560
01.01.01.0002.0290	22143 Pumping Station 26	1	sum	31,560	31,560
01.01.01.0002.0300	22147 Pumping Station 33	1	sum	31,560	31,560
01.01.01.0002.0310	Allowance for power diversions during demolition, alterations and relocation of sub station	1	sum	9,205,000	9,205,000
01.01.01.0002.0320	Demolition of river gates	1	sum	78,900	78,900
01.01.01.0002.0330	Demolition of steel structure over inverted syphon	1	sum	21,040	21,040
01.01.01.0003.	Demolitions - outside of GAL boundary				*26,774,452*
01.01.01.0003.0010	Domestic properties on Radford Road	44	Nr	21,040	925,760
01.01.01.0003.0020	Domestic properties on Balcombe Road	43	Nr	21,040	904,720
01.01.01.0003.0030	Industrial properties on Antlands Road	1	sum	157,800	157,800
01.01.01.0003.0040	Domestic properties on Peeks Brook Lane	28	Nr	21,040	589,120
01.01.01.0003.0050	Industrial properties on Peeks Brook Lane	1	sum	315,600	315,600
01.01.01.0003.0060	Industrial properties on Balcombe Road	1	sum	52,600	52,600
01.01.01.0003.0070	Demolish existing APM structure from South Terminal to approximately 250m North	2,000	m2	526	1,052,000
01.01.01.0003.0080	Demolish existing South Terminal APM transit station	3,000	m2	158	473,400
01.01.01.0003.0090	Demolish existing South Terminal APM transit station	600	m2	158	94,680
01.01.01.0003.0100	Office Buildings at City Place (Assume 4 levels)	1	sum	3,787,200	3,787,200
01.01.01.0003.0110	Industrial Buildings at City Place	1	sum	568,080	568,080
01.01.01.0003.0120	MSCP at City Place	1	sum	284,040	284,040
01.01.01.0003.0130	Industrial Buildings at Lowfield Heath	1	sum	2,840,400	2,840,400
01.01.01.0003.0140	Travel Lodge Hotel at Lowfield Heath	1	sum	473,400	473,400
01.01.01.0003.0150	BCP Airparks Buildings	1	sum	37,872	37,872
01.01.01.0003.0160	BCP Airparks MSCP	1	sum	1,893,600	1,893,600
01.01.01.0003.0170	Gatwick Manor Buildings and Premier Inn	1	sum	378,720	378,720
01.01.01.0003.0180	TUI building adjacent to Astral Towers	1	sum	710,100	710,100
01.01.01.0003.0190	Industrial Buildings Gatwick Road North	1	sum	4,734,000	4,734,000
01.01.01.0003.0200	Residential / Farm Properties	1	sum	1,052,000	1,052,000
01.01.01.0003.0210	Premier Inn in Balcombe Road	1	sum	189,360	189,360
01.01.01.0003.0220	Allowance for disconnections or temporary diversions in relation to demolished buildings	1	sum	5,260,000	5,260,000
01.01.01.0005.	Airfield other				*66,368,683*
01.01.01.0005.0010	Cut or excavation from stockpile and fill to make levels on new airfield	5,800,235	m3	4	24,883,008
01.01.01.0005.0020	Extra over for ground stabilisation; top 300mm mixed with Lime and Cement	2,191,281	m2	12	26,470,674
01.01.01.0005.0030	Landscaping	3,500,000	m2	4	15,015,000
01.01.02.	Airfield				*893,241,695*
01.01.02.0001.	Runway				*51,281,155*
01.01.02.0001.0010	Runway	204,000	m2	218	44,423,040
01.01.02.0001.0020	Runway shoulders	43,326	m2	114	4,922,700
01.01.02.0001.0030	Runway extension / modification	6,847	m2	261	1,789,258
01.01.02.0001.0040	Runway shoulders	1,072	m2	136	146,156
01.01.02.0002.	Taxiways & Aprons				*661,477,523*
01.01.02.0002.0010	Taxiways	984,471	m2	292	287,731,339
01.01.02.0002.0020	End Around Taxiway (EAT's) Western end	113,400	m2	276	31,315,410
01.01.02.0002.0030	Head of Stand roads and footway	53,340	m2	167	8,893,912
01.01.02.0002.0040	Rapid exit taxiway	179,280	m2	321	57,613,421
01.01.02.0002.0050	Rapid access taxiway	201,600	m2	330	66,455,424
01.01.02.0002.0060	Runway crossing	30,117	m2	420	12,658,175
01.01.02.0002.0070	Apron to new aircraft maintenance units	36,490	m2	263	9,596,870
01.01.02.0002.0080	Code C Taxi lanes	124,200	m2	343	42,620,472

Ref No	Description	Quantity	Unit	Rate	Total (£)
01.01.02.0002.0090	Code E Taxi lanes	318,000	m2	316	100,360,800
01.01.02.0002.0100	GSE Parking Areas	141,000	m2	314	44,231,700
01.01.02.0003.	Stands				*132,701,120*
01.01.02.0003.0010	Code C - Midfield	120,000	m2	365	43,761,600
01.01.02.0003.0020	Code E (MARS), Midfield	232,000	m2	383	88,939,520
01.01.02.0004.	Airfield instrumentation				*47,781,898*
01.01.02.0004.0010	Instrument Landing System (ILS) comprising 1nr localiser and 1nr glide path	4	Nr	2,445,900	9,783,600
01.01.02.0004.0020	Fibre link from MLS to new control tower	1	sum	526,000	526,000
01.01.02.0004.0030	Distance Measuring Equipment (DME)	1	Nr	3,534,720	3,534,720
01.01.02.0004.0040	Surface Movement Radar	1	Nr	4,439,440	4,439,440
01.01.02.0004.0050	Instrumented Runway Visual Range (IRVR)	4	Nr	326,120	1,304,480
01.01.02.0004.0060	VHF Receiver Aerial	1	Nr	631,200	631,200
01.01.02.0004.0070	Digitally Resolved Direction Finder	1	Nr	3,156,000	3,156,000
01.01.02.0004.0080	Landing lighting set, end of runway	3	Nr	3,261,200	9,783,600
	Runway and taxiway lighting	2,437,143	m2	6	14,622,858
01.01.03.	Airfield Ancillary Facilities				*149,610,842*
01.01.03.0001.	Air Traffic Control				*30,497,480*
01.01.03.0001.0010	Control Tower and ATC Facilities; height 46m	1	sum	19,356,800	19,356,800
01.01.03.0001.0050	Apron Control Centre	5,000	m2	1,262	6,312,000
01.01.03.0001.0090	Airfield Operations building	1,500	m2	3,219	4,828,680
01.01.03.0002.	Security				*15,234,897*
01.01.03.0002.0010	Remove existing perimeter RZ fencing	5,190	m	26	136,497
01.01.03.0002.0020	New perimeter RZ fencing	10,164	m	600	6,098,400
01.01.03.0002.0030	External Security gate / control point	3	Nr	3,000,000	9,000,000
01.01.03.0003.	Rescue & Fire Fighting				*4,734,000*
01.01.03.0003.0040	Fire Crash & Rescue (FCR) station	2,500	m2	1,894	4,734,000
01.01.03.0005.	De-Icing & Snow Clearance				*29,317,850*
01.01.03.0005.0030	De-icing facility	1	sum	24,000,000	24,000,000
01.01.03.0005.0040	New Mid-Field Snow Base	2,500	m2	2,127	5,317,850
01.01.03.0006.	Serviced areas for ancillary facilities e.g. Hotels, Offices, Cargo Buildings, Hangars, etc				*18,263,300*
01.01.03.0006.0080	Serviced areas for ancillary facilities e.g. Hotels, Offices, Cargo Buildings, Hangars, etc	182,633	m2	100	18,263,300
01.01.03.0007.	Surface Water Drainage				*33,845,218*
01.01.03.0007.0010	Drainage	2,191,281	m2	5	10,583,887
01.01.03.0007.0020	Replacement of pumping stations	9	Nr	526,000	4,734,000
01.01.03.0007.0030	NW Zone balancing ponds for clean and contaminated; 564,500m3 capacity	1	sum	10,520,000	10,520,000
01.01.03.0007.0040	Gravity main connection connecting to network for Pond D and TWSTP	800	m	126	100,992
01.01.03.0007.0050	Underground attenuation at east side, 144,000m3 capacity	1	sum	6,854,339	6,854,339
01.01.03.0007.0060	Water quality monitoring station	1	sum	1,052,000	1,052,000
01.01.03.0008.	Noise control				*17,718,097*
01.01.03.0008.0010	Concrete Noise Wall	308	m	6,312	1,944,096
01.01.03.0008.0020	Earth bund	2,849	m	5,537	15,774,001
01.01.04.	Terminal Buildings				*1,927,699,683*
01.01.04.0001.	Terminals				*1,063,614,067*
01.01.04.0001.0010	New Terminal	228,385	m2	4,583.47	1,046,795,796
01.01.04.0001.0020	New Terminal - fitout ONLY	228,385	m2	73.64	16,818,271
01.01.04.0002.	Piers & Satellites				*839,416,215*
01.01.04.0002.0010	Contact Pier	51,325	m2	5,035	258,420,349
01.01.04.0002.0020	Remote Pier	118,008	m2	4,923	580,995,867
01.01.04.0003.	Fixed Links, VCC, Rotunda/Nodes, PCA and Airbridges				*24,669,400*
01.01.04.0003.0030	Fixed links	67	Nr	368,200	24,669,400
01.01.04.0003.0040	Nodes (Rotunda)	67	Nr	731,994	49,043,613
01.01.04.0003.0050	Passenger Boarding Bridge (PBB)	105	Nr	526,000	55,230,000

Ref No	Description	Quantity	Unit	Rate	Total (£)
01.01.05.	Airside Infrastructure				*403,227,038*
01.01.05.0001.	Access Roads				*30,490,546*
01.01.05.0001.0010	Airside Roads	5,000	m	4,000	20,000,000
01.01.05.0001.0020	Airside Roads - Perimeter Security Road	10,450	m	1,004	10,490,546
01.01.05.0010.	Airside APM				*372,736,492*
01.01.05.0010.0010	Cut and cover tunnel, excluding fit out	1,855	m	30,929	57,372,924
01.01.05.0010.0020	Guideway system and fit out	1,855	m	42,922	79,619,568
	Station construction	2	Nr	50,000,000	100,000,000
01.01.05.0010.0030	Station fit out	2	Nr	30,000,000	60,000,000
01.01.05.0010.0040	Sub-surface maintenance facility remote pier	1	sum	25,248,000	25,248,000
01.01.05.0010.0050	Rolling stock; 4 cars each per set	32	each	1,578,000	50,496,000
01.01.06.	Landside Infrastructure				*541,424,812*
01.01.06.0001.	Landside APM - Continuous system from NT to MFT				*174,850,034*
01.01.06.0001.0010	Extend existing NT Transit station to accommodate new train length	270	m2	4,208	1,136,160
01.01.06.0001.0020	Upgrade existing retained station systems	1	Nr	1,683,200	1,683,200
01.01.06.0001.0030	Upgrade existing retained guidance system	1,070	m	11,572	12,382,040
01.01.06.0001.0040	New sub-structure supports	5	Nr	105,200	526,000
01.01.06.0001.0050	Realign existing bridge deck units to new continuous APM alignment	1	sum	526,000	526,000
01.01.06.0001.0060	New elevated APM guideway connecting new Terminal to South Terminal	500	m	29,231	14,615,285
01.01.06.0001.0070	New at grade APM guideway connecting existing system North of ST to new Terminal	1,400	m	6,733	9,425,920
01.01.06.0001.0080	Guideway system and fit out	1,900	m	33,138	62,962,200
01.01.06.0001.0090	VCC ST Railway Station to APM ST Station: Lifts	6	Nr	263,000	1,578,000
01.01.06.0001.0100	VCC ST Railway Station to APM ST Station: Escalators	6	Nr	105,200	631,200
01.01.06.0001.0110	New APM Station, 75m x 18m = 1,350m2 each	2	Nr	5,680,800	11,361,600
01.01.06.0001.0120	Station fit out	2	Nr	6,919,214	13,838,429
01.01.06.0001.0130	Rolling stock; 4 cars each per set	28	Nr	1,578,000	44,184,000
01.01.06.0002.	Car Parks				*144,055,620*
01.01.06.0002.0010	Car Park - Surface Parking	49,350	Spaces	1,578	77,874,300
01.01.06.0002.0020	Car Park - Surface Parking - EO for Decking	5,520	Spaces	526	2,903,520
01.01.06.0002.0030	Multi Storey Car Park	3,500	Spaces	12,624	44,184,000
01.01.06.0002.0040	Staff car parking - replacement of X, V, Z OVERFLOW, R, G, W, & J	12,100	Spaces	1,578	19,093,800
01.01.06.0003.	Power Generation				*84,160,000*
01.01.06.0003.0010	New Energy Centre, 37MW	1	sum	52,600,000	52,600,000
01.01.06.0003.0020	Anaerobic Digestion Plant	1	sum	21,040,000	21,040,000
01.01.06.0003.0030	District Heating Pipework from Energy Centre to New Midfield Terminal and Satellite, including service tunnel	1	sum	10,520,000	10,520,000
01.01.06.0004.	Utilities				*41,238,400*
01.01.06.0004.0010	Upgrade sub station AF	1	sum	10,520,000	10,520,000
01.01.06.0004.0020	Upgrade sub station BF	1	sum	12,624,000	12,624,000
01.01.06.0004.0030	Water provision to new terminal	1	sum	1,052,000	1,052,000
01.01.06.0004.0040	Reinstatement of electrical capacity previously handed back to UKPN	1	sum	12,624,000	12,624,000
01.01.06.0004.0050	Gas connection to site and on site distribution to new	1	sum	1,052,000	1,052,000
01.01.06.0004.0060	Telecoms to new terminal	1	sum	1,052,000	1,052,000
01.01.06.0004.0070	Alterations to existing sub-stations	1	sum	210,400	210,400
01.01.06.0004.0080	Foul drainage network from New Terminal and Piers to Thames Water WwTW East of Railway	1	sum	2,104,000	2,104,000
01.01.06.0006.	Airport Roads (GAL)				*10,772,480*
01.01.06.0006.0010	Landside Road Tunnels - car park connections beneath	2	Nr	3,682,000	7,364,000
01.01.06.0006.0020	Services road to New Terminal	1,800	m2	1,894	3,408,480
01.01.06.0007.	Facilities				*31,328,560*
01.01.06.0007.0010	Public transport interchange (PTI)	1	sum	13,150,000	13,150,000
01.01.06.0007.0020	Landside / Airside vehicle control point	3	Nr	1,052,000	3,156,000
01.01.06.0007.0030	Transport Maintenance Base	1,500	m2	1,473	2,209,200
01.01.06.0007.0040	Taxi Feeder	1,500	m2	126	189,360
01.01.06.0007.0050	ST Consolidated Car Rental Facility	1,000	Spaces	12,624	12,624,000

Ref No	Description	Quantity	Unit	Rate	Total (£)
01.01.06.0008.	Principle Water Course Permanent Diversions				*55,019,718*
01.01.06.0008.0010	Water Courses - Crawters Brook	2,551	m	4,301	10,970,780
01.01.06.0008.0020	Water Courses - River Mole	3,700	m	7,408	27,410,266
01.01.06.0008.0030	Allowance for structural shoulders	1	sum	526,000	526,000
01.01.06.0008.0040	Re-use of excavated material to infill disused river beds	47,700	m3	2	100,170
01.01.06.0008.0050	Allowance for habitat reprovisions	1	sum	2,104,000	2,104,000
01.01.06.0008.0060	Allowance for contribution to Ifield Lake project	1	sum	5,260,000	5,260,000
01.01.06.0008.0070	Disposal of excavated material off site surplus to requirement; assume inert	818,061	m3	11	8,606,002
01.01.06.0008.0080	Stop-off ends of existing River Mole Culvert	12	m2	473	5,681
01.01.06.0008.0090	Filling shaft to inverted syphon	500	m3	74	36,820
01.01.07.	Equipment				*240,697,600*
01.01.07.0001.	De-Icing & Snow Clearance Equipment				*6,312,000*
01.01.07.0001.0010	Snow clearing and de-icing plant	15	Nr	420,800	6,312,000
01.01.07.0002.	Rescue & Fire Fighting				*2,945,600*
01.01.07.0002.0020	Fire Engines	8	Nr	368,200	2,945,600
01.01.07.0003.	Baggage Handling Systems				*231,440,000*
01.01.07.0003.0010	Centralised baggage handling system - Mid Field	1	sum	231,440,000	231,440,000
01.01.08.	Operational Commissioning				*39,976,000*
01.01.08.0001.	M&E services				*18,410,000*
01.01.08.0001.0010	Comprising: Electrical, Mechanical, Comms & Operations	1	sum	18,410,000	18,410,000
01.01.08.0002.	Airfield				*4,208,000*
01.01.08.0002.0010	Comprising: Runway, Taxi ways & Stands	1	sum	4,208,000	4,208,000
01.01.08.0003.	Baggage				*2,104,000*
01.01.08.0003.0010	Comprising: Automated BHS & Operations	1	sum	2,104,000	2,104,000
01.01.08.0004.	APM				*1,052,000*
01.01.08.0004.0010	Comprising: APM airside & APM landside	1	sum	1,052,000	1,052,000
01.01.08.0005.	Passenger flow and security				*3,682,000*
01.01.08.0005.0010	Comprising: Terminal & Piers	1	sum	3,682,000	3,682,000
01.01.08.0006.	Flight systems				*10,520,000*
01.01.08.0006.0010	Comprising: Network testing by GAL & Third party ICS	1	sum	10,520,000	10,520,000
01.01.09.	Operational Handover				*21,040,000*
01.01.09.0001.	Proving trials by area				*21,040,000*
01.01.09.0001.0010	BHS, Terminals, Piers, Aprons & Runway	1	sum	21,040,000	21,040,000
01.02.	**Purchase of Land & Existing Infrastructure**				**877,740,930**
01.02.01.	Purchase of Land & Existing Infrastructure				*877,740,930*
01.02.01.0001.	Land Purchase				*846,023,130*
01.02.01.0001.0010	PCE, as advised by Deloitte	1	sum	846,023,130	846,023,130
01.02.01.0009.	Reprovision of removed facilities				*31,717,800*
01.02.01.0009.0010	22018 NT LSCP Admin Building	1	sum	1,136,160	1,136,160
01.02.01.0009.0020	20603 NT LSCP Block Park Admin Building	1	sum	568,080	568,080
01.02.01.0009.0030	22085 Summer Special Admin Building	1	sum	757,440	757,440
01.02.01.0009.0040	20020 Building 583A	1	sum	757,440	757,440
01.02.01.0009.0050	20021 Building 583B	1	sum	1,136,160	1,136,160
01.02.01.0009.0060	20023 Building 583C	1	sum	568,080	568,080
01.02.01.0009.0070	20025 Building 583D	1	sum	946,800	946,800
01.02.01.0009.0080	41208 Tinsley House	1	sum	7,006,320	7,006,320
01.02.01.0009.0090	20063 New Engineering Stores	1	sum	3,787,200	3,787,200
01.02.01.0009.0100	20238 & 20062 Marco Workshop & Admin Building	1	sum	946,800	946,800
01.02.01.0009.0110	20706 Coached Departures Building	1	sum	9,846,720	9,846,720
01.02.01.0009.0120	20222 ST Sanitation Block	1	sum	1,052,000	1,052,000
01.02.01.0009.0130	20515 Sub-station J	1	sum	157,800	157,800
01.02.01.0009.0140	20266 Sub-station L	1	sum	1,209,800	1,209,800
01.02.01.0009.0150	20331 Sub-station H	1	sum	157,800	157,800
01.02.01.0009.0160	20591 Sub-station AS	1	sum	157,800	157,800
01.02.01.0009.0170	20230 Sub-station G	1	sum	1,209,800	1,209,800
01.02.01.0009.0180	20228 Sub-station E	1	sum	157,800	157,800
01.02.01.0009.0190	22020 Sub-station BTF (BE)	1	sum	157,800	157,800

Ref No	Description	Quantity	Unit	Rate	Total (£)
01.04.	**Environmental Compensation & Mitigation**				**274,086,855**
01.04.01.	Environmental Compensation & Mitigation				*274,086,855*
01.04.01.0001.	Environmental Compensation & Mitigation				*250,000,000*
01.04.01.0001.0010	Environmental Compensation & Mitigation	1	sum	250,000,000	250,000,000
01.04.01.0007.	Archaeology/ Ecology / Heritage				*5,786,000*
01.04.01.0007.0010	Archaeology	1	sum	2,104,000	2,104,000
01.04.01.0007.0020	Ecology	1	sum	2,630,000	2,630,000
01.04.01.0007.0030	Architectural Heritage	1	sum	1,052,000	1,052,000
01.04.01.0008.	Obstacle clearances				*18,300,855*
01.04.01.0008.0010	High trees for new flight path outside of land take	1	sum	526,000	526,000
01.04.01.0008.0020	Removal of Feeder Park wood	23,400	m2	5	123,084
01.04.01.0008.0030	Removal The Grove wood	9,350	m2	5	49,181
01.04.01.0008.0040	Removal Horleyland wood	90,000	m2	5	473,400
01.04.01.0008.0050	Removal Allens wood	85,100	m2	5	447,626
01.04.01.0008.0060	Removal Furze Fields wood	68,000	m2	5	357,680
01.04.01.0008.0070	Allowance for re provision of woodland at 2 times the area removed	1,051,700	m2	11	11,063,884
01.04.01.0008.0080	Allowance for other heritage and nature conservation	1	sum	5,260,000	5,260,000
01.05.	**Community Impacts**				**121,792,905**
01.05.01.	Community Impacts				*121,792,905*
01.05.01.0001.	Compensation/Blight				*25,460,168*
01.05.01.0001.0010	HoSS, as per Deloitte report	1	sum	2,076,200	2,076,200
01.05.01.0001.0020	Allowance for Blight, Property Market Bond Scheme, etc.	1	sum	23,383,968	23,383,968
01.05.01.0002.	Levies & 106 Agreements				*61,332,737*
01.05.01.0002.0010	Section 106 & 278	1	sum	44,053,398	44,053,398
01.05.01.0002.0020	Section 60	1	sum	11,013,349	11,013,349
01.05.01.0002.0030	Building regulations and planning control	1	sum	6,265,990	6,265,990
01.05.01.0003.	Other Community				*35,000,000*
01.05.01.0003.0010	Other Community	1	sum	35,000,000	35,000,000
01.06.	**Project / Design Team Fees**				**845,976,115**
01.06.01.	Project / Design Team Fees				*845,976,115*
01.06.01.0001.	Project Team Fees				*845,976,115*
01.06.01.0001.0010	Project / Design Team Fees on 01.01	15%	%		654,933,012
01.06.01.0001.0020	Project / Design Team Fees on 01.02	15%	%		131,661,140
01.06.01.0001.0030	Project / Design Team Fees on 01.03	15%	%		0
01.06.01.0001.0040	Project / Design Team Fees on 01.04	15%	%		41,113,028
01.06.01.0001.0050	Project / Design Team Fees on 01.05	15%	%		18,268,936
03.	**Risks & Optimism Bias**				**2,853,759,429**
03.01.	**Risks (Design, Construction & Employer Risk)**				**1,297,163,377**
03.01.01.	Risks (Design, Construction & Employer Risk)				*1,297,163,377*
03.01.01.0001.	Risks (Design, Construction & Employer Risk)	*20%*			*1,297,163,377*
03.01.01.0001.0010	Risk Contingency on 01.01		%		873,244,016
03.01.01.0001.0020	Risk Contingency on 01.02		%		175,548,186
03.01.01.0001.0030	Risk Contingency on 01.03		%		0
03.01.01.0001.0040	Risk Contingency on 01.04		%		54,817,371
03.01.01.0001.0050	Risk Contingency on 01.05		%		24,358,581
03.01.01.0001.0060	Risk Contingency on 01.06		%		169,195,223
03.02.	**Optimism Bias**				**1,556,596,052**
03.02.01.	Optimism Bias				*1,556,596,052*
03.02.01.0001.	Optimism Bias	*20%*			*1,556,596,052*
03.02.01.0001.0010	Optimism Bias on 01.01		%		873,244,016
03.02.01.0001.0020	Optimism Bias on 01.02		%		175,548,186
03.02.01.0001.0030	Optimism Bias on 01.03		%		0
03.02.01.0001.0040	Optimism Bias on 01.04		%		54,817,371
03.02.01.0001.0050	Optimism Bias on 01.05		%		24,358,581
03.02.01.0001.0060	Optimism Bias on 01.06		%		169,195,223
03.02.01.0001.0070	Optimism Bias on 03.01		%		259,432,675

Appendix D Approach to Core and Asset Replacement Capital Expenditure

The approach to the Core works and Asset Replacement estimates was based upon the estimates provided by GAL. This approach recognised that GAL has greater knowledge relating to the condition of the current assets and the detail of its plans in the absence of the second runway Scheme works. However, recognising The Green Book guidance to correct for the systematic tendency for project appraisers to be overly optimistic, GAL's estimates were adjusted for optimism bias.

Following the approach to optimism bias set out in Section 2.2.1, the Core works were assessed to be undertaken in a more known environment comprising established procurement methodologies and supply chains, and within the footprint of the current site, therefore, with reference to Appendix B, it was considered that optimism bias could be reasonably mitigated to a greater extent than that applied to the Scheme works, and a consistent 15% allowance was determined. As per Section 2.2.1, we note GAL's comments, but consider 15% to be an appropriate allowance at this stage of project development within the context of the analyses in which these cost estimates are to be used.

In summary, therefore, adjustments were made as follows:

		Core		Asset Replacement (Post Q6)
		To 2016	Post 2016	
Risk		0	0	20
Optimism Bias	**Mitigated**	0	15	20
	Unmitigated	0	15	38

Table D-1 Summary of Risk and Optimism Bias Adjustments to the Base Costs (%)

D.1 Core Works

GAL provided estimates of its Core works, commencing in financial year 2016/17. In order for the capital cost estimate to commence in 2014, the first three years of GAL's forecast were assumed to be as per its Q6[4] settlement. GAL's cost estimate was adopted as presented without adjustment for risk, but it was adjusted to include optimism bias at the reduced Core rate of 15% as discussed above.

D.1.1 Q6

The CAA set out in CAP1152 the minimum capital expenditure required as a condition of GAL's licence. These costs are presented in Table D-2 on the following page.

[4] Q6 is the current five year regulatory period adopted by the Civil Aviation Authority (CAA). The Q6 settlement or 'notice granting the licence' is a binding commitment between the airport and the CAA covering the period April 2014 to December2018 inclusive.

	2014/15	2015/16	2016/17	2017/18	2018/19	Total	2019/20	2020/21
Asset stewardship	55.1	74.3	63.5	64.3	63.1	320.3	78.4	99.2
Carry over	66.3	21.7	0.0	0.0	0.0	88.0	0.0	0.0
Core enhancement capex	33.3	101.8	124.5	74.9	48.0	382.5	90.1	117.4
Total core capex plan	154.7	197.8	188.0	139.2	111.0	790.8	168.6	216.6
Development enhancement capex	12.7	7.8	54.1	45.5	9.4	129.6	0.0	0.0
Total capex plan	167.5	205.6	242.1	184.8	120.5	920.4	168.6	216.6

Table D-2 Q6 Capital Expenditure (Source: CAP 1152, CAA)

The costs for GAL were adjusted into calendar years by adopting 9 months and 3 months of each financial year. The costs within CAP 1152 are presented in 2011/12 prices. These were inflated into 2014 prices using the Construction Output Price Index (COPI), which represented a 4.9% increase to the above values[5]. The costs were adopted, unadjusted for risk and optimism bias as they had gone through the airport's capital cost development, constructive engagement and the CAA's regulatory processes.

As only a proportion of Q6 cost was used within the GAL estimate (given that GAL had provided estimates for the later years of Q6), the costs for those earlier years were assumed to be distributed between expansion and asset replacement in the same proportion to the estimates provided by GAL for the later years of Q6.

D.1.2 Core Works Cost Estimate

The key elements of Core work were identified as being:

- *process and capacity improvements to the North and South terminals; and*
- *development of the Pier 6 extension.*

The total cost of the works was stated to be £3.2 billion including adjustment for optimism bias at 15%.

[5] In order to determine GAL's calendar year 2014 costs, the capital investment for financial year 2013/14 was adopted from GAL's annual accounts, 2014. These accounts report capital expenditure of £201 million. We note that this value was included within the adjustment for the base of pricing data into 2014 at the same inflation rate as the Q6 costs (which are presented in 2011/12 prices). This differing treatment may therefore overstate capital expenditure at Gatwick in calendar year 2014 by c £1.2million, although we note that this difference is likely to be well within the order of accuracy of the estimated expenditure.

D.2 Asset Replacement

The allowance for asset replacement sought to cover expenditure relating to:

- *routinely maintain the assets condition and capacity;*
- *periodic major investment to restore the assets deteriorated condition and capacity; and*
- *invest in improvements to condition and capacity of the existing infrastructure.*

It is recognised that the asset replacement category of cost is difficult to estimate with accuracy. Most notably the final allowance, to improve the condition or capacity of the existing asset within the confines of the existing asset, is the most ill-defined as it seeks to ensure a number of unknown, but likely to be incurred, costs are adequately included. For example, it represents investment in existing infrastructure to increase efficiency, improve passenger experience, respond to changing regulatory requirements, or to support an enhanced business case (for example, a new CIP lounge for a new entrant airline), which by their nature are unknown across the planning horizon. Whilst such investments would be subject to their own business case at the time, it is not clear to what extent it can be assumed that traffic would continue to grow without investment in improved services within the extant infrastructure, or that non-aeronautical revenues would not deteriorate without such investment. Such improvements are often undertaken in conjunction with more clearly expansionary works, further clouding the uncertainty of this cost element, but noting that the Scheme works do not allow for any such contemporaneous investments it is necessary to ensure that the cost is separately identified. Even in the absence of purely expansionary works, it is reasonable to assume that GAL would seek to improve the condition and capacity of its existing infrastructure, either driven by regulation or to remain competitive within its national and international markets.

D.2.1 Approach

The asset replacement costs proposed by GAL were assessed on a per passenger basis. This considered GAL's presented total asset replacement estimate, uplifted to 2014, against GAL's traffic forecast for the corresponding years. The resulting average per passenger rate, adjusted for risk and optimism bias, was used in the differing Airports Commission's demand scenarios.

D.2.2 Asset Replacement Cost Estimate

GAL provided its estimate of asset replacement from financial year 2016/17 to 2049/50. With reference to the above, this investment can be interpreted into a per passenger rate as follows:

Total investment (£'million)	4,020
Total passengers (millions, GAL forecast)	2,327
Average investment per passenger (£)	1.73
Plus 20% risk allowance (£)	2.07
With mitigated optimism bias (20%)	2.49
With unmitigated optimism bias (38%)	2.86

Table D-3 Determination of GAL Asset Replacement Cost per Passenger

This asset replacement rate per passenger was assessed in the context of market expectation and considered to lie towards the lower end of, but within an expected range. As such, as discussed above, the resulting expenditure may provide an adequate budget to cover the first two identified elements of asset replacement (routine and major intervention maintenance expenditure), but may constrain the potential for investment in the third element (investment in improvements to the condition and capacity of the infrastructure that would exist at that time, for example, response to changing regulatory requirements or new business opportunities requiring investment within the existing infrastructure as discussed above). Nonetheless, the rate was considered to be reasonable for the purposes of this assessment.

In addition to the adoption of the above per passenger rates from 2017 onwards, the first three years of the Q6 capital expenditure requirement were included and distributed between expansion and asset replacement in the same proportion to the estimates provided by GAL for the later years of Q6. Consequently, across the assessed demand scenarios, driven by the differing passenger flows, total asset replacement over the forecast period varied from £3.9 to £6.3 billion with mitigated optimism bias and from £4.5 to £7.3 billion with unmitigated optimism bias.

Appendix E Core and Asset Replacement Capital Expenditure Summary

The tables on the following pages summarise the annual capital expenditure relating to the Core and asset replacement works under each of the demand scenarios set out in Figure 2-1. The summaries are presented with mitigated optimism bias applied. The distribution of Core works between elements as shown was assumed for the purpose of the depreciation calculation only.

2014, real prices in £'million - Mitigated optimism bias

Core Works	Total	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Terminal buildings	***2,435***	*115*	*129*	*153*	*118*	*93*	*85*	*89*	*104*	*105*	*91*	*59*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*
Plant	***286***	*14*	*15*	*18*	*14*	*11*	*10*	*10*	*12*	*12*	*11*	*7*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Transit systems	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Runways	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Taxiways and aprons	***143***	*7*	*8*	*9*	*7*	*5*	*5*	*5*	*6*	*6*	*5*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
Equipment	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Land	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Airfield Ancillary	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Car Parks	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Third Party Land Users	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Environment	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Community	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Risk	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Optimism Bias	**360**	-	-	-	21	16	15	16	18	19	16	10	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
Core Works Total	**3,224**	**136**	**151**	**180**	**160**	**125**	**115**	**120**	**140**	**142**	**123**	**80**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**

Asset Replacement	Total	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Asset Replacement	**3,112**	49	55	65	64	66	66	67	67	69	68	68	70	72	74	76	77	79	81	82	83	85	87	88	90	92	94	96	99	99	102	104	107	108	112	115	119	120
Risk	**589**	-	-	-	13	13	13	13	13	14	14	14	14	14	15	15	15	16	16	16	17	17	17	18	18	18	19	19	20	20	20	21	21	22	22	23	24	24
Optimism Bias	**707**	-	-	-	15	16	16	16	16	16	16	16	17	17	18	18	19	19	19	20	20	20	21	21	22	22	23	23	24	24	25	25	26	26	27	28	29	29
Asset Replacement Total	**4,408**	**49**	**55**	**65**	**93**	**94**	**95**	**96**	**97**	**99**	**97**	**98**	**101**	**103**	**106**	**110**	**111**	**113**	**116**	**118**	**120**	**122**	**125**	**127**	**129**	**132**	**135**	**138**	**142**	**143**	**147**	**149**	**154**	**156**	**161**	**166**	**171**	**173**

Table E-1 Assessment of Need Carbon Capped

2014, real prices in £'million - Mitigated optimism bias

Core Works	Total	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Terminal buildings	***2,435***	*115*	*129*	*153*	*118*	*93*	*85*	*89*	*104*	*105*	*91*	*59*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*
Plant	***286***	*14*	*15*	*18*	*14*	*11*	*10*	*10*	*12*	*12*	*11*	*7*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Transit systems	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Runways	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Taxiways and aprons	***143***	*7*	*8*	*9*	*7*	*5*	*5*	*5*	*6*	*6*	*5*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
Equipment	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Land	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Airfield Ancillary	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Car Parks	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Third Party Land Users	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Environment	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Community	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Risk	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Optimism Bias	**360**	-	-	-	21	16	15	16	18	19	16	10	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
Core Works Total	**3,224**	**136**	**151**	**180**	**160**	**125**	**115**	**120**	**140**	**142**	**123**	**80**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**

Asset Replacement	Total	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Asset Replacement	**3,406**	49	55	65	66	66	67	67	67	67	68	69	73	76	78	81	83	86	88	89	90	93	96	98	99	102	104	107	110	113	116	120	125	128	132	134	138	141
Risk	**647**	-	-	-	13	13	13	13	13	13	14	14	15	15	16	16	17	17	18	18	18	19	19	20	20	20	21	21	22	23	23	24	25	26	26	27	28	28
Optimism Bias	**777**	-	-	-	16	16	16	16	16	16	16	17	17	18	19	20	20	21	21	21	22	22	23	23	24	24	25	26	26	27	28	29	30	31	32	32	33	34
Asset Replacement Total	**4,830**	**49**	**55**	**65**	**95**	**95**	**97**	**97**	**96**	**97**	**98**	**100**	**105**	**110**	**113**	**117**	**120**	**123**	**126**	**128**	**129**	**133**	**138**	**141**	**143**	**147**	**150**	**154**	**159**	**162**	**167**	**173**	**179**	**185**	**190**	**193**	**198**	**204**

Table E-2 Assessment of Need Carbon Traded

2014, real prices in £'million - Mitigated optimism bias

Core Works	Total	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Terminal buildings	***2,435***	*115*	*129*	*153*	*118*	*93*	*85*	*89*	*104*	*105*	*91*	*59*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*
Plant	***286***	*14*	*15*	*18*	*14*	*11*	*10*	*10*	*12*	*12*	*11*	*7*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Transit systems	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Runways	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Taxiways and aprons	***143***	*7*	*8*	*9*	*7*	*5*	*5*	*5*	*6*	*6*	*5*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
Equipment	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Land	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Airfield Ancillary	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Car Parks	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Third Party Land Users	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Environment	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Community	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Risk	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Optimism Bias	**360**	-	-	-	21	16	15	16	18	19	16	10	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
Core Works Total	**3,224**	**136**	**151**	**180**	**160**	**125**	**115**	**120**	**140**	**142**	**123**	**80**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**

Asset Replacement	Total	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Asset Replacement	**4,461**	49	55	65	66	66	68	67	68	69	69	69	95	99	102	106	112	124	137	144	149	152	152	152	155	156	155	157	156	157	158	159	160	161	162	163	165	166
Risk	**859**	-	-	-	13	13	14	13	14	14	14	14	19	20	20	21	22	25	27	29	30	30	30	30	31	31	31	31	31	31	32	32	32	32	32	33	33	33
Optimism Bias	**1,030**	-	-	-	16	16	16	16	16	16	17	17	23	24	25	25	27	30	33	35	36	37	36	37	37	37	37	38	37	38	38	38	38	39	39	39	40	40
Asset Replacement Total	**6,350**	**49**	**55**	**65**	**95**	**95**	**97**	**96**	**98**	**99**	**100**	**99**	**136**	**142**	**147**	**152**	**161**	**179**	**197**	**208**	**215**	**220**	**218**	**219**	**223**	**224**	**223**	**225**	**224**	**226**	**227**	**229**	**230**	**232**	**233**	**234**	**238**	**238**

Table E-3 Low Cost is King Carbon Traded

2014, real prices in £'million - Mitigated optimism bias

Core Works	Total	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Terminal buildings	***1,937***	*115*	*129*	*153*	*118*	*93*	-	-	-	-	-	-	-	-	-	-	*85*	*89*	*104*	*105*	*91*	*59*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*
Plant	***228***	*14*	*15*	*18*	*14*	*11*	-	-	-	-	-	-	-	-	-	-	*10*	*10*	*12*	*12*	*11*	*7*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Transit systems	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Runways	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Taxiways and aprons	***114***	*7*	*8*	*9*	*7*	*5*	-	-	-	-	-	-	-	-	-	-	*5*	*5*	*6*	*6*	*5*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
Equipment	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Land	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Airfield Ancillary	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Car Parks	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Third Party Land Users	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Environment	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Community	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Risk	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Optimism Bias	**272**	-	-	-	21	16	-	-	-	-	-	-	-	-	-	-	15	16	18	19	16	10	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
Core Works Total	**2,550**	**136**	**151**	**180**	**160**	**125**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**115**	**120**	**140**	**142**	**123**	**80**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**

Asset Replacement	Total	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Asset Replacement	**2,766**	49	55	65	60	59	59	58	57	57	57	58	59	61	62	64	65	67	69	71	73	74	76	78	80	82	84	86	88	90	92	94	97	100	103	105	106	109
Risk	**519**	-	-	-	12	12	12	12	11	11	11	12	12	12	12	13	13	13	14	14	15	15	15	16	16	16	17	17	18	18	18	19	19	20	21	21	21	22
Optimism Bias	**623**	-	-	-	14	14	14	14	14	14	14	14	14	15	15	15	16	16	16	17	17	18	18	19	19	20	20	21	21	22	22	23	23	24	25	25	26	26
Asset Replacement Total	**3,908**	**49**	**55**	**65**	**86**	**84**	**84**	**84**	**82**	**82**	**82**	**83**	**85**	**87**	**89**	**92**	**94**	**96**	**99**	**102**	**104**	**106**	**110**	**113**	**115**	**118**	**121**	**124**	**127**	**130**	**133**	**136**	**140**	**144**	**148**	**151**	**153**	**157**

Table E-4 Global Fragmentation Carbon Capped

2014, real prices in £'million - Mitigated optimism bias

Core Works	Total	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Terminal buildings	***2,435***	*115*	*129*	*153*	*118*	*93*	*85*	*89*	*104*	*105*	*91*	*59*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*	*50*
Plant	***286***	*14*	*15*	*18*	*14*	*11*	*10*	*10*	*12*	*12*	*11*	*7*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*	*6*
Transit systems	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Runways	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Taxiways and aprons	***143***	*7*	*8*	*9*	*7*	*5*	*5*	*5*	*6*	*6*	*5*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
Equipment	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Land	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Airfield Ancillary	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Car Parks	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Third Party Land Users	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Environment	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Community	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Risk	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Optimism Bias	**360**	-	-	-	21	16	15	16	18	19	16	10	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
Core Works Total	**3,224**	**136**	**151**	**180**	**160**	**125**	**115**	**120**	**140**	**142**	**123**	**80**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**

Asset Replacement	Total	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Asset Replacement	**4,188**	49	55	65	70	71	73	74	75	76	77	78	79	94	99	103	107	110	114	118	121	124	127	130	133	136	139	142	144	147	150	152	155	157	159	161	162	164
Risk	**804**	-	-	-	14	14	15	15	15	15	15	16	16	19	20	21	21	22	23	24	24	25	25	26	27	27	28	28	29	29	30	30	31	31	32	32	32	33
Optimism Bias	**965**	-	-	-	17	17	17	18	18	18	18	19	19	23	24	25	26	26	27	28	29	30	31	31	32	33	33	34	35	35	36	37	37	38	38	39	39	39
Asset Replacement Total	**5,957**	**49**	**55**	**65**	**101**	**103**	**105**	**106**	**108**	**109**	**110**	**112**	**113**	**136**	**143**	**148**	**154**	**159**	**164**	**169**	**174**	**179**	**183**	**188**	**192**	**196**	**200**	**204**	**208**	**212**	**215**	**219**	**223**	**226**	**229**	**232**	**234**	**236**

Table E-5 Rebased Adopting GAL Traffic

Appendix F Operational Expenditure

F.1 Introduction

This appendix sets out the approach used to develop an independent forecast of operating costs for the period 2014 to 2050 for the Gatwick Airport Second Runway scheme.

This appendix contains the following sections:

- *Section F-2 describes the methodology adopted in developing operating cost forecasts for the period, including the modelling assumptions used for all schemes and the approach towards the treatment of risk and optimism bias.*
- *Section F-3 describes the inputs received from the scheme promoter and any specific assumptions used to develop the independent operating cost forecasts.*
- *Section F-4 sets out the operating cost modelling outputs in comparison to the costs submitted by the scheme promoter.*

F.2 Approach

The approach took as its starting point the CAA's notice granting the licence to GAL (CAP 1152) for the Q6 period (2014-2019), adjusted to 2014 prices and revised to reflect differences in traffic forecasts.

Airport operating costs typically increase in relation to growth in airport activity, assessed using passenger numbers. In addition, because a certain proportion of airports' operating costs are fixed, relating to the infrastructure rather than directly to passenger numbers, the addition of new infrastructure brings with it a step-change in fixed costs. Efficient airports take steps to make as much of their operating cost base as possible variable rather than fixed, for example by designing staff rosters to match passenger demand as closely as possible and by switching off lighting in unoccupied areas of the terminal building. Operating cost forecasts for efficient airports therefore tend to adopt higher elasticities to airport activity (i.e., passenger numbers) rather than infrastructure size, since a greater proportion of the total cost is variable. Because airport operating costs can never be fully variable, a relationship with infrastructure size (i.e., terminal gross floor space and airfield area) is appropriate to take account of the step-change in fixed costs.

The independent forecasts developed for each scheme following the Q6 period (i.e. from 2019 to 2050) used a combination of drivers based on passenger growth and infrastructure expansion (see Section 0) to derive annual costs for each category, taking into account the opportunity to implement efficiencies in certain categories over time.

These forecasts were then treated according to The Green Book guidelines to take account of the risk that costs, individually or collectively, could prove higher than forecast, and to adjust for optimism bias, which takes account of unforeseen factors that could cause outturn costs to be higher than forecasted.

F.2.1 Elasticities

Elasticities, where supplied by scheme promoters, were reviewed against comparable benchmarks, and adjusted according to various aspects of each airport's operation (e.g. its complexity, existing cost base, current efficiency, level of fixed cost) to reflect the nature of each airport. The resulting elasticities, based on industry experience, were considered to be similar for each scheme.

Elasticities to passenger growth, terminal floor space and airfield area were applied, and adjustments for efficiency improvements were also provided for.

The following table presents the elasticities used from 2019 onwards for all schemes.

Elasticities	Staff	Routine Maintenance	Utilities	Rent & Rates	Rail	Other
Passenger increase	40%	40%	5%	0%	40%	40%
Gross floor area increase	40%	40%	70%	80%	0%	30%
Airfield increase	5%	5%	5%	20%	0%	5%

Table F-1 Elasticities Used for all Schemes

The independent model assumed that cost increases for Routine Maintenance should be deferred for two years after terminal or airfield expansion to take account of warranty periods and the likelihood that less routine maintenance will be required on these assets in the first two years.

F.2.2 Efficiencies

Airports as with other businesses continually seek to improve the efficiency of their operations. Efficiency is embedded within the elasticity based approach described above. Over and above this, further efficiencies were assumed across all cost categories, with the exception of Rent & Rates against which the airport has little or no capacity to achieve efficiencies.

Efficiencies of 1% per annum were assumed from 2019, after the Q6 period. These efficiencies were phased out over time reflecting a number of airport-specific factors, including the overall level of efficiency of the airport assumed at the end of Q6 and the scope for further efficiencies thereafter, and the impact that opening substantial new infrastructure would have in terms of transforming the operation of the airport.

F.2.3 Treatment of Risk and Optimism Bias

The Green Book Guidance on appraisal and evaluation in Central Government has been adopted for the purposes of determining appropriate adjustments for risk and optimism bias. The guidance recommends making such adjustments on the basis that there is a demonstrated, systematic tendency for project appraisers to be overly optimistic.

Allocations have been made within the Airports Commission's independent cost estimates for each scheme, seeking to address two unknown factors:

- *Risk: the unknown detail of the identified airport operation which would be expected to lead to an under-estimate of the operating costs although the scope may be reasonably defined. For example, wage rates increasing above inflation; and*
- *Optimism Bias: the unknown scope of all necessary operating activities which could extend significantly to deliver the fully operational scheme. For example, the design of the new terminal requiring a greater number of operational staff than foreseen.*

The allocation for optimism bias is calculated on the risk-adjusted price.

F.2.3.1 Risk

In order to address the risk that operating costs escalate at a greater rate than forecast, a compound real growth increase of 0.5% per annum was applied from 2019 onwards (i.e. after Q6). Risk is already taken into consideration within the Q6 regulatory settlement.

The risk value is applied as a 0.5% real increase in the cost base, calculated using an index with base year 2018 (the final year of the Q6 period). Therefore 2019 is the first year in which risk-adjusted costs are 0.5% higher than the base case forecast. At the end of the forecasting period (2050), this adjustment is equivalent to $(1.005)^{32}$, a 17.3% increase, and is applicable to the operating costs associated with the whole airport (i.e., both the core airport and the scheme).

	2018	2019	2020	2021	2022	2023	2024	2025	2030	2040	2050
Risk Index (0.5% per annum)	1.000	1.005	1.010	1.015	1.020	1.025	1.030	1.036	1.062	1.116	1.173

Table F-2 Risk Index

This approach to applying risk takes account of the greater certainty of cost estimates at the beginning of the forecasting period in comparison to a much greater level of uncertainty in 2050.

F.2.3.2 Optimism Bias

HM Treasury's Supplementary Green Book Guidance recommends an upper bound of 41% on 'Outsourcing projects', which, in the absence of other data, has been applied to appraisal of operating costs.

Applicable mitigation factors were assessed to determine where a reduction in the adjustment could be justifiable. These included the experience and capabilities of the project management team, the early involvement of the operator in the design phase, the level of innovation and complexity of the proposed operation, and external influences including economic and regulations/legislation.

HM Treasury's Supplementary Green Book Guidance does not set out a calculation method to establish the appropriate level of optimism bias to be applied to operational expenditure. Noting that the setting of an appropriate rate requires judgement across a range of factors, most of which are difficult to establish with accuracy from an external assessment of the organisation responsible for

operational delivery, and noting that those assessments would be subjective in nature rather than demonstrably objective, the approach to optimism bias was to establish a reasonable allowance that was applied consistently to all schemes.

Table F-3, below, sets out the calculation used to derive an appropriate level of mitigated optimism bias used consistently for all schemes.

Operating Expenditure Contributory Factors	HMT Treasury Green Book Descriptions	Outsourcing Optimism Bias (%)	Mitigation Factor (0<X<1)	Reduction in Optimism Bias
Procurement	Late Contractor Involvement in Design	5	0.8	4
	Poor contractor capabilities	15	0.8	12
Project Specific	Design Complexity	5	0.5	2.5
	Degree of Innovation	5	0.5	2.5
Client Specific	Project Management Team	20	0.7	14
	Poor Project Intelligence	10	0.5	5
Environment	Site Characteristics	5	0.4	2
External Influences	Economic	20	0.25	5
	Legislation/Regulations	15	0.25	3.75
Weighted Total		**100**		**50.75**
Adjusted Optimism Bias	= 50.75 * Upper Bound (41%)			**20%**

Table F-3 Optimism Bias Mitigations

The purpose of optimism bias is to address the unknown scope of all necessary costs required to deliver a fully operational scheme and acceptable service standards. Given that the scope of costs is much better understood for the existing core airport operation, it was determined that optimism bias should apply only to the incremental operating expenditure associated with the additional runway and new facilities, and not to the core airport. This also follows the Department for Transport's Web-based Transport Analysis Guidance (TAG) which recommends that for rail schemes, optimism bias should only be applied to the operating costs associated with the incremental scheme and not to any existing operation. Based on the mitigation calculation set out in Table F-3, a mitigated adjustment of 20% is proposed at this stage of the appraisal process.

Costs have also been modelled with the upper bound optimism bias of 41% applied.

F.2.4 Inflation

The Retail Prices Index (RPI) was adopted as a basis for modelling operating costs. The financial model inputs incorporate real increases or decreases in relation to RPI as appropriate. For instance, staff costs (which reflect a combination of staff numbers, wage rates and other employment costs) are modelled on the basis of RPI, with real efficiency improvements reflected in the forecasts over the long term as appropriate. Contract costs, such as with cleaning providers, suppliers and outsourced maintenance providers, are typically linked to RPI. RPI is more reflective of wage rate increases than the Consumer Prices Index (CPI) and is,

therefore, considered appropriate for modelling staff costs. Materials and other non-staff costs are also assumed to increase with RPI.

F.3 Modelling Inputs

GAL supplied annual operating expenditure by category for the total scheme and for the Runway 2 increment, in 2013/14 prices, for the period 2016/17 to 2049/50.

Costs supplied by GAL were in 2013/14 prices and were inflated by three-quarters of the 2014 inflation value of 1.9% (Source: UK inflation, average consumer prices. IMF World Economic Outlook Database, April 2014) to bring them to 2014 prices. Forecasts for 2014-17 were based on the Q6 settlement, revised to reflect differences in traffic forecasts.

F.3.1 Elasticities

GAL's submission did not include specific cost drivers but provided the following commentary on cost drivers used as the basis of its forecasting approach.

Passengers – much of our opex is to some degree impacted by changing passenger numbers. However, the main areas are security staff numbers (and in particular, the resourcing of the central search areas), terminal operation resource, and PRM costs; Provision of space – The Capital Cost Forecast Appendix includes a Schedule of Facilities produced by our Masterplan consultants, ARUP. This document contains the size of the individual components of the masterplan scheme. The four main categories driven by additional space are business rates, utilities, maintenance and cleaning. For each of these categories, various benchmark metrics are used to inform the opex projection. Opex increases in these categories are seen I n the years where new phases (and thus new area) of the master plan scheme go live. Some of the key measurements used are around the gross floor area of the terminals and piers, as well as areas of the airfield that include runway, taxiways, aprons and stands; and Inflation – there are a number of activities provided by 3rd parties and price increases are set in their contractual terms. Generally, these contracts are linked to either the Retail Price Index or Consumer Price Index. Similarly, the Government sets out that business rates rise in line with the Retail Price Index. Other key areas of inflation are utility commodity prices, as well as wage inflation. **Source: A Second Runway for Gatwick, Appendix A16**

Table F-4 GAL Commentary on Cost Drivers

F.3.2 Efficiencies

Efficiencies of 1% per annum were assumed across all cost categories, with the exception of Rent & Rates and 'Other' costs. For this scheme, no annual efficiency was applied to 'Other' costs as this approach was considered to follow a comparable trend to GAL's own forecast.

For this scheme, the efficiency factor was reduced to 0% per annum after 2030, recognising that the scale of expansion, in proportion to the existing operation, would provide for a step-change in efficiency to be implemented and more limited incremental opportunity thereafter.

GAL's own forecast assumes an efficiency factor of 1.0% throughout the forecasting period.

Table F-5 below illustrates the efficiency factors that have been applied for each category, and how these have been phased out over time. Efficiencies are shown as negative values in the table below since they reduce operating expenditure.

Year	Staff	Routine Maintenance	Utilities	Rent & Rates	Rail	Other
2019-29	-1.0%	-1.0%	-1.0%	0%	n/a	0%
2030-50	0%	0%	0%	0%	n/a	0%

Table F-5 Real Efficiency Factors by Category

F.4 Independent Operational Expenditure Forecast

This section presents graphical outputs of the independent operating cost model, compared with the costs presented by, or inferred from, the scheme promoter's submission.

The figure below shows GAL's forecast total operating costs against the independent forecasts for each of the demand scenarios. The independent forecasts include risk applied to total costs and optimism bias at the mitigated level of 20% applied to scheme operating costs.

The stepped increases in the independent cost forecasts are in line with increases in terminal floor space and airfield area. The phasing of terminal development differs between scenarios, accounting for the stepped increases occurring at different times.

An additional traffic case is also illustrated: 'GAL Traffic'. This case adopts the passenger demand scenario submitted by GAL, but applies an independently developed phasing of terminal infrastructure development and an independent operating cost forecast.

GAL's own operating cost forecast against GAL's passenger forecast assumes that three phases of capital expansion are required. GAL's forecast is more optimistic than the independent forecast, in particular the level of fixed costs associated with opening new infrastructure.

Under the Assessment of Need Carbon Capped and Global Fragmentation Carbon Capped demand scenarios, the level of passenger demand requires that only two of GAL's three phases of capital expansion occur. Therefore, only two stepped increases in cost are apparent for these cases.

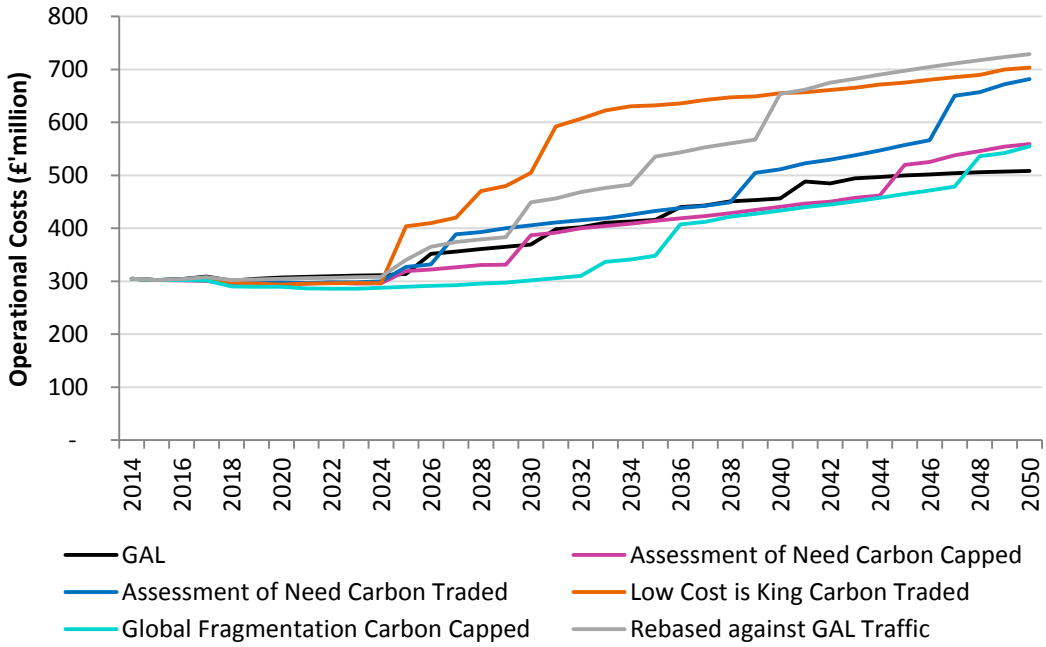

Figure F-1 Gatwick Airport Second Runway Scheme Forecast Operating Expenditure (Risk Adjusted and Mitigated Optimism Bias)

Figure F-2, below, illustrates forecast operating costs on a per passenger basis. Temporary increases occur during the period following the opening of new infrastructure. When new terminal buildings open, there is a marked increase in fixed costs. Over time, as passenger numbers increase to fill the terminal buildings, costs become more efficient on a per passenger basis.

While GAL's forecast shows a steady decrease, with comparatively small periods of inefficiency resulting from the fixed costs of opening new infrastructure, more pronounced periods of inefficiency are visible in the independent forecasts. Overall, costs per passenger, adjusted for risk and optimism bias, are forecast to remain at a similar level in real terms to the range forecast by the CAA through the Q6 period.

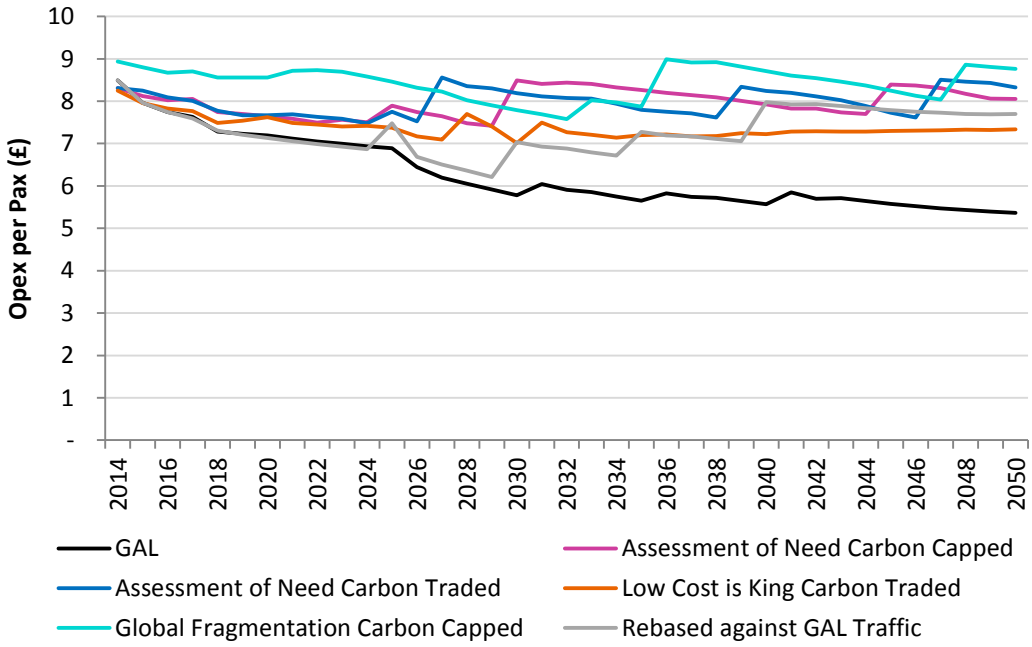

Figure F-2 Gatwick Airport Second Runway Scheme Forecast Operating Expenditure per Passenger (Risk Adjusted and Mitigated Optimism Bias)

2014, real prices in £'million

GAL	Total	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Staff	**5,678**	147	140	135	133	124	124	124	125	125	126	126	127	137	139	141	143	144	153	154	155	156	157	163	164	166	167	169	176	177	179	180	181	183	184	185	185	186
Routine maintenance	**1,215**	39	34	29	25	25	26	26	26	26	26	26	26	26	26	26	26	26	26	26	32	32	32	32	32	37	37	37	37	37	44	44	44	44	44	44	44	44
Utilities	**1,526**	21	24	26	31	31	31	31	31	31	31	31	31	41	41	41	41	41	44	44	44	44	44	47	47	47	47	47	51	51	51	51	51	51	51	51	51	51
Rent and rates	**1,696**	30	30	30	32	32	32	32	32	32	32	32	32	35	35	35	35	35	46	46	46	46	46	54	54	54	54	54	64	64	64	64	64	64	64	64	64	64
Rail	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	**4,651**	67	75	84	88	89	92	95	95	96	96	97	99	113	115	118	120	123	129	131	133	135	137	144	145	146	148	149	160	155	156	157	158	160	160	161	162	162
Opex	**14,765**	**305**	**302**	**304**	**309**	**301**	**305**	**307**	**308**	**310**	**311**	**312**	**314**	**352**	**356**	**361**	**365**	**369**	**398**	**402**	**410**	**413**	**416**	**440**	**443**	**451**	**454**	**456**	**489**	**485**	**494**	**497**	**500**	**502**	**504**	**506**	**507**	**508**
Opex/pax (£)	**-**	8.49	7.96	7.74	7.63	7.28	7.23	7.20	7.12	7.05	7.00	6.94	6.89	6.44	6.19	6.05	5.91	5.78	6.04	5.90	5.85	5.75	5.65	5.83	5.74	5.72	5.64	5.57	5.85	5.70	5.71	5.64	5.58	5.52	5.47	5.43	5.39	5.37

Assessment of Need Carbon Capped	Total	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Staff	**5,207**	147	140	133	130	121	120	119	118	118	116	116	121	121	121	122	121	137	139	140	140	142	143	144	145	146	147	149	151	151	153	154	170	170	173	175	177	178
Routine maintenance	**1,051**	39	34	29	26	24	24	24	24	24	23	23	23	23	24	25	24	25	25	28	28	29	29	29	29	29	30	30	30	30	31	31	31	31	35	35	36	36
Utilities	**1,320**	21	24	26	31	33	32	32	32	31	31	31	32	32	32	31	31	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	44	45	45	45	45	45
Rent and rates	**1,577**	30	30	30	31	32	32	32	32	32	32	32	38	38	38	38	38	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	56	56	56	56	56	56
Rail	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	**3,820**	67	75	83	82	85	85	86	86	87	86	86	92	93	94	95	95	105	106	107	107	108	109	110	111	112	113	114	115	115	117	117	127	128	129	131	132	133
Opex	**12,975**	**305**	**302**	**301**	**300**	**294**	**293**	**292**	**291**	**291**	**288**	**287**	**306**	**307**	**309**	**310**	**310**	**352**	**355**	**360**	**361**	**364**	**366**	**368**	**370**	**372**	**375**	**378**	**381**	**382**	**386**	**387**	**428**	**430**	**437**	**441**	**446**	**447**
Opex (incl. risk and 20%OB)	**14,521**	**305**	**303**	**301**	**301**	**294**	**295**	**295**	**296**	**297**	**296**	**296**	**320**	**322**	**327**	**331**	**331**	**387**	**392**	**400**	**404**	**409**	**414**	**419**	**423**	**429**	**435**	**441**	**447**	**450**	**457**	**462**	**520**	**525**	**538**	**546**	**554**	**559**
Opex/pax (£)	**-**	8.31	8.12	8.03	8.06	7.75	7.70	7.64	7.59	7.49	7.57	7.50	7.89	7.74	7.65	7.48	7.42	8.49	8.41	8.44	8.41	8.33	8.26	8.20	8.15	8.09	8.01	7.92	7.83	7.83	7.73	7.70	8.39	8.37	8.31	8.17	8.06	8.05

Assessment of Need Carbon Traded	Total	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Staff	**5,640**	147	140	134	132	122	122	120	119	118	117	117	124	125	141	142	142	143	144	145	146	148	150	151	152	154	169	171	173	174	176	179	182	184	207	208	210	213
Routine maintenance	**1,132**	39	34	29	27	25	25	24	24	24	24	24	24	24	25	25	29	29	29	29	29	30	30	30	31	31	31	32	35	35	36	36	37	37	38	38	42	43
Utilities	**1,421**	21	24	26	31	33	32	32	32	31	31	31	32	32	39	38	38	38	38	38	38	38	38	38	38	38	45	45	45	45	45	45	45	45	54	54	54	54
Rent and rates	**1,708**	30	30	30	31	32	32	32	32	32	32	32	38	38	47	47	47	47	47	47	47	47	47	47	47	47	56	56	56	56	56	56	56	56	69	69	69	69
Rail	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	**4,128**	67	75	84	85	86	87	87	87	87	87	88	94	96	106	108	109	110	111	112	112	113	115	116	117	118	127	129	130	131	133	134	137	138	152	153	154	156
Opex	**14,030**	**305**	**302**	**303**	**305**	**297**	**297**	**295**	**293**	**292**	**291**	**291**	**312**	**315**	**358**	**360**	**364**	**367**	**370**	**372**	**373**	**376**	**381**	**383**	**385**	**388**	**428**	**432**	**438**	**441**	**445**	**450**	**456**	**460**	**519**	**521**	**530**	**534**
Opex (incl. risk and 20%OB)	**15,923**	**305**	**303**	**304**	**307**	**298**	**298**	**298**	**297**	**298**	**298**	**300**	**327**	**332**	**389**	**393**	**400**	**406**	**411**	**415**	**419**	**425**	**433**	**438**	**442**	**449**	**505**	**511**	**523**	**530**	**538**	**547**	**557**	**566**	**650**	**657**	**672**	**682**
Opex/pax (£)	**-**	8.31	8.25	8.09	8.01	7.78	7.66	7.67	7.69	7.63	7.59	7.48	7.75	7.52	8.56	8.35	8.30	8.19	8.11	8.08	8.06	7.94	7.79	7.75	7.72	7.62	8.34	8.24	8.19	8.12	8.02	7.89	7.73	7.62	8.51	8.46	8.43	8.33

Low Cost is King Carbon Traded	Total	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Staff	**6,656**	147	140	134	131	122	120	118	118	117	116	115	151	152	153	167	170	177	204	209	212	214	213	213	215	215	215	216	216	216	217	217	218	218	219	219	221	221
Routine maintenance	**1,356**	39	34	29	26	25	24	24	24	24	23	23	26	27	31	32	32	36	38	39	43	44	44	44	44	44	44	44	44	44	44	45	45	45	45	45	45	45
Utilities	**1,652**	21	24	26	31	33	32	32	32	31	31	31	39	39	39	45	44	44	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54
Rent and rates	**1,970**	30	30	30	31	32	32	32	32	32	32	32	46	46	46	54	54	54	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66
Rail	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	**4,804**	67	75	83	84	86	86	85	86	86	87	87	112	114	115	125	128	134	150	154	156	157	157	157	158	158	158	159	158	159	159	160	160	160	161	161	162	162
Opex	**16,438**	**305**	**302**	**302**	**303**	**297**	**294**	**291**	**291**	**290**	**289**	**287**	**374**	**377**	**384**	**422**	**428**	**446**	**512**	**521**	**531**	**535**	**534**	**534**	**537**	**538**	**537**	**539**	**538**	**539**	**541**	**542**	**543**	**544**	**545**	**546**	**548**	**549**
Opex (incl. risk and 20%OB)	**19,076**	**305**	**302**	**302**	**305**	**298**	**295**	**294**	**296**	**296**	**297**	**296**	**404**	**410**	**420**	**470**	**480**	**505**	**593**	**607**	**622**	**630**	**632**	**636**	**643**	**647**	**649**	**655**	**657**	**661**	**666**	**671**	**675**	**680**	**685**	**690**	**700**	**704**
Opex/pax (£)	**-**	8.25	7.95	7.82	7.77	7.48	7.54	7.62	7.49	7.45	7.40	7.42	7.37	7.17	7.10	7.70	7.41	7.01	7.49	7.26	7.20	7.14	7.20	7.22	7.17	7.18	7.24	7.23	7.28	7.29	7.28	7.28	7.30	7.30	7.32	7.33	7.32	7.34

Global Fragmentation Carbon Capped	Total	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Staff	**4,936**	147	140	134	130	119	118	117	114	113	112	112	111	111	111	111	111	113	114	115	122	123	125	141	143	144	145	147	149	150	151	153	154	156	158	173	174	176
Routine maintenance	**997**	39	34	29	26	24	24	23	23	23	23	22	22	22	22	22	22	23	23	23	23	24	25	25	26	29	29	30	30	30	30	31	31	31	32	32	32	36
Utilities	**1,245**	21	24	26	31	33	32	32	32	31	31	31	30	30	30	30	29	29	29	29	31	31	31	38	38	38	38	38	38	38	38	38	38	38	38	45	45	45
Rent and rates	**1,444**	30	30	30	31	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	38	38	38	47	47	47	47	47	47	47	47	47	47	47	47	56	56	56
Rail	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	**3,610**	67	75	83	83	83	83	83	82	82	82	83	83	84	85	86	87	88	89	90	95	96	97	107	108	109	110	111	113	113	114	116	117	118	120	129	129	131
Opex	**12,232**	**305**	**302**	**302**	**301**	**290**	**288**	**286**	**282**	**280**	**279**	**279**	**279**	**280**	**279**	**281**	**281**	**284**	**286**	**289**	**309**	**311**	**316**	**359**	**361**	**367**	**370**	**373**	**376**	**379**	**381**	**384**	**388**	**392**	**395**	**435**	**437**	**444**
Opex (incl. risk and 20%OB)	**13,582**	**305**	**303**	**302**	**302**	**290**	**290**	**289**	**287**	**286**	**286**	**288**	**289**	**292**	**293**	**296**	**298**	**302**	**306**	**310**	**337**	**341**	**348**	**407**	**412**	**422**	**428**	**434**	**440**	**445**	**451**	**458**	**465**	**472**	**478**	**536**	**542**	**555**
Opex/pax (£)	**-**	8.94	8.80	8.67	8.70	8.56	8.56	8.56	8.71	8.73	8.69	8.58	8.46	8.32	8.23	8.03	7.90	7.79	7.69	7.58	8.02	7.97	7.88	8.99	8.91	8.92	8.82	8.71	8.61	8.54	8.46	8.37	8.25	8.13	8.04	8.86	8.81	8.76

Rebased Adopting GAL Traffic	Total	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Staff	**6,220**	147	140	135	133	124	124	123	123	122	121	121	128	137	139	139	140	159	161	163	165	166	181	183	184	186	187	210	212	213	215	216	218	219	220	221	222	223
Routine maintenance	**1,242**	39	34	29	27	25	25	25	25	25	25	24	24	26	28	28	28	28	29	33	33	33	34	34	37	37	37	38	38	43	43	43	44	44	44	44	44	45
Utilities	**1,505**	21	24	26	31	33	32	32	32	32	31	31	33	33	33	33	32	39	39	39	39	39	45	45	45	45	45	54	54	54	54	54	54	54	54	54	54	54
Rent and rates	**1,807**	30	30	30	31	32	32	32	32	32	32	32	39	39	39	39	39	48	48	48	48	48	56	56	56	56	56	68	68	68	68	68	68	68	68	68	68	68
Rail	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	**4,765**	67	75	84	86	89	89	90	90	91	91	92	98	106	108	110	112	127	128	130	131	133	144	146	147	148	149	168	169	170	171	172	174	175	176	176	177	178
Opex	**15,538**	**305**	**302**	**304**	**308**	**302**	**302**	**302**	**301**	**301**	**300**	**299**	**323**	**341**	**347**	**349**	**351**	**401**	**405**	**413**	**417**	**420**	**459**	**463**	**468**	**472**	**475**	**538**	**541**	**548**	**551**	**554**	**557**	**560**	**562**	**564**	**566**	**567**
Opex (incl. risk and 20%OB)	**17,938**	**305**	**302**	**304**	**308**	**302**	**304**	**305**	**306**	**307**	**308**	**308**	**340**	**365**	**374**	**379**	**383**	**449**	**457**	**469**	**476**	**482**	**536**	**543**	**553**	**560**	**567**	**654**	**661**	**675**	**683**	**690**	**697**	**705**	**711**	**717**	**723**	**729**
Opex/pax (£)	**-**	8.49	7.96	7.74	7.59	7.31	7.21	7.13	7.06	6.99	6.93	6.87	7.48	6.68	6.51	6.36	6.21	7.03	6.93	6.89	6.79	6.71	7.28	7.19	7.17	7.11	7.06	7.98	7.92	7.93	7.88	7.83	7.79	7.75	7.73	7.70	7.69	7.70

Table F-6 Operational Expenditure Forecasts

Appendix G Non-Aeronautical Revenue

G.1 Introduction

This appendix sets out the approach used to develop an independent forecast of non-aeronautical revenues for the period 2014 to 2050 for the Gatwick Airport Second Runway scheme.

This appendix contains the following sections:

- *Section G-2 describes the data inputs received from scheme promoter, including their own non-aeronautical revenue forecasts for the period, and the passenger traffic forecasts against which these were developed.*
- *Section G-3 describes the independent non-aeronautical revenue forecasting methodology.*
- *Section G-4 provides commentary on the non-aeronautical revenue model outputs.*

G.2 Non-Aeronautical Revenue Forecast Data Inputs

GAL supplied non-aeronautical revenue by category for the Core and Scheme, in 2013/14 prices, for the period 2016/17-2049/50. Estimates up to 2016/17 have been developed based on the Q6 settlement.

While GAL only provided a total retail revenue line, a detailed split of this category into Duty Free/ Other Retail/ Catering was achieved by applying GAL's recommended shares of 35.33%, 48.33%, 16.33% respectively, throughout the forecast period.

Non-aeronautical revenues supplied by GAL were in 2013/14 prices and were inflated by three-quarters of the 2014 inflation value of 1.90% (Source: UK inflation, average consumer prices. IMF World Economic Outlook Database, April 2014).

Terminal gross floor space was derived from the capacity analysis work presented in Section 0. The timing of the phases of expansion of terminal buildings, which differ under each demand scenario, formed a key input to the non-aeronautical revenue modelling work.

G.3 Independent Non-aeronautical Revenue Forecasts

G.3.1 General Forecast Commentary

All non-aeronautical revenues are presented in real 2014 prices.

Forecasts have been developed for the following non-aeronautical revenue categories:

- *Retail (Duty and Tax Free, Food and Beverage, Other Retail)*
- *Car Parking*
- *Property Rental*
- *Other Revenue*

The 'Other Retail' sub-category includes:

- *Specialist Retail*
- *Bureaux de Change*
- *Other Retail*

The 'Other Revenue' category includes:

- *Passengers with Reduced Mobility (PRM)*
- *Staff Car Parking*
- *Operational facilities and utilities income' (common user terminal equipment (CUTE), baggage systems, utility cost recovery)*

The forecast's base year is 2014, which reflects the latest GAL annual report for 2013/14, the most recent available data on non-aeronautical revenue performance. Additionally, 2014 should reflect the revenue performance in the absence of one-off events such as the Olympics, a terminal opening, or a terminal commercial space reconfiguration.

The independent non-aeronautical revenue forecasts have taken into consideration the attributes of the airport scheme, in terms of:

- *Passenger mix: high share of origin and destination traffic, impacting terminal concessions spend*
- *Surface access options*
- *Terminal commercial space design: GAL's historic performance reflects optimisation practices through terminal reconfiguration only. The opening of a new terminal at Gatwick represents therefore an opportunity to design a commercially optimised space, which could trigger non-aeronautical revenue upsides not reflected in the historical trend*

G.3.2 Impact of Overcapacity

In all scenarios except the Low Cost is King Carbon Traded, the scheme is forecast to operate within the potentially provided capacity. The Low Cost is King Carbon Traded demand scenario only exceeds the capacity of 95 mppa by 1mppa. Given this marginal overcapacity no impact on non-aeronautical revenue was forecast, although we would note the potential for congestion as capacity reached to potentially impact revenue as passengers spend a proportionally greater period of their dwell time within queues or are able to circulate less easily.

G.3.3 Risk and Optimism Bias

The Green Book guidance suggests that revenue forecasts should be adjusted for both risk and optimism bias.

Adjustments for risk are intended to take account of the potential for foreseeable negative impacts on revenues to occur. Adjustments for optimism bias are intended to take account of inherent optimism when forecasting revenues and for the potential for unforeseeable negative impacts to occur.

Whereas the approach adopted for applying optimism bias to operating costs considers only the incremental operating costs of the scheme, to be incurred when operating the expanded facilities as a result of a new runway being built at the airport, this approach would be less robust for non-aeronautical revenues since any risk factors would be likely to apply to the whole airport rather than just the new facilities. For example, if retail revenues at a new terminal were to fall short of

forecast levels as a result of an aspect of design, it can be expected that management would take the necessary steps to reconfigure the space to address the shortfall. If, however, retail revenues fell short of forecast levels as a result of a general trend away from airport shopping, then this could be expected to impact revenues at the existing terminal as well as the new terminal.

Setting appropriate levels for risk and optimism bias is a matter of professional judgement rather than robust evidence available from benchmarks or best practices. Although peaks and troughs in revenues can be expected through the forecasting period, a sustained period of underperforming non-aero revenues would likely be met with remedial action by management. It was proposed that a compound 0.25% per annum reduction in non-aeronautical revenues would be appropriate to take account of risk across the portfolio of non-aeronautical revenues. For optimism bias, a further 0.25% per annum reduction would apply to the risk-adjusted non-aeronautical revenue value. Both adjustments have been implemented from 2019, the first year after the Q6 regulatory period has ended. The same adjustments are applicable to each airport scheme.

By 2050, the risk adjustment of 0.25% per annum with a further 0.25% per annum for OB applied to the risk-adjusted value results in a 14.8% reduction in annual non-aeronautical revenues. The risk-adjusted reduction is 7.7% by 2050.

G.3.4 Historical Trends

As shown in Figure G-1, net non-aeronautical revenue per passenger has decreased at a compound annual growth rate (CAGR) of -0.3% over the FY 2008 – 2014 period. Net non-aeronautical revenues have marginally grown at a 0.06% CAGR over the same period, in the context of 0.3% passenger growth.

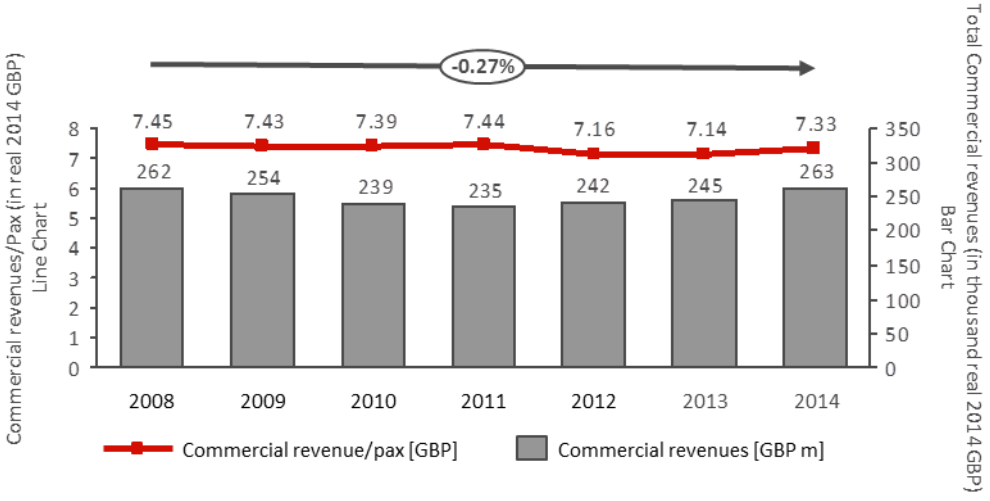

Figure G-1 Gatwick Airport Historical Non-Aeronautical Revenue in Real 2014 GBP

Net retail revenue (including duty free, catering, and other retail) has increased at a 0.7% CAGR over the same 7-year period, while revenue per passenger has increased at a CAGR of 0.8%.

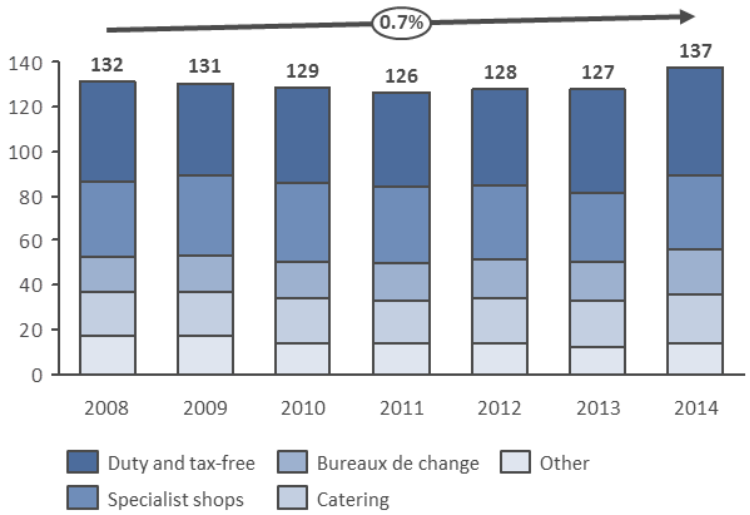

Figure G-2 Gatwick Airport Historical Retail Revenue Split in Real 2014 GBP

G.3.5 Non-Aeronautical Revenue Forecast Assumptions Provided by GAL

GAL's submission (see Appendix A16 Financial Case) specifies the following non-aeronautical forecast assumptions:

Retail

- *The retail Income per Passenger (IPP) is assumed to track in line with the Consumer Price Index. The IPP will also rise due to two additional factors:*
  - *A higher portion of long-haul passengers in the passenger mix over time, with a higher propensity to purchase retail goods, as well as at a higher average transaction value. Long-haul passengers tend to dwell for longer periods of time in the airside departure lounges and therefore generate a higher spend. They also attract a higher retail margin as these destinations are outside of the EU and are therefore not liable for VAT.*
  - *It is assumed that there will be an improvement in retail performance from a new retail departure lounge concept in the mid-field terminal building. Overall, retail IPP therefore increases by an improvement factor of up to 20%, which is triggered and aligned to the phasing and utilisation assumptions of the mid-field terminal.*
- *The overall retail IPP is benchmarked against other airports to ensure it is set at an appropriate level.*

Car parks

- *Car park IPP is assumed to decrease over time in line with our assumption that public transport modal share will increase from an average of 44% in 2012 to 60% by 2050, reducing car parking income per passenger in real terms. Offsetting this effect, car parking IPP will increase in line with the Consumer Price Index.*

Property

- *Property is modelled in absolute terms as it is assumed to be relatively inelastic to passenger volumes, although large scale passenger increases will drive*

additional airport-related property requirements. The scheme includes provision of space for ancillary facilities such as offices, cargo, hangars, hotels and industrial units. Where these facilities are not assumed to be a re-provision, the assumption is that a third party will develop these ancillary sites, and therefore our capital plan does not reflect the costs of this infrastructure. For this reason, the property income only reflects a minimal ground rental for these sites. Separately, additional income has been assumed from additional CIP lounges and ramp accommodation as a result of the mid-field pier and terminal development.

Utility income

- *An element of the utility consumption is as a result of usage by the tenanted sites as well as third party sites that make use of the supply. The airport therefore recharges an element of its utility cost to these external users. The assumption is that external consumption will rise at the same rate as the operational consumption, and therefore the recharge percentage as a total of the utility costs will remain static.*

Other income

- *Other revenue consists predominantly of revenue from the provision of essential airport-related activities. The key categories include check-in and baggage, staff car parking and services for passengers with reduced mobility. These are broadly assumed to rise in line with passengers, and the rate is assumed to track the Consumer Price Index.*

General GAL commentary

- *Over the period between 2020 and 2050, GAL anticipates non-aero income per passenger to remain relatively static in real terms.*
- *Uplifts in retail income per passenger from retail in the new midfield terminal will be broadly offset by a decline in car parking income per passenger as a result of additional public transport usage.*

G.3.6 Independent Non-Aeronautical Revenue Forecast Approach and Assumptions

Table G-1 summarises the independent non-aeronautical revenue assumptions.

Revenue Category	Driver	Assumptions
Car parking	▪ Originating passengers	A decreasing elasticity to originating passenger traffic growth has been assumed to reflect the 10% increase in public transport modal share by 2050, as forecast by Jacobs. The car parking revenue per passenger is forecast to decrease by GBP 0.21 in real terms over the FY 2025/26 – FY 2049/50 forecast period, based on the calculation below: (46.2% - 56%)/56% = -17.5% -17.5% * 1.21 = GBP -0.21 *where* 1.21 represents the car parking revenue per passenger in 2025/26 (year reflects the addition of the second runway), and 46.2% and 56% represent the non-public transport modal share in 2030 and 2012

Revenue Category	Driver	Assumptions
		respectively. GAL has adopted a similar forecast approach for car parking revenues, in order to reflect the change in modal share. Real yield decrease at CPI-1% per annum post Q6, reflects pressure from off-airport competition, as well as changes in the trip length. GAL's forecast yield has been assumed for the mid-term (i.e. Q6).
Retail	Drivers per sub-category	Assumptions per sub-category. A 20% one-off increase in overall terminal retail revenues is assumed to reflect the opening of a commercially optimised midfield terminal
Duty Free	▪ Total passengers ▪ Elasticity to GDP by region	Elasticities to GDP in the range of 20% to 30% have been assumed per world regions and correlated to the corresponding passenger traffic categories, in order to capture the changes in passenger mix over time, as well as the different spending patterns by region. In addition, 60% elasticity to passenger traffic growth has been assumed. The long term forecasts, in particular the last 10 year period leading to 2050, take into consideration the elasticity to international passenger traffic forecast only to reflect a more conservative view, which excludes the GDP effect
Other retail	▪ Total passengers ▪ Elasticity to GDP by region for the Specialist Retail category	Similar assumptions as for the Duty Free revenues have been applied to the Specialist Retail revenue sub-category. Bureaux de Change and Other Retail revenues have not been linked to GDP growth
Catering	▪ Total passengers	An elasticity of 90% to passenger traffic has been assumed, accounting for the large share of O&D traffic, as well as the large share of Low Cost airlines, which do not provide complimentary meals on board
Property rental	▪ Terminal size	A 20% elasticity to terminal size growth has been assumed, reflecting the stepped increases in terminal space, which would allow for more revenue from spaces such as airline lounges and offices to be accrued. The assumption takes into consideration the lack of constraint in terminal capacity
Rail	▪ n/a	No rail revenue accrued
Other revenues	▪ Total passengers ▪ Terminal size ▪ Utilities category linked to Opex by applying the same drivers	▪ Category includes 'Operational Facilities and Utilities Income sub-category' and 'Other Revenues' (PRM, Staff Car Parking) ▪ The Utilities Income represents the recovery of utility costs from airport tenants. The independent forecast estimates a 40% cost recovery share, and the actual GBP amount is obtained by applying this share to the FY 2013/14 utility costs. This amount, which represents the base of the Utility Income forecast, represents 29% of the Operational Facilities and Utilities Income. Utility cost (e.g., Opex) drivers have been applied to the Utility Income forecast in order to maintain the 40% cost recovery share over the forecast period. ▪ 'Operational Facilities' revenues (71% of the

Revenue Category	Driver	Assumptions
		'Operational Facilities and Utilities Income category) are accrued on a per passenger basis. Real yield increases assumed over the Q6 period to reflect GAL's proposed actions to fully recover check-in and baggage handling costs which were under-recovered in Q5, as well as baggage infrastructure charges to be implemented in Q6. Over the long term, past Q6, the yield is maintained flat in real terms, and total revenue assumed to increase in line with passenger growth ▪ In the absence of a detailed split of the 'Other Revenues' category, a low elasticity to passenger traffic has been applied to the whole category to reflect PRM revenue increases ▪ In the context of the proposed surface access options, a moderate elasticity to passenger and terminal size growth has been assumed in the staff car parking revenue forecast

Table G-1 Independent Non-Aeronautical Revenue Assumptions

G.4 Non-Aeronautical Revenue Modelling Outputs

This section presents graphical outputs of the independent non-aeronautical revenue model, compared with the revenues presented by, or inferred from, the scheme promoter's submission.

The figure below shows GAL's forecast total non-aeronautical revenues against our independent forecasts for each of the demand scenarios. Our forecasts include risk and optimism bias.

The stepped increases in our revenue forecasts are in line with increases in terminal floor space as well as reflecting the changes in passenger numbers. The phasing of terminal development differs between scenarios, accounting for the stepped increases occurring at different times.

Under each demand scenario, our independent non-aeronautical revenue forecasts for the scheme commence in 2017 at a lower base than GAL's forecast, mainly due to the higher passenger forecast assumed by GAL. Thereafter, total revenues are forecast to grow in line with passenger growth at a lower overall elasticity than forecast by GAL, reflecting different assumptions across all sub-categories; in particular passenger retail, car parking and 'other'.

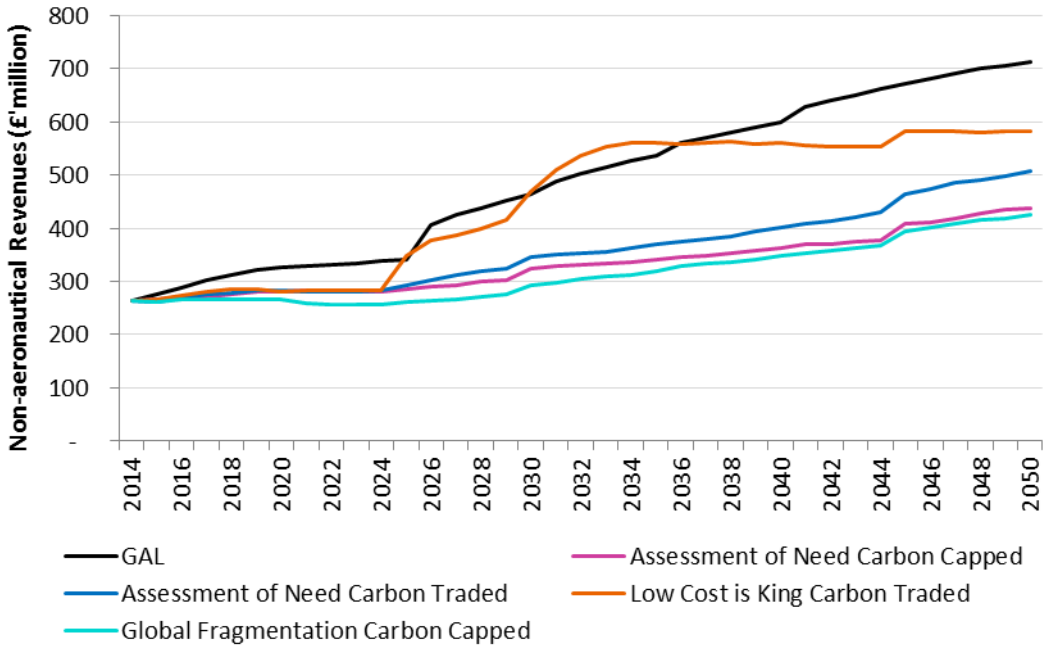

Figure G-3 Gatwick Airport Second Runway Scheme Forecast Non-Aeronautical Revenue (Risk Adjusted and Optimism Bias)

Independent forecasts for non-aeronautical real revenue per passenger remain relatively flat over the 2017 to 2050 period, while GAL assumes a 0.03% Compound Annual Growth Rate (CAGR) over the same period. The independent forecast takes into consideration increases in retail passenger spending correlated to GDP growth (i.e., purchasing power), as well as revenue uplifts as a result of the opening of a commercially optimised midfield terminal. The independent forecast also takes into account a trend towards increased use of public transport to access the airport, resulting in lower car parking revenues per passenger, and the relatively flat relationship between passenger growth and certain revenue streams such as Property and Other.

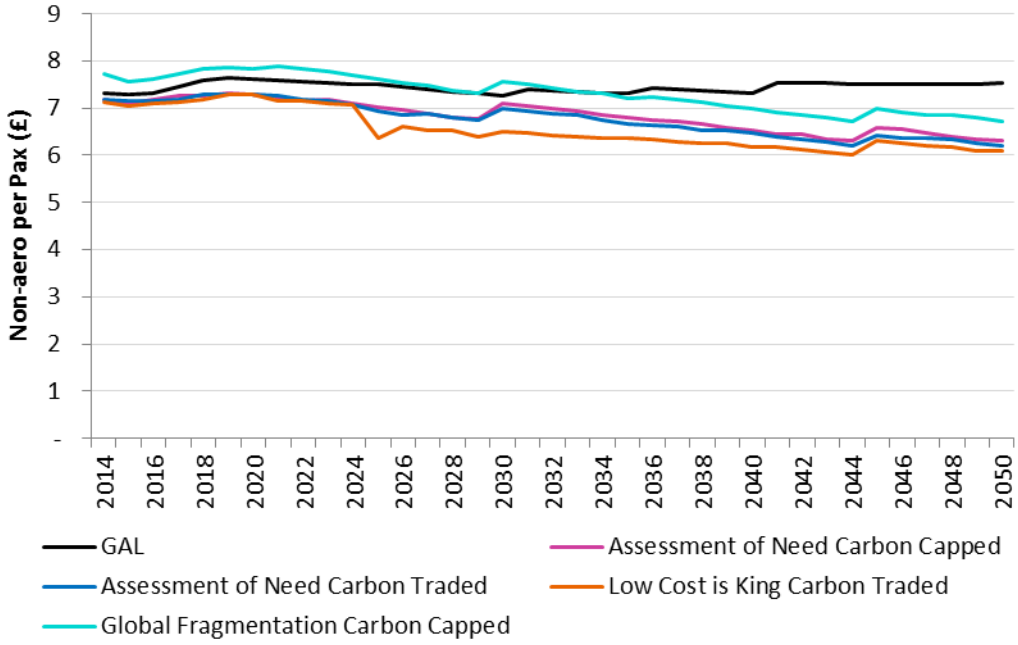

Figure G-4 Gatwick Airport Second Runway Scheme Forecast Non-Aeronautical Revenue per Passenger (Risk Adjusted and Mitigated Optimism Bias)

The table on the following page sets out the independent forecasts for each demand scenario.

2014, real prices in £'million

GAL	Total	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Car parking	**2,468**	49	53	53	53	53	55	55	55	56	56	56	56	67	69	70	71	71	72	73	73	73	73	73	72	72	71	70	70	71	72	73	75	76	77	78	78	79
Total retail	**10,548**	137	143	152	154	161	167	169	171	174	176	178	180	217	229	238	247	256	274	284	294	303	312	331	339	347	354	362	388	396	403	411	418	425	432	437	442	447
Duty and tax-free	***3,796***	*48*	*52*	*55*	*56*	*58*	*60*	*61*	*62*	*62*	*63*	*64*	*65*	*78*	*82*	*86*	*89*	*92*	*99*	*102*	*106*	*109*	*112*	*119*	*122*	*125*	*128*	*130*	*140*	*143*	*145*	*148*	*151*	*153*	*155*	*157*	*159*	*161*
Other retail	***5,064***	*67*	*69*	*73*	*74*	*77*	*80*	*81*	*82*	*83*	*84*	*85*	*86*	*104*	*110*	*114*	*119*	*123*	*131*	*136*	*141*	*145*	*150*	*159*	*163*	*166*	*170*	*174*	*186*	*190*	*194*	*197*	*201*	*204*	*207*	*210*	*212*	*214*
Food and beverage	***1,688***	*22*	*23*	*24*	*25*	*26*	*27*	*27*	*27*	*28*	*28*	*28*	*29*	*35*	*37*	*38*	*40*	*41*	*44*	*45*	*47*	*48*	*50*	*53*	*54*	*55*	*57*	*58*	*62*	*63*	*65*	*66*	*67*	*68*	*69*	*70*	*71*	*71*
Property rental	**1,147**	26	27	27	25	28	28	28	28	28	28	28	28	29	29	30	30	30	32	32	32	32	32	33	33	33	33	33	34	34	35	35	35	35	35	35	35	35
Rail	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other revenue	**4,011**	51	53	55	70	71	73	74	74	75	76	77	78	94	98	101	104	107	111	113	116	119	121	125	127	129	131	134	137	139	141	143	145	147	149	150	151	152
Non-aero	**18,174**	**263**	**277**	**288**	**302**	**313**	**322**	**325**	**329**	**332**	**335**	**338**	**342**	**407**	**425**	**438**	**451**	**465**	**488**	**502**	**516**	**526**	**538**	**561**	**571**	**581**	**590**	**599**	**629**	**640**	**651**	**662**	**673**	**683**	**692**	**700**	**707**	**713**
Non-aero/pax (£)	-	7.33	7.29	7.33	7.46	7.58	7.65	7.61	7.59	7.56	7.54	7.52	7.52	7.45	7.39	7.35	7.31	7.27	7.41	7.38	7.35	7.33	7.30	7.43	7.40	7.37	7.34	7.31	7.53	7.53	7.53	7.52	7.51	7.51	7.51	7.51	7.52	7.52

Assessment of Need Carbon Capped	Total	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Car parking	**2,058**	49	49	50	49	49	49	50	50	50	50	49	50	50	51	52	53	53	54	55	55	56	56	57	57	58	59	59	60	61	61	62	63	64	65	66	68	69
Total retail	**7,545**	137	139	141	141	143	145	146	148	151	150	151	155	159	164	169	172	191	195	199	202	207	211	216	220	225	231	237	242	245	251	255	284	289	296	305	314	318
Duty and tax-free	***2,825***	*48*	*49*	*49*	*50*	*50*	*51*	*52*	*53*	*54*	*54*	*54*	*56*	*57*	*59*	*61*	*63*	*71*	*73*	*74*	*76*	*78*	*80*	*82*	*83*	*85*	*88*	*90*	*93*	*94*	*96*	*98*	*110*	*113*	*115*	*119*	*123*	*125*
Other retail	***3,529***	*67*	*68*	*69*	*69*	*70*	*70*	*71*	*72*	*73*	*72*	*73*	*75*	*77*	*79*	*81*	*82*	*90*	*92*	*93*	*95*	*97*	*99*	*101*	*102*	*104*	*107*	*109*	*112*	*113*	*115*	*117*	*129*	*131*	*134*	*138*	*142*	*143*
Food and beverage	***1,191***	*22*	*22*	*23*	*23*	*23*	*23*	*23*	*24*	*24*	*24*	*24*	*24*	*25*	*26*	*27*	*27*	*30*	*31*	*31*	*32*	*33*	*33*	*34*	*34*	*35*	*36*	*37*	*38*	*38*	*39*	*40*	*45*	*46*	*47*	*49*	*50*	*51*
Property rental	**1,006**	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	29	29	29	29	29	29
Rail	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other revenue	**13,330**	51	51	53	55	58	61	62	62	63	62	63	64	65	66	68	68	72	73	74	74	75	76	77	78	79	80	82	83	84	85	86	90	91	93	95	97	98
Non-aero	**13,330**	**263**	**265**	**270**	**271**	**276**	**282**	**284**	**286**	**290**	**288**	**289**	**295**	**301**	**307**	**316**	**320**	**344**	**350**	**355**	**359**	**365**	**372**	**378**	**383**	**390**	**397**	**406**	**414**	**418**	**425**	**431**	**467**	**473**	**484**	**496**	**509**	**514**
Non-aero (incl. risk and OB)	**12,296**	**263**	**265**	**270**	**271**	**276**	**280**	**281**	**282**	**284**	**281**	**281**	**284**	**289**	**294**	**300**	**302**	**324**	**328**	**331**	**333**	**337**	**341**	**345**	**349**	**353**	**358**	**363**	**369**	**370**	**375**	**378**	**408**	**411**	**418**	**427**	**435**	**438**
Non-aero/pax (£)	-	7.18	7.11	7.18	7.26	7.26	7.32	7.28	7.23	7.16	7.19	7.11	7.02	6.95	6.88	6.79	6.77	7.10	7.03	6.98	6.94	6.87	6.81	6.76	6.71	6.65	6.59	6.53	6.46	6.44	6.34	6.31	6.58	6.55	6.46	6.39	6.33	6.31

Assessment of Need Carbon Traded	Total	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Car parking	**2,233**	49	48	49	50	49	50	50	50	49	49	50	51	53	55	56	57	58	59	59	60	60	62	63	63	64	65	66	67	69	70	71	73	75	77	78	79	80
Total retail	**8,230**	137	137	140	144	144	147	148	147	149	150	153	160	167	173	179	184	206	211	215	218	224	232	238	242	248	255	262	269	275	282	291	328	338	348	354	362	371
Duty and tax-free	***3,100***	*48*	*48*	*49*	*51*	*51*	*52*	*53*	*53*	*53*	*54*	*55*	*57*	*60*	*63*	*65*	*68*	*77*	*79*	*81*	*82*	*84*	*88*	*90*	*92*	*95*	*98*	*101*	*103*	*106*	*109*	*112*	*128*	*132*	*136*	*139*	*142*	*146*
Other retail	***3,823***	*67*	*67*	*69*	*70*	*70*	*71*	*72*	*71*	*72*	*73*	*74*	*77*	*81*	*83*	*86*	*88*	*96*	*98*	*100*	*101*	*104*	*108*	*110*	*112*	*115*	*118*	*121*	*123*	*126*	*129*	*133*	*147*	*152*	*156*	*158*	*161*	*165*
Food and beverage	***1,306***	*22*	*22*	*23*	*23*	*23*	*23*	*23*	*23*	*24*	*24*	*24*	*25*	*27*	*27*	*28*	*29*	*33*	*34*	*34*	*34*	*35*	*37*	*37*	*38*	*39*	*40*	*41*	*42*	*43*	*44*	*46*	*52*	*54*	*56*	*57*	*58*	*60*
Property rental	**1,025**	26	26	26	26	26	26	26	26	26	26	26	26	26	28	28	28	28	28	28	28	28	28	28	28	28	29	29	29	29	29	29	29	29	31	31	31	31
Rail	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other revenue	**2,927**	51	51	53	56	59	62	62	62	62	63	63	66	68	72	73	75	76	77	78	78	80	82	83	84	85	89	91	92	94	96	98	101	103	108	109	112	114
Non-aero	**14,415**	**263**	**262**	**269**	**276**	**278**	**285**	**286**	**285**	**286**	**288**	**292**	**303**	**314**	**327**	**336**	**344**	**367**	**375**	**380**	**383**	**392**	**404**	**411**	**417**	**425**	**438**	**448**	**458**	**467**	**476**	**489**	**531**	**545**	**563**	**572**	**583**	**596**
Non-aero (incl. risk and OB)	**13,263**	**263**	**262**	**269**	**276**	**278**	**284**	**283**	**281**	**281**	**281**	**284**	**293**	**302**	**313**	**320**	**325**	**346**	**351**	**354**	**356**	**362**	**371**	**376**	**379**	**385**	**395**	**401**	**408**	**414**	**420**	**429**	**464**	**474**	**487**	**492**	**499**	**507**
Non-aero/pax (£)	-	7.18	7.16	7.16	7.19	7.28	7.29	7.28	7.26	7.19	7.15	7.07	6.93	6.85	6.89	6.80	6.75	6.98	6.93	6.89	6.85	6.75	6.67	6.65	6.61	6.53	6.52	6.47	6.40	6.34	6.27	6.19	6.43	6.37	6.37	6.33	6.26	6.20

Low Cost is King Carbon Traded	Total	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Car parking	**2,910**	49	50	51	51	51	51	50	50	50	50	50	59	69	71	73	75	81	88	94	98	100	100	99	99	99	98	98	97	96	96	96	96	95	95	95	95	95
Total retail	**10,607**	137	140	143	146	148	148	146	148	150	152	152	194	212	220	228	240	286	315	335	349	358	360	361	367	371	371	375	375	376	378	382	417	419	421	423	429	431
Duty and tax-free	***4,060***	*48*	*49*	*50*	*51*	*53*	*53*	*52*	*53*	*54*	*54*	*55*	*67*	*78*	*81*	*84*	*89*	*107*	*119*	*128*	*134*	*138*	*140*	*141*	*143*	*145*	*146*	*147*	*147*	*147*	*148*	*150*	*165*	*166*	*167*	*168*	*170*	*171*
Other retail	***4,842***	*67*	*69*	*70*	*71*	*72*	*71*	*71*	*72*	*73*	*73*	*73*	*95*	*100*	*104*	*107*	*113*	*132*	*144*	*152*	*158*	*162*	*162*	*163*	*165*	*167*	*167*	*169*	*168*	*169*	*170*	*171*	*184*	*185*	*186*	*187*	*190*	*190*
Food and beverage	***1,705***	*22*	*23*	*23*	*23*	*24*	*24*	*23*	*24*	*24*	*24*	*24*	*32*	*34*	*35*	*37*	*39*	*47*	*52*	*55*	*57*	*58*	*58*	*58*	*59*	*59*	*59*	*60*	*59*	*60*	*60*	*61*	*67*	*68*	*68*	*68*	*69*	*69*
Property rental	**1,069**	26	26	26	26	26	26	26	26	26	26	26	28	28	28	29	29	29	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
Rail	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other revenue	**3,621**	51	51	54	57	60	62	61	62	63	63	63	81	84	86	90	94	101	111	116	118	120	120	120	121	122	121	122	122	122	123	124	124	125	125	126	127	127
Non-aero	**18,207**	**263**	**267**	**274**	**280**	**285**	**287**	**283**	**287**	**289**	**291**	**291**	**362**	**393**	**405**	**420**	**438**	**497**	**545**	**576**	**596**	**609**	**610**	**610**	**618**	**623**	**622**	**626**	**624**	**625**	**628**	**632**	**667**	**670**	**672**	**674**	**682**	**684**
Non-aero (incl. risk and OB)	**16,704**	**263**	**267**	**274**	**280**	**285**	**286**	**281**	**283**	**284**	**284**	**283**	**349**	**377**	**387**	**399**	**415**	**468**	**511**	**537**	**553**	**562**	**560**	**558**	**562**	**564**	**560**	**560**	**556**	**554**	**554**	**555**	**583**	**582**	**582**	**580**	**584**	**583**
Non-aero/pax (£)	-	7.12	7.03	7.09	7.13	7.17	7.28	7.29	7.16	7.14	7.09	7.08	6.37	6.60	6.54	6.53	6.40	6.50	6.46	6.43	6.40	6.37	6.38	6.33	6.27	6.25	6.24	6.18	6.17	6.11	6.06	6.02	6.30	6.25	6.21	6.17	6.10	6.08

Global Fragmentation Carbon Capped	Total	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Car parking	**1,822**	49	45	46	45	44	44	44	43	42	41	41	42	43	43	44	45	45	46	47	48	48	49	50	51	52	52	53	54	55	56	56	57	59	60	61	61	62
Total retail	**7,210**	137	138	140	141	139	138	139	136	136	136	139	142	145	148	153	157	175	180	185	190	194	201	206	211	216	222	228	234	238	243	249	278	286	293	299	304	311
Duty and tax-free	***2,692***	*48*	*48*	*49*	*50*	*49*	*49*	*49*	*49*	*48*	*49*	*49*	*51*	*52*	*53*	*55*	*57*	*64*	*66*	*69*	*71*	*73*	*75*	*78*	*80*	*82*	*84*	*87*	*89*	*91*	*93*	*95*	*108*	*111*	*114*	*117*	*118*	*121*
Other retail	***3,383***	*67*	*68*	*68*	*68*	*67*	*68*	*68*	*66*	*66*	*67*	*68*	*69*	*71*	*72*	*74*	*76*	*83*	*85*	*87*	*90*	*91*	*94*	*97*	*99*	*101*	*103*	*106*	*108*	*110*	*112*	*115*	*126*	*130*	*133*	*135*	*137*	*140*
Food and beverage	***1,135***	*22*	*22*	*23*	*22*	*22*	*22*	*22*	*21*	*21*	*21*	*22*	*22*	*23*	*23*	*24*	*24*	*28*	*28*	*29*	*30*	*30*	*31*	*32*	*33*	*34*	*35*	*35*	*36*	*37*	*38*	*39*	*44*	*45*	*47*	*47*	*48*	*50*
Property rental	**993**	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	28	28	28	28	28	28	28	28	28	28	28	28	29	29	29
Rail	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other revenue	**2,607**	51	51	53	55	57	60	59	58	58	58	59	60	61	62	63	64	65	66	68	69	70	71	75	76	77	78	80	81	82	84	85	87	89	90	94	95	97
Non-aero	**12,632**	**263**	**260**	**266**	**267**	**266**	**268**	**268**	**264**	**262**	**262**	**265**	**270**	**275**	**279**	**286**	**291**	**311**	**318**	**326**	**333**	**338**	**347**	**359**	**366**	**372**	**380**	**389**	**397**	**403**	**410**	**418**	**450**	**461**	**471**	**482**	**488**	**498**
Non-aero (incl. risk and OB)	**11,645**	**263**	**260**	**266**	**267**	**266**	**267**	**265**	**260**	**257**	**256**	**258**	**261**	**264**	**267**	**272**	**276**	**293**	**298**	**304**	**309**	**312**	**319**	**328**	**333**	**337**	**342**	**348**	**354**	**358**	**362**	**367**	**393**	**401**	**408**	**415**	**418**	**425**
Non-aero/pax (£)	-	7.71	7.57	7.62	7.71	7.84	7.87	7.84	7.89	7.83	7.77	7.69	7.62	7.54	7.49	7.37	7.32	7.57	7.50	7.42	7.35	7.31	7.21	7.24	7.19	7.12	7.06	6.99	6.91	6.86	6.79	6.72	6.99	6.91	6.85	6.85	6.79	6.71

Table G-2 Non-Aeronautical Revenue Forecasts

Appendix H Surface Access Capital Expenditure, Operational Expenditure and Maintenance Costs

H.1 Introduction

This appendix briefly sets out the approach used to develop an independent forecast of surface access costs for the Gatwick Airport Second Runway scheme.

This appendix should be read in conjunction with Appraisal Module 4. Surface Access: Gatwick Airport Second Runway Surface Access Requirements.

This appendix contains the following sections:

- *Section H-2 describes the road projects required for the scheme*
- *Section H-3 describes the rail projects required for the scheme*
- *Section H-4 summarises the estimates of capital and operational expenditure, and asset replacement costs for both road and rail projects*

H.1.1 Adjustment for Risk and Optimism Bias

In general the guidance of WebTAG has been followed to apply risk and optimism bias to the base cost estimates. Optimism bias was applied to the risk adjusted base cost.

H.1.1.1 Capital Expenditure and Asset Replacement

WebTAG guidance suggests that at this stage of project development, optimism bias should be applied at the level of 44% for road projects and 66% for rail projects.

For rail schemes, WebTAG states that at this stage of early development, no additional allowance for risk is required in addition to adjusting for optimism bias.

The same approach has been followed for road schemes. WebTAG guidance suggests that a quantified risk assessment be undertaken for each non-Highways Agency scheme. Due to the difficulties in understanding the full scope of works required at this stage, in addition to many of these schemes involving Highways Agency works, a separate risk premium is not considered appropriate, given that the upper bound of optimism bias has also been applied for road schemes. However, a 10% risk allocation has been tested as a sensitivity, presented in the output section below.

H.1.1.2 Operational Expenditure

WebTAG guidance suggests that at this stage of project development, optimism bias should be applied at the level of 44% for road projects and 41% for rail projects.

For rail schemes, WebTAG states that at this stage of early development, no additional allowance for risk is required in addition to adjusting for optimism bias.

For road schemes, as per the approach to risk provision for capital expenditure, with agreement of the Airports Commission, no separate allocation for risk has been applied. However, a 10% risk allocation has been tested as a sensitivity, presented in the output section below.

H.2 Surface Access - Roads

H.2.1 Capital Expenditure

It was determined that the following works would be needed to support the opening of the scheme. These are separated below into Highways Agency network projects and local road projects that would be the responsibility of relevant local authorities.

Highways Agency network capital costs include the following schemes:

- *M23, J9 slip road widening and grade separated flyover*
- *M23, J9-J9a road widening of dual carriageway (D2) to 4 lanes eastbound and 5 lanes westbound*

Local road capital costs include the following schemes:

- *Airport Way, Widening of existing D2 to 4 lanes in each direction*
- *A23 re-alignment, provision of new section of A23 to D2 standard*
- *Grade-separated section of A23 re-alignment*
- *Long-term parking, new high capacity roundabout and approaches*
- *Industrial zone, new roundabout and approaches*
- *North Terminal access, new high capacity roundabout and approaches*
- *A23 to Airport Way grade-separated flyover*
- *New Terminal access, provision of new D2 connecting M23 to new terminal*
- *Grade-separated section of new D2 access to new terminal - includes grade-separation over new roundabout and eastbound carriageway at northern end connecting to M23*
- *South Terminal access, new high capacity roundabout and approaches*
- *Longbridge Roundabout, capacity enhancements*
- *Gatwick Road, new roundabout and approaches*
- *Balcombe Road, re-provision of existing road (standard 7.5m width 1 lane in either direction)*

Highways and local road investments are assumed to be spread over two years, completed before the opening of the second runway.

Descriptions of schemes and costs are contained in Appraisal Module 4. Surface Access: Gatwick Airport Second Runway Surface Access Requirements

H.2.2 Asset Replacement Costs

Asset replacement (or Heavy Maintenance) costs were determined using Highways Agency published data (Source: https://www.gov.uk/government/publications/cost-of-maintaining-the-highways-agency-s-motorway-and-a-road-network-per-lane-mile). 2011/12 costs were uplifted to 2014 prices using a multiplier of 1.07453 (Source: UK inflation, average consumer prices. IMF World Economic Outlook Database, April 2014).

The Highways Agency (England) figure of £43k per lane mile was used to calculate Highways Agency network maintenance costs while the South East cost of £52k per lane mile was used to calculate local road network maintenance costs.

Road maintenance costs are assumed to begin to be incurred in the year following road scheme completion and to continue thereafter.

H.2.3 Operating Costs

Road operating costs include activities such as lighting, drainage and landscaping. Annual cost estimates have been derived on the basis of DfT Cost and Benefit Analysis guidance (2006). For Highways Agency roads, Road Type 11 was selected (£45k per km); for local roads, Road Type 6 was selected (£30k per km). Costs were inflated from 2002 to 2014 prices (Source: UK inflation, average consumer prices. IMF World Economic Outlook Database, April 2014).

Road operating costs are assumed to begin to be incurred in the year following road scheme completion and continue thereafter.

H.3 Surface Access – Rail

H.3.1 Capital Expenditure

No rail capital expenditure has been included for the scheme. GAL has allocated £65.9m (2014 prices) to improve the railway station after 2020 in addition to £50m spending by Network Rail on rail station concourse works planned for 2020. The surface access study conducted by Jacobs has not identified a requirement for these works but it may be reasonable to include them at a later stage of the assessment.

H.3.2 Asset Replacement Costs

No rail asset replacement costs are applicable.

H.3.3 Operating Costs

No rail operating costs are applicable. It is assumed that the Thameslink, Southern and Great Northern (TSGN) franchise will provide adequate train capacity. While overcapacity is expected on some services prior to 2030, there is understood to be inadequate train path capacity to accommodate new services. The growth in demand is predominantly background and therefore any need to make investments to expand the infrastructure to accommodate more services would be largely unrelated to the airport expansion.

H.4 Outputs

Table H-1, on the next page, shows the scheme promoter's surface access costs and the independently assessed costs, including the impact of a sensitivity test in which a 10% risk allowance is added to road capital costs (capital expenditure and asset replacement).

		0% Risk	10% Risk	GAL
Roads	Total Asset Replacement	33	37	110
	Total Opex	20	22	
	Total Capex	734	808	516
Rail	Total Asset Replacement	-	-	
	Total Opex	-	-	
	Total Capex	-	-	66
Total Opex		**20**	**22**	
Total Capex		**768**	**845**	**693**

All costs in 2014 real prices and incl. risk and optimism bias - £'million
GAL costs are uplifted from 2013/14 prices by multiplying by 1.025514 (Source: UK inflation, average consumer prices. IMF World Economic Outlook Database, April 2014)

Table H-1 Summary Costs and Risk Sensitivity Test

Tables H-2 and H-3, on the following page, set out summaries of the capital, operational and asset replacement costs by road and rail project, including adjustments for risk and optimism bias.

GAL Highway/Local Road/Rail	Route	Length (km)	Unit Cost (£'million per km)	Estimated Cost (£'million)	Risk	Optimism Bias	Total (£'million)	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Highway	M23 junction 9	1	42.5	42.5	-	19	61										21	21																						
Highway	M23 junction 9	1	35	35	-	15	50										18	18																						
Highway	M23 9 to 9a road widening	0.75	30	22.5	-	10	32										11	11																						
Local Road	Airport Way	1.25	30	37.5	-	17	54										19	19																						
Local Road	A23 re-alignment	5.5	25	137.5	-	61	198					69	69																										
Local Road	A23 re-alignment	1.75	35	61.25	-	27	88					31	31																										
Local Road	Long-term parking		5	5	-	2	7										3	3																						
Local Road	Industrial zone		5	5	-	2	7										3	3																						
Local Road	North Terminal access		5	5	-	2	7										3	3																						
Local Road	North Terminal access	0.6	35	21	-	9	30										11	11																						
Local Road	New Terminal access	1.3	25	32.5	-	14	47										16	16																						
Local Road	New Terminal access	1.3	35	45.5	-	20	66										23	23																						
Local Road	South Terminal access		5	5	-	2	7										3	3																						
Local Road	Longbridge Roundabout		1	1	-	0	1										1	1																						
Local Road	Gatwick Road		5	5	-	2	7					3	3																										
Local Road	Balcombe Road	3.25	15	48.75	-	21	70					24	24																										
Total				**510**	-	**224**	**734**	-	-	-	-	**182**	**182**	-	-	-	**185**	**185**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Highway Maintenance	Source: Highways Agency website inflated from 2011/12	2.75	0.046	0.13																																		
Local Road Maintenance	Source: Highways Agency website inflated from 2011/12	14.95	0.056	0.84																																		
Total Road Maintenance /year				**23.18**	-	**10.20**	**33.38**	-	-	-	-	-	-	**0.85**	**0.85**	**0.85**	**0.85**	**0.85**	**1.39**	**1.39**	**1.39**	**1.39**	**1.39**	**1.39**	**1.39**	**1.39**	**1.39**	**1.39**	**1.39**	**1.39**	**1.39**	**1.39**	**1.39**	**1.39**	**1.39**	**1.39**	**1.39**	**1.39**	**1.39**
Highway Opex	Source: DfT COBA (2006), road type 11, inflated from 2002 to 2014	2.75	0.045	0.12																																		
Local Road Opex	Source: DfT COBA (2006), road type 6, inflated from 2002 to 2014	14.95	0.03	0.45																																		
Total Road Opex /year				**13.59**	-	**5.98**	**19.57**	-	-	-	-	-	-	**0.45**	**0.45**	**0.45**	**0.45**	**0.45**	**0.82**	**0.82**	**0.82**	**0.82**	**0.82**	**0.82**	**0.82**	**0.82**	**0.82**	**0.82**	**0.82**	**0.82**	**0.82**	**0.82**	**0.82**	**0.82**	**0.82**	**0.82**	**0.82**	**0.82**	**0.82**
Rail Maintenance /year	Source: LeighFisher analysis	**-**	**-**	**-**	-	**-**	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rail Opex /year	Source: LeighFisher analysis	**-**	**-**	**-**	-	**-**	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GRAND TOTAL (£'million)							**787.35**	-	-	-	-	**181.8**	**181.8**	**1.3**	**1.3**	**1.3**	**186.7**	**186.7**	**2.2**	**2.2**	**2.2**	**2.2**	**2.2**	**2.2**	**2.2**	**2.2**	**2.2**	**2.2**	**2.2**	**2.2**	**2.2**	**2.2**	**2.2**	**2.2**	**2.2**	**2.2**	**2.2**	**2.2**	**2.2**

Table H-2 Summary Costs

Gatwick	Total 2014-50	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Roads																																						
Capex	**510.0**	-	-	-	-	-	-	-	-	-	126.3	126.3	-	-	-	128.8	128.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Asset Replacement Capex	**23.2**	-	-	-	-	-	-	-	-	-	-	-	0.6	0.6	0.6	0.6	0.6	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Opex	**13.6**	-	-	-	-	-	-	-	-	-	-	-	0.3	0.3	0.3	0.3	0.3	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Rail																																						
Capex	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Asset Replacement Capex	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Opex	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Risk on Capex	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Optimism Bias on Capex	**234.6**	-	-	-	-	-	-	-	-	-	55.6	55.6	0.3	0.3	0.3	56.9	56.9	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Risk on Opex	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Optimism Bias on Opex	**6.0**	-	-	-	-	-	-	-	-	-	-	-	0.1	0.1	0.1	0.1	0.1	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Total Capex (inc. Risk & OB)	**767.8**	-	-	-	-	-	-	-	-	-	**181.8**	**181.8**	**0.8**	**0.8**	**0.8**	**186.2**	**186.2**	**1.4**	**1.4**	**1.4**	**1.4**	**1.4**	**1.4**	**1.4**	**1.4**	**1.4**	**1.4**	**1.4**	**1.4**	**1.4**	**1.4**	**1.4**	**1.4**	**1.4**	**1.4**	**1.4**	**1.4**	**1.4**
Total Opex (inc. Risk & OB)	**19.6**	-	-	-	-	-	-	-	-	-	-	-	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**

Table H-3 Summary Outputs