Gatwick Airport Northern Runway Project

Environmental Statement
Appendix 17.9.2: Local Economic Impact Assessment

Book 5

VERSION: 1.0

DATE: JULY 2023

Application Document Ref: 5.3

PINS Reference Number: TR020005

APFP Regulations 5(2)(a) **Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009**

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1 Executive Summary

1.1.1 This appendix, prepared on behalf of Gatwick Airport Limited (GAL), presents the results of an economic impact assessment (EIA) of proposed alternations to London Gatwick Airport's (Gatwick) existing northern runways and infrastructure (referred to herein as 'the Project'). The Project proposes alterations to the existing 'standby' or 'northern' runway at Gatwick, which, together with lifting the current restrictions on its use, would enable dual runway operations. The proposed alterations would allow the northern runway to be used for take-off-only operations (i.e. no landings) for smaller aircraft (up to and including Code C aircraft).

1.1.2 By enabling dual runway operations, the Project would significantly expand capacity at Gatwick and in turn allow additional air traffic to flow through Gatwick and the London aviation system as a whole. Traffic forecasts produced by GAL anticipate that by 2047 (the long-term forecast year) the Project could increase Gatwick's passenger throughput to approximately 80.2 million passengers per annum (mppa), compared to a maximum potential passenger throughput based on existing facilities (without the Project) of 67.2 mppa. The use of this capacity by passengers and airlines would have substantial economic impacts at national, regional and local levels. GAL has commissioned Oxera to assess these economic impacts.

1.1.3 The Project is expected to increase employment and value associated with Gatwick by increasing the scale of economic activity on site (referred to as 'direct' impacts), in the supply chains of those firms ('indirect' impacts), from these employees spending their wages ('induced' impacts), and to firms that locate close to Gatwick because of the connectivity and business opportunities that it offers ('catalytic' impacts). Together, these direct, indirect, induced and catalytic impacts represent the total impact of the Project. While some of this economic activity might be displaced from other parts of the UK or other firms within the local area, the impact on the local economy would be significant. The total impact derived from the analysis corresponds to the total net impact of the Project at the Six Authorities Area level, as it reflects the direct, indirect, induced, and catalytic impacts while taking into account displacement.

1.1.4 The COVID-19 pandemic had a significant impact on the aviation sector around the world. Between 2019 and 2020, passenger volumes dropped by 78% at Gatwick. However, by the time the Project becomes operational in 2029, GAL expects that the pandemic will no longer have an impact on the UK aviation sector as a whole, and Gatwick in particular. As a result, the analysis in this appendix is based on the assumption that the COVID-19 pandemic will have a limited influence on passenger traffic related to the Project in the long run. Although the pandemic may not have a lasting impact on air traffic, it could have long-term impacts on the economy and employment, which are taken into account in this assessment. In addition, a sensitivity analysis undertaken for the appendix shows that the Project would continue to deliver economic benefits even if there is slower growth in forecast traffic.

1.1.5 The analysis focuses on several geographic study areas defined to support the assessment, and which are in line with previous EIAs of Gatwick. The economic impact of the Project has been assessed on the UK as a whole, as well as on three sub-national areas: the Gatwick Diamond (local authorities close to the airport), a defined Labour Market Area (the relevant labour market area around the airport), and the Six Authorities Area (a whole sub-regional area).

1.1.6 Overall, the Project would bring an economic impact in the Six Authorities Area of £1.11bn in gross value added (GVA)[1] per annum and create 12,800 additional jobs in 2047. Impact estimates at different spatial scales are presented in Table 1.1.

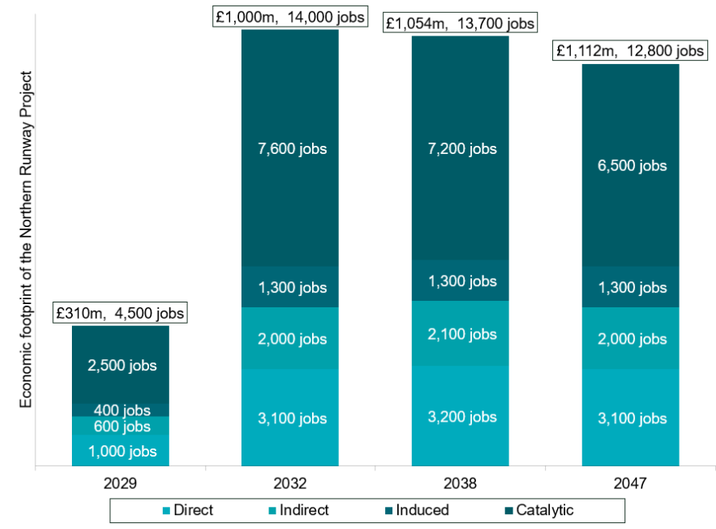
Table 1.1 Local economic impact of the Project in 2047

GVA	Direct	Indirect	Induced	Catalytic	Total
Gatwick Diamond	£286m	£55m	£72m	£131m	£544m
Labour Market area		£84m	£96m	£318m	£783m
Six Authorities		£170m	£106m	£550m	£1,112m
Employment	**Direct**	**Indirect**	**Induced**	**Catalytic**	**Total**
Gatwick Diamond	3,100	700	800	1,500	6,100
Labour Market area		1,000	1,100	3,700	9,000
Six Authorities		2,000	1,300	6,500	12,800

1.1.7 Gatwick also expects to contribute to the local tourism industry through the additional connectivity that the Project creates. An increase in local tourism would generate additional economic benefits through tourists' spending on hospitality and attractions. These local tourism impacts are reflected, in part, in the induced footprint and the catalytic effect, and are discussed qualitatively in the assessment.

1.1.8 The incremental economic impact of the Project is summarised in Figure 1.1.

Figure 1.1 Local economic impact of the Project in the Six Authorities Area



Note: Entries correspond to the incremental difference between the economic impacts of Gatwick with and without the Project. Values may not sum due to rounding. GVA is reported in 2022 prices. Employment figures are expressed as headcounts and are rounded to the nearest hundred. GVA estimates for a particular impact may diverge from the employment estimates over time due to the forecast increase in GVA per worker.

Source: Oxera analysis.

[1] GVA estimates are reported in 2022 prices.

2 Glossary

Table 2.1 Glossary of terms

Term	Description
Base year	The year that is used to pin down the macroeconomic parameters, such that all the forecasts and estimates are based on this year; this is set to be 2019 in the analysis. Note this 'base year' is different from the year used for inflation adjustment and discounting, which is 2022.
Baseline	The situation that would arise without the Project; analogous to the 'do minimum' scenario.
Catalytic effect	The employment and GVA generated due to the economic activity of firms choosing to locate or expand near the airport because of the connectivity that it offers.
Direct footprint	The employment and GVA associated with the activities on the Gatwick campus site. Employees of GAL and of other firms that operate on site at the airport are included.
Economic footprint	The economic footprint measures the total resources (in GVA or employment terms) on and off the airport used in delivering the economic activity at Gatwick. It consists of direct, indirect, induced, and catalytic impacts.
Gross operating surplus	The operating profits of private market entities other than sole traders.
GVA	GVA (gross value added) is a standard measure of economic activity routinely used by statistical agencies, such as the UK Office for National Statistics (ONS) and Eurostat, to measure an industry's contribution to the economy's total output. It is defined as the total value of output from a service excluding the value of any intermediate inputs (i.e. outputs of other sectors used as inputs from the supply chain).
Indirect footprint	The employment and GVA supported throughout the UK via the supply chains of the firms located at Gatwick.
Induced footprint	The employment and GVA generated due to workers—both on site and in the supply chain—spending their wages on activities that are not necessarily associated with, or located close to, the airport.
London aviation system	Airlines and passengers at London City, Gatwick, Heathrow, Luton, Southend and Stansted airports.
Net economic impact	Net economic impacts reflect the impacts generated beyond those that would have arisen anyway if people employed at Gatwick would have been employed somewhere else in the area in the absence of Gatwick.
The Project	Gatwick's Northern Runway Project proposes alterations to the existing 'standby' or 'northern' runway at Gatwick, which, together with lifting the current restrictions on its use, would enable dual runway operations. The proposed alterations would enable the northern runway to be used for take-off-only operations (i.e. no landings) for smaller aircraft (up to and including Code C aircraft).

Source: Oxera.

3 Updates in response to consultation feedback

3.1.1 Table 3.1 summarises the updates to the local EIA that have been made in response to stakeholder feedback on the PEIR EIA report produced by Oxera in August 2021, and which was subject to consultation in autumn 2021.

Table 3.1 Overview of Oxera's updates to this assessment in response to 2021 consultation feedback

Topic	Summary of feedback	Oxera update to this assessment
Employment impact multipliers	The multipliers used to estimate employment impacts appear high and should be reported.	Input-output modelling (indirect and now induced) has been revised to adjust multipliers which are reported.
Induced employment	Induced impacts should be scoped in to complete the assessment.	Induced employment is now estimated and potential overlaps with other impacts are accounted for in the revised analysis.
Labour supply impact assumptions	The assumptions used on displacement and other labour supply impacts should be updated together with an explanation of how they apply to the context of the Project.	Owing to the difficulty in robustly estimating the net impacts, including labour supply impacts, such estimation has been scoped out of the assessment. Net impacts are discussed only qualitatively in this appendix. The catalytic impact methodology has also been adjusted as a result.
Sensitivity analysis on slower growth impacts	The sensitivity analysis produced by Oxera may not accurately reflect a worst-case scenario for local impacts.	Traffic forecasts for the slow growth sensitivity, as produced by Oxera for the PEIR report, are now produced by ICF. Oxera uses these ICF forecasts as inputs to the sensitivity analysis as they appropriately reflect a worst-case traffic scenario for economic impacts consistent with the main traffic forecasts.
Study area definition	The Oxera and Lichfields study areas are not consistent with each other.	Two of Oxera's study areas have been aligned with those of Lichfields. Impacts are now reported for the Gatwick Labour Market Area and for the Six Authorities Area (Five Authorities and Croydon).
Type and quality of employment impacts	More information should be provided on the type and quality of employment impacts.	A breakdown of employment estimates by occupational category is provided and is considered in the context of **ES Chapter 17: Socio-Economic** (Doc Ref. 5.1).
Experian forecast sensitivity	A sensitivity analysis with Experian forecasts (used by local stakeholders) should be undertaken.	A sensitivity analysis is conducted based on Experian forecasts, as discussed in this appendix.
Treatment of the impacts of the COVID-19 pandemic	More clarity on how the impacts of the COVID-19 pandemic are taken into account in the baseline data.	Further clarification on assumptions made in respect of the impacts of COVID-19 is provided where appropriate in this assessment.
Direct employment estimates	More clarity on how the direct employment estimates were produced.	Annex 3 explains how direct employment input estimates were produced and the elasticity assumptions used.
Catalytic impacts	The methodology used to estimate catalytic impacts is unclear and needs to be clarified.	The methodology for estimating catalytic impacts has been revised and is explained.

Note: This table summarises the key changes to the local impacts assessment methodology. Other feedback points made with respect to the presentation of the impacts and additional information required on the methodology are also incorporated in the update but not mentioned here.

Source: Oxera.

4 Introduction

4.1 Background

4.1.1 Aviation plays an important role in the UK economy. By enabling the movement of people and goods internationally, air travel facilitates trade, investment and business activity as well as tourism and leisure activity. The role of aviation in connecting the UK to the global economy is reflected in the growth of the sector: between 2000 and 2019, the number of passengers at UK airports increased by 66%.[2]

4.1.2 Gatwick was the UK's second-busiest airport in 2019 and has continued to hold this position even during the COVID-19 pandemic.[3] It is currently served by a single runway. It has a second runway, located to the north of the main runway, but planning restrictions limit the use of this northern runway to when the main runway is closed. GAL is proposing to make alterations to the northern runway, which, along with lifting the current restrictions on its use, would enable dual runway operations ('the Project'). The proposed alterations would enable the northern runway to be used for take-off-only operations (i.e. no landings) for smaller aircraft (up to and including Code C aircraft).

4.1.3 By enabling dual runway operations, the Project would significantly expand capacity at Gatwick and in turn enable additional air traffic to flow through Gatwick and the London aviation system as a whole.[4] GAL commissioned Oxera to undertake an EIA of the Project.

4.2 Scope of the economic assessment

4.2.1 The Project would lead to significant economic benefits, including benefits accruing to the national economy as well as in the local area around the airport. This appendix presents the results of the local EIA of the Project at different spatial scales.[5]

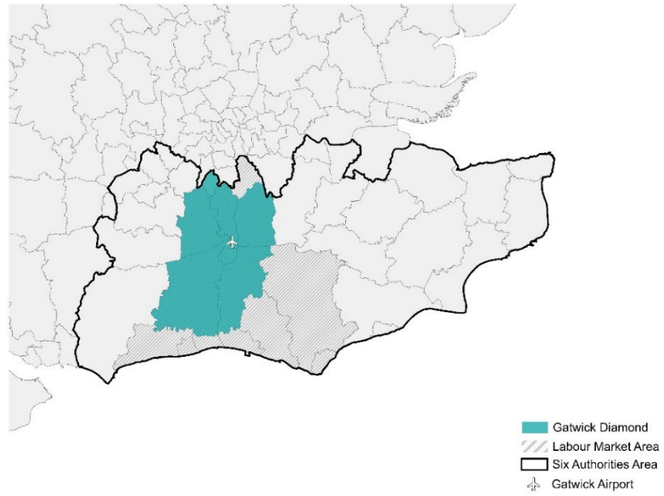
4.2.2 The economic analysis focuses on several geographic study areas that have been defined to support the assessment and are in line with previous EIAs of Gatwick. The economic impact of the Project is assessed on the UK as a whole, as well as on three sub-national areas. These three areas are defined below.

4.2.3 The approach to assessing impacts for different geographic study areas is as follows.

- Assess the local economic impact at the level of the seven local authority districts (LADs) around the airport site, which form the **Gatwick Diamond**. These LADs are: Epsom and Ewell, Mole Valley, Reigate and Banstead, Tandridge, Crawley, Mid Sussex, and Horsham.
- Quantify impacts in the areas that form the larger Gatwick **Labour Market Area,**[6] a wider area that captures 14 LADs—Mole Valley, Reigate and Banstead, Tandridge, Crawley, Mid Sussex, Horsham, Croydon, Brighton and Hove, Lewes, Worthing, Arun, Adur, Wealden, and Eastbourne.
- Finally, consider the scale of Gatwick's economic significance to a larger sub-regional area: the **Six Authorities Area**. This covers the county council areas of West Sussex, East Sussex, Surrey, and Kent[7] as well as the Unitary Authority of Brighton and Hove, and the London Borough of Croydon.

4.2.4 Figure 4.1 shows the geographic coverage of the analysis.

Figure 4.1 Geographic study areas



Source: Oxera.

4.2.5 Local economic impacts correspond to the added value and additional employment that the Project would generate in the area around the airport due to the increase in economic activity from the capacity expansion related to the scheme. In general terms, gross economic impacts (made up of direct, indirect, induced, and gross catalytic impacts—together, also referred to as the 'footprint') are measures of the economic activity, whether on or off site, that is associated with an economic entity such as Gatwick, or an identifiable change such as the Project. They include measures such as the total number of workers employed at Gatwick and the economic output generated (measured as GVA). The 'footprint' of a scheme provides useful insight into the scale of the economic activity supported by an entity or a project.

[2] Department for Transport (2020), 'Air traffic, United Kingdom airports', AVI0101. Growth is reported to 2019 given the impact of the COVID-19 pandemic on passenger figures in 2020–22.
[3] In 2019, close to 47m passengers travelled through Gatwick. During the pandemic, however, only 10m and 6m passengers travelled through Gatwick in 2020 and 2021, respectively. Gatwick is second to Heathrow, which welcomed 81m passengers in 2019, 22m in 2020, and 19m in 2021 (CAA data).
[4] Consisting of Gatwick, Heathrow, London City, Stansted, Luton and Southend airports.
[5] A separate Oxera report covers a national cost–benefit assessment of the impact of the Project on UK society in accordance with the Department for Transport's Transport Appraisal Guidance. This separate report is being submitted as a standalone supporting document with the DCO application, see **Needs Case Appendix 1 - National Economic Impact Assessment** (Doc Ref. 7.2).
[6] This Labour Market Area originates from Lichfields' analysis regarding where the direct workforce at Gatwick Airport comes from. The Labour Market Area captures 70% of Gatwick's direct workforce.
[7] This does not include the unitary authority of Medway, which is run by Medway Council and is independent of Kent County Council.

4.2.6 In particular, the Project is expected to increase employment and value associated with Gatwick by increasing the scale of economic activity on site (known as 'direct' impacts), in the supply chains of firms located on site (known as 'indirect' impacts), from these employees spending their wages (known as 'induced' impacts), and to firms that locate close to Gatwick because of the additional connectivity that it offers (known as 'catalytic' impacts). While some of this impact might be displaced from other parts of the UK or from other firms within the local area, the impact on the local economy would be significant.

4.2.7 The analysis focuses on the impact of the Project. The economic impact of the Project beyond the impact that Gatwick as a whole would have had in absence of the scheme (i.e. the baseline) is referred to as the incremental impact. Figure 4.2 illustrates the relationship between the baseline footprint (i.e. the impact of Gatwick as a whole without the Project), the overall footprint (i.e. the impact of Gatwick as a whole with the Project), and the incremental footprint of the Project (i.e. the difference between the baseline and overall footprints).

Figure 4.2 Illustration of the incremental footprint of the Project

Note: The incremental footprint of the Project corresponds to the difference between the gross economic impact of Gatwick with (overall) and without (baseline) the Project.

Source: Oxera.

4.3 Policy context

4.3.1 Undertaking an EIA of the Northern Runway Project addresses some of the planning policy considerations, against which the application for development consent will be determined.

4.3.2 For instance, the Airports National Policy[8] details some of the considerations for weighing adverse impacts against benefits for any airport development, including potential benefits such as job creation, which the EIA examines. The Aviation Policy Framework[9] recognises that the aviation sector contributes significantly to the UK economy. More recently, Flightpath to the Future[10] recognises aviation's vital importance to the UK, in terms of economic contribution, jobs, and the personal value it provides to individuals despite current challenges due to recovery from the impact of the COVID-19 pandemic and climate change. This assessment, along with the separate National Impact Assessment, addresses the contribution the Project could make to the UK national economy whilst accounting for some of these challenges.

4.3.3 From a broader perspective, various policy documents have consistently confirmed the Government's support for making best use of existing runway capacity at airports beyond Heathrow. The principle of making best use of existing airport capacity has been a long-standing and consistent feature of UK aviation policy since the Future of Air Transport White Paper.[11]

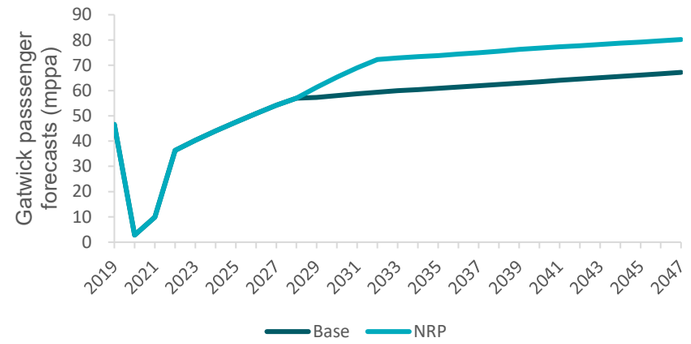
4.3.4 For a summary of the key planning policy documents that informed the local EIA approach, and its relevance as part of the application for development consent, please refer to Annex 1.

4.4 Traffic forecast scenarios

4.4.1 GAL and ICF have provided forecasts of air traffic at Gatwick up to 2047. Further information on the forecasts is provided in **ES Appendix 4.3.1: Forecast Data Book** (Doc Ref. 5.3). Figure 4.3 shows the build-up of passenger volumes with the Project from the anticipated opening year of 2029 (with the first full year of operations anticipated to be 2030) compared with passenger projections in the future baseline scenario (i.e. without the Project).

4.4.2 The forecasts suggest that passenger volumes at Gatwick in the future baseline scenario are expected to grow, with passenger volumes forecast to exceed 62 mppa by 2038 and reach 67 mppa in 2047. In the Project scenario, passenger numbers would increase more substantially following the introduction of dual runway operations in 2029. The growth rate is then expected to slow down slightly after 2032. The forecasts suggest an incremental 61,000 ATMs and 13m passengers at the end of the forecast period as a result of the Project, which is 20% above the baseline. These forecasts are used as the basis of the analysis in this appendix, and these forecasts are used consistently throughout the Environmental Statement as the baseline of other assessments.

Figure 4.3 Gatwick traffic forecasts



Note: Passenger growth in the baseline reflects assumptions on improved runway utilisation, increased load factors and aircraft size. Passenger growth with the Project reflects the same assumptions as the baseline and additional ATMs enabled by the Project.

Source: GAL.

4.4.3 The Forecast Data Book explains that the forecast levels of passenger growth provide a realistic view of air traffic growth that would occur at Gatwick, while also ensuring that the environmental impacts of Gatwick's growth, some of which, such as noise, traffic and carbon, rely heavily on the forecasts, are not understated. This approach also accords with advice from the Planning Inspectorate to ensure that realistic 'worst case' environmental impacts are understood. It is therefore possible that the estimated economic benefits of the Project assessed on the basis of these forecasts may be overstated. For this reason, economic impact estimates for a scenario that assumes slower / lower passenger growth at Gatwick are also provided —see Annex 2. This sensitivity aims to show the effect of lower levels of demand on economic impacts. The forecasts corresponding to this sensitivity are used only for the purpose of this economic assessment.

[8] Department for Transport, 2018a.
[9] Department for Transport, 2013.
[10] Department for Transport, 2022a.
[11] Department of Transport, 2003.

4.5 The COVID-19 pandemic and its impact on the economic assessment

4.5.1 The traffic forecasts presented above take account of the effect that the COVID-19 pandemic has had on Gatwick and other airports. Between 2019 and 2020, passenger volumes at Gatwick dropped by 78%.[12] Passenger volumes decreased further from 10.2 mppa in 2020 to 6.3 mppa in 2021. However, in 2022, the number of passengers at Gatwick reached 32.8m—more than three times the annual figure in 2021, and 71% of the 2019 traffic, illustrating the significant recovery of traffic in the recent period.[13]

4.5.2 As shown in Figure 4.3, it is expected that passenger volumes rebound strongly after 2022, before transitioning to a more steady recovery path and reaching 2019/20 levels of traffic in 2024/25 (i.e. approximately 45m passengers). This is in line with industry forecasts, such as IATA and ACI, which have estimated that global and European passenger traffic will return to pre-COVID-19 levels in 2024 and 2025 respectively.[14][15]

4.5.3 By the time the Project is operational in 2029, GAL expects that the pandemic will no longer have an impact on the UK aviation sector as a whole, and Gatwick in particular. As a result, the analysis is based on the assumption that the COVID-19 pandemic will not have an influence on passenger traffic related to the Project in the long run.

4.5.4 Although the pandemic may not have a lasting impact on air traffic, it could have long-term impacts on the economy and on employment.[16] These long-term economic effects are taken into account in the analysis by using up-to-date baseline data forecasts from TAG and the ONS. Use is also made of updated estimates for total local employment within the study area from Cambridge Econometrics,[17] which reflect the long-term effect of the pandemic on employment.

4.5.5 Impact estimates in 2019 are used as the baseline for assessing local and regional economic conditions when the Project is completed. 2019 is considered to be a better reflection of the future state of the economy than 2020 or 2021, which were significantly affected by COVID-19. Where it is not stated otherwise, it is assumed that macroeconomic relationships that held in 2019 will remain constant in the long run, absent any up-to-date information suggesting that such relationships have changed.

5 The local economic impact of the Northern Runway Project

5.1 Introduction

5.1.1 This section sets out the **economic footprint** of the Project. The economic footprint is a measure of the resources, whether on or off site, that are used in delivering the economic activity generated by the Project. This is typically measured by employment or gross value added (GVA).[18]

5.2 Overview of the approach to estimating the economic footprint

5.2.1 The economic footprint of the Project considers three separate impacts: direct, indirect, and induced.[19] Table 5.1 provides a summary of the different components of the economic footprint analysis.

Table 5.1 Local economic footprint overview

	Type of impact	Analysis
Economic 'footprint'	Direct footprint	Economic activity of firms on site at the airport. Examples include air crews or airport management staff.
	Indirect footprint	Economic activity in the supply chain of Gatwick and other firms located at the airport, such as aircraft parts manufacturers or maintenance firms. These firms in the supply chain are not based at the airport. The estimated indirect impacts are restricted to those occurring within the UK.
	Induced footprint	Economic activity due to workers—both on site and in the supply chain—spending their wages on activities that are not necessarily associated with, or located close to, the airport, such as barbers and restaurants.

Source: Oxera.

5.2.2 In addition to the three impacts described above, there is a fourth component of the economic footprint, the catalytic footprint, which refers to the economic activity of firms that are not in the indirect or induced footprint of the airport choosing to locate near the airport because of the connectivity that it offers. The catalytic effect is derived from total net impacts and is discussed separately in section 6. The economic footprint presented in section 5 does not therefore represent the total economic impact of the Project, as the catalytic effect is not included.

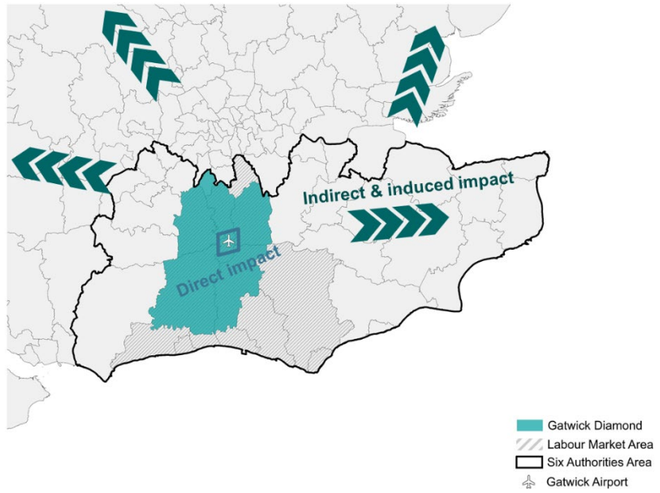
5.2.3 As discussed in section 4.2, these different economic impacts of the Project are assessed on the UK as a whole as well as on three local study areas—the Gatwick Diamond, the Labour Market Area, and the Six Authorities Area. These local study areas are centred on the airport and are included within the broader South East region.

5.2.4 Figure 5.1 below illustrates the geographic scope of each impact:

- direct impacts occur on site at the airport;
- indirect impacts occur throughout the UK, since Gatwick's suppliers can be located anywhere in the country or abroad (however, the analysis in this appendix focuses only on the impact of the Project within the UK);
- induced impacts also occur throughout the UK, as workers can spend their money locally but also across the country;

[12] Gatwick Airport (2020), 'Gatwick Key Facts', https://www.gatwickairport.com/business-community/about-gatwick/company-information/gatwick-key-facts/
[13] Ibid.
[14] IATA (2022), 'Aviation recovery continues despite headwinds', 21 September.
[15] Airports Council International (2022), 'Airport Traffic Forecast - 2023 Scenarios & 2023-2027 Outlook', December.
[16] For example, please refer to Office for Budget Responsibility (2021), 'Coronavirus analysis', March.
[17] Cambridge Econometrics (2022), 'Local employment by industry', March. A sensitivity has also been run on the analysis using employment forecasts from Experian, which do not significantly change the results of the analysis.
[18] GVA is a standard measure of economic activity that statistical agencies (such as the UK ONS and Eurostat) routinely use to ascertain an industry's contribution to an economy's total output. It is defined as the total value of output from a service excluding the value of any intermediate inputs (ie outputs of other sectors used as inputs to the supply chain).
[19] The assessment does not include welfare impacts. This is because, given the limited passenger diversion between London airports during the assessment period in the ICF input forecasts, it is estimated that the local welfare impacts of the Project (monetary and time travel savings for local residents) are expected to be marginal and transitory (ie will occur for a limited period of time only).

Figure 5.1 Geographic scope of footprint impacts



Source: Oxera.

5.2.5 For avoidance of doubt, in this subsection (and elsewhere in this appendix), the economic footprint of the Project is reported as an 'increment'; in other words, it refers to the difference of the local economic footprint of Gatwick with and without the Project.

5.3 Direct footprint

5.3.1 The **direct footprint** is the employment and GVA that is directly associated with the firm or site concerned. In the case of the Project, Gatwick proposes to increase its overall capacity, which will in turn increase passengers and aircraft movements at the airport. This additional aviation activity leads to an increase in employment on site at Gatwick that is driven by both GAL and other firms.

5.3.2 The direct GVA of the Project is equal to the sum of the additional operating surplus, worker compensation, and taxes (minus subsidies) for activities located on the site of Gatwick.

5.3.3 As discussed in section 4.5, 2019 is used as a base year for the assessment. For this baseline year, employment and GVA for GAL and for other firms on site is determined as follows.

- For GAL, figures are obtained directly from GAL's 2019 annual report.
- For other firms on site, ICF has provided data on employment at the airport broken down by occupational categories (see Annex 3 for more details). These estimates are based on GAL's 2015/16 Travel to Work survey data.[20] We calculate non-GAL GVA from this data as follows.
  - This employment data from ICF is combined with the average wages of staff on site at Gatwick to obtain the corresponding labour costs.
  - The labour costs information is then converted to GVA based on the data from the ONS on the ratio of labour costs to GVA[21] in the sectors represented on site.
  - This leads to the estimated GVA that the direct (but non-GAL) employment would be expected to generate.

5.3.4 To estimate impacts for future assessment years (2029, 2032, 2038, 2047), ICF's forecasts of total direct on-site employment by occupation are used to forecast direct GVA, assuming that GVA grows in line with employment.

5.3.5 Forecast inputs to the direct economic footprint are assessed as follows.

- GAL and non-GAL employees: ICF on-site employment forecasts are used as inputs.
- Wages of GAL employees: the average wage for employees at GAL is uplifted for future years using forecast growth in real GDP per household from the DfT's Transport Appraisal Guidance (TAG).[22]
- Future profitability for GAL: this is estimated using future staff costs (based on employment forecasts from ICF and estimated future average wages) multiplied by the ratio of GAL profits[23] to staff costs in 2019, which is assumed to remain constant.[24]
- GAL direct GVA: this is estimated as the sum of labour compensation and future GAL profitability, calculated as explained above.
- Non-GAL direct GVA: it is assumed that the ratio of labour costs to GVA from ONS data remains constant. This is combined with the uprated average wage and employment numbers discussed above to estimate future GVA.

5.3.6 Direct employment (ICF forecasts) and GVA (Oxera estimates) are derived for each assessment year (2029, 2032, 2038, 2047) for both the baseline (without the Project) and NRP (with the Project) scenarios. The incremental footprint of the Project represents the difference between the baseline and NRP scenarios.

5.3.7 Table 5.2 provides an overview of the methodology used to derive direct employment and GVA for GAL and other firms on site in the base year and future assessment years.

Table 5.2 Overview of direct employment/GVA methodology

	GAL		Other on-site firms	
	Employment	**GVA**	**Employment**	**GVA**
Base year (2019)	Actual based on GAL annual report		Estimated using Travel to Work survey	Estimated using Travel to Work survey and ONS data
Future assessment years (2029, 2032, 2038, 2047)	Forecasts from ICF	Estimated using ICF forecasts, TAG and ONS data	Forecasts from ICF	Estimated using ICF forecasts, TAG and ONS data

Source: Oxera.

5.3.8 Table 5.3 below shows the additional direct GVA and employment that the Project will generate in each future assessment year. It is estimated that, as a result of the Project, in 2029 employment at Gatwick will increase by 1,000 jobs and GVA will increase by £73m. This will further increase to 3,200 jobs and £263m in GVA by 2038, and 3,100 jobs and £286m in GVA by 2047.[25] These values reflect Gatwick's high

[20] Gatwick Airport Limited (2016), 'Gatwick Employer and Travel to Work Survey 2016', Table 7.
[21] Office for National Statistics (2020), UK Input-Output Analytical Tables (2016 data).
[22] Department for Transport (2020), 'WebTAG databook', July.
[23] Measured by EBITDA (earnings before interests, taxes, depreciations, and amortisation).
[24] For the purposes of this analysis, it is assumed that the COVID-19 pandemic will not have a long-term impact on GAL's profitability. 2019 is therefore used as a baseline for the relationship between profitability and staff costs. It is also assumed that, absent any relevant information suggesting otherwise, profitability from the Project would not be structurally different from that of the rest of the airport.
[25] The GVA impact increases between 2038 and 2047, while the job footprint decreases due to increasing productivity per worker between the two assessment years.

productivity, part of which could be attributed to the capital-intensive nature of activity at an airport.[26]

Table 5.3 The Project's direct footprint

	2029	2032	2038	2047
Direct GVA	**£73m**	**£238m**	**£263m**	**£286m**
Direct employment	**1,000**	**3,100**	**3,200**	**3,100**

Note: Entries correspond to the incremental difference between the direct economic footprint of Gatwick with and without the Project. GVA is reported in 2022 prices. Employment figures are expressed as headcounts and are rounded to the nearest hundred.

Source: GAL, ICF; Oxera analysis.

5.3.9 While all direct impacts occur on site at the airport, direct employment figures are also disaggregated at a LAD level based on the residency of airport employees for the purposes of Lichfields' assessment as part of **ES Chapter 17: Socio-Economic** (Doc Ref. 5.1). Impact estimates produced on the basis of a residency distribution of direct impacts are presented in Annex 4 of this appendix. GAL has provided an anonymised dataset that includes the reported residence of employees holding Gatwick passes that provide access to airport facilities (i.e. GAL and non-GAL on-site employees).[27] This information is used to allocate the additional on-site jobs generated as a result of the Project to each LAD.[28] These estimates are presented at the LAD level in Annex 4.

5.4 Indirect footprint

5.4.1 The **indirect footprint** refers to the employment and GVA supported across the UK as a result of the supply chains of Gatwick and other firms located at Gatwick.

5.4.2 An input-output model is used to estimate indirect GVA, which is the sum of profits and employee compensation generated in the UK from the supply-chain spending of firms that are located on site at Gatwick. To calculate this impact, three key steps are undertaken:

- convert direct GVA (output of the direct impact analysis set out in section 5.3 above) into direct output by sector (input to the indirect impact analysis);
- estimate the corresponding indirect output using the input–output model;
- convert indirect output to GVA.

5.4.3 These three steps are described in more detail in Table 5.4.

Table 5.4 Indirect footprint calculations

Main outputs	Relevant metrics	Description
	Direct employment by sector on site (A)	ICF input data derived from GAL 2015/16 Employer and Travel to Work Survey. Number of employees by occupation is matched to ONS sectors. Each occupation is matched to an ONS SIC Code[1] and the number of direct employees working in each sector is calculated.
	Average GVA per employee by sector (B)	The average GVA per employee within each sector is calculated using the average labour compensation by sector from the 2019 Annual Business Survey,[2] and the ratio of labour compensation to GVA based on ONS data.[3]
	Implied direct GVA per sector (C = A x B)	The GVA per sector is calculated as the average GVA per employee (B), multiplied by the total number of direct employees per sector (A).
	Total implied direct GVA (D)	The implied direct GVA for each sector is summed to give the total implied direct GVA.
	Share of direct GVA by sector (E = C / D)	The share of direct GVA per sector is calculated as the implied direct GVA per sector (C) divided by total implied direct GVA (D).
Actual direct GVA by sector (G = E x F)	Share of direct GVA by sector (E)	As calculated above.
	Direct GVA footprint (F)	From the direct footprint analysis. See Table 5.3 above.
Direct output by sector (I = G x H)	Direct GVA by sector (G)	As calculated above.
	Output to GVA ratio by sector (H)	The ratio of GVA per final unit of output is calculated using ONS UK Input-Output Tables (domestic use).[3]
Indirect (supply-chain) output by product (L = I x J x K)	Direct Output by sector on site (I)	As calculated above.
	Share of product output by sector (J)	ONS UK Input-Output Tables (domestic use)[3] are used to calculate the sum of output for each product within a given sector, and divide it by the sum of output for the sector to obtain the share.
	Indirect (supply-chain) spending multiplier by unit of final output (K)	ONS UK Input-Output Tables (Type I Leontief)[3] are used to obtain the output multiplier for supply-chain spending given a unit of final output in a product.
Indirect (supply-chain) GVA (N = L / M summed across products)	Indirect (supply-chain) output by product (L)	As calculated above.
	Output/GVA ratio by product (M)	ONS UK Input–Output Tables[3] are used to calculate the ratio of GVA per final unit of output.

Note: [1] Office for National Statistics (2022), 'UK SIC 2007', 24 January. [2] Office for National Statistics (2021), 'Non-financial business economy, UK and regional (Annual Business Survey): 2019 results', 24 June. [3] Office for National Statistics (2020), 'UK Input-Output Analytical Tables (2018 data)'.

Source: Oxera analysis.

[26] Capital intensity is estimated by the ONS using the ratio of capital stocks estimates to GVA. The 'transport and storage' sector is among the most capital-intensive in the UK. Office for National Statistics (2019), 'Capital stocks and fixed capital consumption, UK: 2019', November.

[27] The passholder data provided is anonymised.

[28] For the purposes of this analysis, it is assumed that the geographic distribution of employees from the survey remains constant over time and does not significantly change going forward.

5.4.4 The resulting indirect GVA estimates are converted into indirect job estimates using the South East GVA per job based on ONS data.[29]

5.4.5 Unlike the direct economic footprint (which, by definition, is contained on site at Gatwick), the indirect footprint will be distributed across a wider geographic area. In order to estimate the economic footprint for each of the three local study areas, it is necessary to determine how much indirect activity would be retained in these three local areas and how much would 'leak' out to the rest of the UK.[30] To do this, two pieces of evidence are used.

- An Oxford Economics report, The Economic impact of Gatwick Airport, which presents a disaggregation of Gatwick's indirect GVA[31] into different areas of the UK based on the distribution of Gatwick's supply chain. This evidence, from 2016, is used as a first step to disaggregate indirect GVA to the study area level.
- ONS data on GVA for each LAD in the UK.[32] This data allows disaggregation of GVA at the study area level across LADs to distribute the total indirect footprint.

5.4.6 Table 5.5 shows the estimated incremental effect of the Project on the indirect footprint of Gatwick. Estimates for each study area in the table include significant overlaps between regions—e.g. the Six Authorities estimate includes the indirect footprint in the Labour Market Area. Therefore, these figures should not be considered additive, but they are presented in order to show the relative magnitude of the impact in each area.[33]

Table 5.5 The Project's indirect footprint

	2029	2032	2038	2047
Indirect GVA				
of which Gatwick Diamond	£14m	£46m	£51m	£55m
of which Labour Market area	£21m	£70m	£77m	£84m
of which Six Authorities	£43m	£141m	£156m	£170m
Total UK	**£58m**	**£191m**	**£212m**	**£230m**
Indirect employment				
of which Gatwick Diamond	200	700	700	700
of which Labour Market area	300	1,000	1,000	1,000
of which Six Authorities	600	2,000	2,100	2,000
Total UK	**900**	**2,700**	**2,800**	**2,700**

Note: Entries correspond to the incremental difference between the indirect economic footprint of Gatwick with and without the Project. Values may not sum due to rounding. GVA is reported in 2022 prices. Employment figures are expressed as headcounts and are rounded to the nearest hundred. Figures for each study area include potential overlaps—e.g. the Six Authorities estimate includes the Labour Market area.

Source: Oxera analysis.

5.4.7 As shown in Table 5.5, the indirect footprint of the Project is estimated to be £58m in GVA (900 jobs) in 2029 and increases to £212m (2,800 jobs) by 2038, and £230m (2,700 jobs) by 2047. Over two-thirds of these benefits are estimated to arise within the Six Authorities Area.

5.4.8 The estimates above imply a direct-to-indirect impact multiplier of 1.88. Taking 2038 as an example, the Project is estimated to lead to an additional 3,200 jobs on site (see Table 5.3), while supply chain activity contributes to an additional 2,800 indirect jobs.[34] Therefore, for every direct job that the Project creates, an additional 0.88 indirect jobs is created in Gatwick's supply chain.

5.5 Induced footprint

5.5.1 The **induced footprint** refers to the employment and GVA generated as a result of individuals working at Gatwick or in its supply chain spending their wages. More specifically, it represents the additional income generated as a result of the direct and indirect impacts discussed above.

5.5.2 Similar to the indirect footprint, induced impacts are estimated using an input–output analysis. The input–output model used for indirect impacts estimation is amended to account for compensation of employees and final consumption expenditure by households as an additional sector of the economy. Therefore, in addition to the direct and indirect impacts, this expanded input–output table takes account of the extent to which an increase in GVA in one sector (e.g. transportation) would generate additional income (more wages through additional employment) and additional spending (more spending through the additional income generated). The steps used to estimate induced impacts are summarised in Table 5.6.

Table 5.6 Induced footprint calculations

Main outputs	Relevant metrics	Description
Indirect (supply-chain) and induced output by product (L = I x J x K)	Direct output by sector on site (I)	Same calculation steps as described in Table 5.4.
	Share of product output by sector (J)	Same calculation steps as described in Table 5.4.
	Indirect (supply-chain) and induced spending multiplier by unit of final output (K)	ONS UK Input-Output Tables (derived Type II Leontief)[1] that include the compensation of employees are used to obtain the output multiplier for the supply-chain and induced spending given a unit of final output in a product.
Indirect (supply-chain) and induced GVA	Indirect (supply-chain) and induced output by product (L)	As calculated above.

[29] The South East GVA per job is used to provide more accurate estimates of the local employment generated by the Project (i.e. more accurate estimates within the Six Authorities Area). As the UK-level GVA per job is, on average, lower than the South East average, this assumption would yield more conservative estimates of the UK-level employment generated by the Project (i.e. using the UK estimate would yield higher employment figures).
[30] For the purposes of this analysis, it is assumed that this geographic distribution of indirect activity remains constant over time and will not significantly change going forward as a result of the COVID-19 pandemic.
[31] Oxford Economics (2017), 'The Economic impact of Gatwick Airport', p. 13.
[32] Office for National Statistics (2018), 'GVA (Income approach) by LAD', December.
[33] Absent specific information on the Project's impact on Gatwick Airport's supply chain, it is assumed that the distribution of activity across the different study areas remains constant over the years.
[34] Calculated as: (3,200 + 2,800 + 3,500) / 3,200. This multiplier is broadly in line with existing estimates for indirect impacts assessments (range of 1.23–1.68 in PwC's literature review of local economy analyses for the Airports Commission, 1.78 in the recent Luton PEIR assessment). See PwC (2014), 'Local Economy: Literature Review; Airports Commission', November; Oxford Economics (2021), 'The Economic Impact of London Luton Airport', December.

(N = L / M summed across products)	Output/GVA ratio by product (M)	Same calculation steps as described in Table 5.4.
Induced GVA (P = N - O)	Indirect (supply-chain) and Induced GVA footprint (N)	As calculated above.
	Indirect GVA footprint (O)	As estimated in Table 5.5.

Note: [1] The type II Leontief matrix is not provided directly by the ONS. Oxera has derived it using the UK Input-Output Tables and ONS data on total household income. Office for National Statistics (2020), UK Input-Output Analytical Tables (2018 data); ONS Regional Gross Household Disposable Income.

Source: Oxera analysis.

5.5.3 To estimate the induced local economic footprint for the study areas, we first estimate a regional input-output table for the South East using location quotients. Location quotients reflect the proportion of regional requirements that are met by firms located within the region (i.e. propensity to use regional inputs).[35] We use ONS data on GVA per product by region to estimate the location quotients for the South East.[36] Based on this, we compute the regional input-output table for the South East, which we use to estimate the induced footprint in the South East. We derive the Six Authorities-induced impact using the Six Authorities' share of South East household consumption based on ONS data.[37]

5.5.4 We then distribute the Six Authorities' footprint into each LAD based on passholder data from GAL. We use this information to disaggregate induced impacts, on the assumption that airport employees (and employees in the airport's supply chain)[38] are more likely to spend their wages close to their place of residence.

5.5.5 Table 5.7 shows the induced footprint for the Project and for each of the three study areas. Figures correspond to the incremental footprint, i.e. the difference between the economic footprints of Gatwick with and without the Project.

Table 5.7 The Project's induced footprint

	2029	2032	2038	2047
Induced GVA				
of which Gatwick Diamond	£18m	£60m	£66m	£72m
of which Labour Market area	£24m	£80m	£88m	£96m
of which Six Authorities	£27m	£88m	£98m	£106m
Total UK	**£73m**	**£238m**	**£263m**	**£286m**
Induced employment				
of which Gatwick Diamond	300	900	900	800
of which Labour Market area	400	1,100	1,200	1,100
of which Six Authorities	400	1,300	1,300	1,300
Total UK	**1,100**	**3,400**	**3,500**	**3,400**

Note: [1] The type II Leontief matrix is not provided directly by the ONS. Oxera has derived it using the UK Input-Output Tables and ONS data on total household income. Office for National Statistics (2020), UK Input-Output Analytical Tables (2018 data); ONS Regional Gross Household Disposable Income.

Source: Oxera analysis.

5.5.6 As shown in Table 5.7, the induced footprint of the Project is estimated to increase from £73m in GVA (1,100 jobs) in 2029 to £286m (3,400 jobs) by 2047. Over a third of these benefits are estimated to arise within the Six Authorities Area, and about a quarter are expected to be within the Gatwick Diamond.

5.5.7 The estimates imply a direct-to-indirect-and-induced multiplier of 2.97. Taking 2038 as an example, the Project will generate an additional 3,200 jobs on site at Gatwick, indirect employment of 2,800, and 3,500 induced jobs.[39] Therefore, for every direct job, the Project creates an additional 0.88 indirect jobs in the supply chain of Gatwick, and another 1.09 jobs due to induced spending.

5.6 Summary of the economic footprint of the Project

5.6.1 The footprint analysis shows that the Project will increase the scale of the airport's impact in the three study areas around the airport and in the UK as a whole, in terms of both employment and GVA. This impact is a result of direct activity on site associated with servicing additional air traffic, indirect activity in the airport's supply chain, and induced activity from individuals employed at Gatwick or in the supply chain spending their wages.

Table 5.8 Breakdown of economic 'footprint' in the Six Authorities Area

	GVA				Employment			
	2029	2032	2038	2047	2029	2032	2038	2047
Direct	£73m	£238m	£263m	£286m	1,000	3,100	3,200	3,100
Indirect	£43m	£141m	£156m	£170m	600	2,000	2,100	2,000
Induced	£27m	£88m	£98m	£106m	400	1,300	1,300	1,300
Total	**£143m**	**£467m**	**£516m**	**£561m**	**2,000**	**6,400**	**6,600**	**6,400**

Note: Entries correspond to the incremental difference between the footprint of Gatwick with and without the Project. Values may not sum due to rounding. GVA is reported in 2022 prices. Employment figures are expressed as headcounts and are rounded to the nearest hundred.

Source: Oxera analysis.

5.6.2 As depicted in Table 5.8, the direct, indirect, and induced footprint of the Project within the Six Authorities Area is estimated to initially support 2,000 jobs and £143m of GVA per year (2029 estimates). This will grow as traffic volumes increase, rising to 6,600 jobs and £516m GVA in 2038, and 6,400 jobs and £561m of GVA in 2047.[40]

[35] For example, households in the South East may disproportionally buy their agricultural products from local suppliers (eg purchasing a large share of their fruit and vegetables from South East farmers instead of other suppliers outside of the region). In this case, the location quotient would reflect the fact that household expenditure with respect to agriculture is higher within the South East than in the UK as a whole, and therefore the resulting regional multiplier would be higher than the UK average.
[36] For further details on location quotients, please refer to Flegg, A.T. and Webber, C.D. (2000), 'Regional Size, Regional Specialization and the FLQ Formula', *Regional Studies*, **34**:6, pp. 563–569.
[37] ONS Office for National Statistics (2020), National Household Final Consumption Expenditure by COICOP commodities, 2009 to 2018.
[38] We assume that employees in the airport's supply chain would be distributed throughout the local area in a similar way to airport employees. This assumption reflects the localised nature of the airport's supply chain as shown by the indirect footprint results (ie localities closest to the airport represent a larger share of the airport's supply chain).
[39] Calculated as: (3,200 + 2,800) / 3,200. This multiplier is broadly in line with existing estimates for indirect and induced impacts assessments (range of 1.32–3.10 in PwC's literature review of local economy analyses for the Airports Commission, 2.60 in the recent Luton PEIR assessment). See PwC (2014), 'Local Economy: Literature Review; Airports Commission', November; Oxford Economics (2021), 'The Economic Impact of London Luton Airport', December.
[40] GVA is reported in 2022 prices. Employment figures are expressed as headcounts. The GVA impact increases between 2038 and 2047, while the job footprint decreases due to increasing productivity per worker between the two assessment years.

6 The net economic impact of the Northern Runway project

6.1 Introduction

6.1.1 While the economic footprint analysis in section 5 shows the scale of the economic activity associated with the Project, it does not take account of the alternative uses of resources and people absent the Project. Therefore, the total net impact of the Project would include net direct, indirect, induced, and other impacts once alternative uses of resources and people absent the Project are accounted for and are removed from the gross (footprint) impacts at the local level. Section 6.2 presents how this total net impact of the Project is calculated using an estimate of an elasticity of traffic to net employment in the Six Authorities area. This elasticity estimate accounts for the net change in local employment (i.e. difference between economic expansion and potentially contraction due to the Project).

6.1.2 From this total net impact, the catalytic impact of the Project, which corresponds to the economic activity of firms that choose to be located near the airport because of the connectivity that it offers, can be quantified. The catalytic impact is estimated conservatively based on the total net economic impact and the (gross) footprint estimates discussed in section 5. This is shown in section 6.3.

6.1.3 A diagrammatic illustration of the relation between gross economic footprints (direct, indirect, and induced), the total net economic impact, and the catalytic impact is shown in Figure 6.1.

Figure 6.1 Overview of impacts

Source: Oxera.

6.1.4 Separately, the local tourism impacts of the Project, which would overlap in part with the induced and catalytic impacts measured, are presented in section 6.4.

6.1.5 However, estimating net direct, indirect and induced impacts separately would require making assumptions on the level of job displacement associated with the footprint impacts, for which limited information is available. Therefore, the discussion on net impacts of the Project in sections 6.4 and 6.6 are qualitative.

6.2 Total net economic impact

6.2.1 To estimate the total net impact of Gatwick's activities in the Six Authorities Area, an elasticity of local employment to air traffic (0.13%) is used. This employment elasticity is derived from an econometric analysis of the relationship between local employment and air passenger traffic in the UK. See Box 6.1 for more information on the elasticity estimate, and Annex 5 for additional details on the econometric analysis.

Box 6.1 Airport activity and local employment in the UK[41]

Increased activity at an airport is expected to have impacts on the local and national economy through different mechanisms such as lower fares, and increased productivity, trade and employment. Various methodologies exist to appraise these benefits, but there is limited evidence on how these effects vary across countries. While direct, indirect and induced impacts can be estimated using methodologies such as input–output approaches, in the absence of extensive surveys on local employment impacts, estimating catalytic employment impacts and within-region displacement requires the use of econometric methods.

A review of the existing literature indicates that there is evidence that increased air traffic is positively associated with increased local employment—the estimated change in regional employment resulting from a unit percentage change in air traffic ranges from 0.02% to 0.18%.[42] The estimates in this appendix are in line with these results. In the absence of studies for the UK specifically, existing approaches (Percoco, 2010; Brueckner, 2003) are replicated to produce elasticity estimates. The approach takes the form of a two-stage regression analysis with a non-linear first stage and makes use of the variation between locations in the UK (cross-sectional analysis) to assess the impact of increased air traffic on local employment levels.

The results suggest that a 1% increase in traffic levels increases local employment levels around Gatwick on average by 0.13%, given the labour market conditions and air traffic levels in the UK in 2018.

Source: Oxera.

6.2.2 This elasticity estimate is combined with the percentage increase in air traffic due to the Project, to obtain the corresponding percentage increase in local employment. This percentage increase in local employment is then applied to the forecast local employment estimated by Cambridge Econometrics (in absence of the Project)[43] to produce the total net employment impact of the Project in the Six Authorities Area.

6.2.3 It is assumed that this relationship between air traffic and local employment remains constant throughout the period of appraisal. While it is acknowledged that this relationship may

[41] Please refer to Annex 5 'Airport activity and local employment in the UK for further technical details on the econometric analysis undertaken. The analysis was done on 2018 data and reflects the pre-COVID labour market conditions and air traffic levels. It is assumed that this empirical relationship will not be affected by COVID-19 in the long term.

[42] The lower end of the range of estimates corresponds to impacts at smaller spatial scales (0.02% at the scale of Italian cities in Percoco).

[43] Cambridge Econometrics (2022), 'Local employment by industry', March. The results of the estimated impacts have been cross-checked using employment forecasts from Experian, with no significant changes in estimates.

evolve, there is limited information available on the direction and extent to which the relationship will evolve as different long-term trends may have opposing impacts. For instance, productivity improvements may reduce the employment impact of increased air traffic while stronger connectivity and agglomeration impacts may strengthen the relationship between air traffic and employment.

6.2.4 Table 6.1 shows the resulting estimated total net employment impacts for each assessment year. This net employment impact measures the change in local employment that occurs as a result of the Project. This accounts for the increase in local employment driven by either a decrease in local unemployment and inactivity, or an inflow of workers into the area (e.g. workers migrating or commuting into the area for work).

Table 6.1 The Project's total net employment impact in the Six Authorities Area

	2029	2032	2038	2047
Total net employment impact	4,500	14,000	13,700	12,800

Note: Employment figures are expressed as headcounts and are rounded to the nearest hundred.

Source: Oxera analysis.

6.3 Catalytic effect

6.3.1 The **catalytic effect** refers to the economic activity of firms that choose to be located near the airport because of the connectivity that it offers. The activity of these firms is not directly related to the airport's activities—i.e. not related to direct, indirect, or induced footprint—but the firms nevertheless benefit from the additional connectivity the airport provides. Catalytic effects are concentrated locally, since they are related to the connectivity that the airport provides in the local area. For the purpose of this assessment, it is assumed that the geographic scope of catalytic impacts is the Six Authorities Area, although some of the catalytic impact of the airport could occur outside of the area.[44]

6.3.2 The catalytic effect of the Project is calculated as a residual of other impacts—i.e. the remaining employment impact in the study area that does not correspond to the direct, indirect or induced impacts. It is estimated in three steps:

- calculate the total net impact of the Project in the Six Authorities Area (stage 1);
- identify the combined direct, indirect, and induced impact that is attributable to the Six Authorities Area (stage 2);
- the catalytic effect is then calculated as the difference between the total net impact and the direct/indirect/induced impacts (stage 3).

Calculating the total net impact

6.3.3 The estimation of the total net impact (stage 1) was described in section 6.2. Below is a discussion of the remaining two steps.

Calculating the combined gross footprint

6.3.4 As a local EIA is being undertaken, the focus is on identifying impacts occurring at a local geographic scale. The net impact estimates presented above provide a robust approach to identifying local impacts as the elasticity used to produce these estimates is specific to the local area.[45] If one assumes that the net impact of the Project at the Six Authorities Area level is equal to the combined net direct, indirect, induced, and catalytic impacts at this geographic scale, it follows that the net catalytic impact would correspond to the difference between the net total impact and net direct, indirect, and induced impacts.

6.3.5 However, estimating net direct, indirect, and induced impacts requires assumptions on displacement that are difficult to determine robustly due to a lack of evidence and information. Gross impacts are therefore used to derive local catalytic effects. This approach is conservative because the catalytic footprint would likely be higher if the gross total footprint at the local level (i.e. the economic impact of the Project without accounting for alternative use of resources and people) was used to estimate the catalytic impact. However, the approach adopted is appropriate because the impact derived is specific to the local area defined.

6.3.6 Table 6.2 summarises the total direct, indirect and induced footprint for the Six Authorities Area for each assessment year.

Table 6.2 The Project's total combined (direct, indirect, and induced) footprint in the Six Authorities Area

	2029	2032	2038	2047
Direct footprint	1,000	3,100	3,200	3,100
Indirect footprint	600	2,000	2,100	2,000
Induced footprint	400	1,300	1,300	1,300
Combined footprint	**2,000**	**6,400**	**6,600**	**6,400**

Note: Entries correspond to the incremental difference between the economic footprints of Gatwick with and without the Project. Employment figures are expressed as headcounts and are rounded to the nearest hundred.

Source: Oxera analysis.

Estimating the catalytic effect

6.3.7 As discussed, the catalytic effect is estimated as the difference between (1) the total net employment impact of the Project in the Six Authorities Area; and (2) the combined direct, indirect, and induced footprint of the Project in the same area. Table 6.3 shows the catalytic effect generated as a result of the Project for the Six Authorities Area.

Table 6.3 The Project's total catalytic effect in the Six Authorities Area

	2029	2032	2038	2047
Total net employment impact	4,500	14,000	13,700	12,800
Combined footprint	2,000	6,400	6,600	6,400
Catalytic effect	**2,500**	**7,600**	**7,200**	**6,500**

Note: Entries correspond to the incremental difference between the catalytic economic impact of Gatwick with and without the Project. Values may not sum due to rounding. Employment figures are expressed as headcounts and are rounded to the nearest hundred.

Source: Oxera analysis.

6.3.8 As previously discussed, the resulting catalytic effect is a conservative estimate as it is derived from a net impact total. Net impacts take account of the alternative uses of resources

[44] Catalytic impacts outside of the Six Authorities Area are not within the scope of the local impact assessment and have therefore not been assessed.

[45] A more detailed discussion on the elasticity estimate and how it was derived is presented in Annex 5 of this report.

and people absent the Project. To the extent that a share of the economic footprint of the Project would still occur in the local area absent the Project, this share of the footprint is not net additional to the local economy and is excluded from the net impacts of the Project.

6.3.9 From the catalytic employment effect presented above, the catalytic GVA is estimated by using the average GVA per job in the South East, since all catalytic employment is generated within the Six Authorities study area.

6.3.10 Catalytic estimates at the level of the Six Authorities Area are disaggregated further into estimates for other study areas (Labour Market Area and Gatwick Diamond) using 2019 CAA passenger survey data to determine the local authorities from which passengers originate and depart when travelling through Gatwick. As catalytic impacts reflect the economic activity of firms that choose to be located near the airport because of the connectivity that it offers, such economic activity would be reflected in individuals travelling from the airport to their place of work, a company locating close to the airport because of the connectivity it offers, or the economic activity generated by tourists travelling from/to the airport and their spending in the local economy. The CAA data would therefore capture the distribution of the economic activity around the airport due to its connectivity.

6.3.11 Table 6.3 shows the catalytic impact generated as a result of the Project which totals £168m (in 2022 prices) and generates 2,500 jobs in 2029 across the Six Authorities Area. This will increase to £538m and 7,200 jobs in 2038, and £550m and 6,500 jobs in 2047.

Table 6.4 The Project's catalytic impact: disaggregation

	2029	2032	2038	2047
Catalytic GVA				
of which Gatwick Diamond	£40m	£127m	£128m	£131m
of which Labour Market area	£97m	£307m	£311m	£318m
of which Six Authorities	£168m	£532m	£538m	£550m
Catalytic employment				
of which Gatwick Diamond	600	1,800	1,700	1,500
of which Labour Market area	1,400	4,400	4,100	3,700
of which Six Authorities	2,500	7,600	7,200	6,500

Note: Entries correspond to the incremental difference between the catalytic economic footprints of Gatwick with and without the Project. Values may not sum due to rounding. GVA is reported in 2022 prices. Employment figures are expressed as headcounts and are rounded to the nearest hundred. Figures for each study area include potential overlaps—e.g. the Six Authorities estimate includes the Labour Market area.

Source: Oxera analysis.

6.4 Local tourism impacts

6.4.1 Tourism is an important part of the UK economy. As an island nation, a significant part of the UK tourism industry is facilitated by inbound and outbound international travel and air travel in particular. According to an ABTA report (2022), it is estimated that in 2019, inbound international travel supported 152,000 jobs and £7.7 billion in GVA in London, and 79,000 jobs and £3.9 billion in GVA in the South East.[46] Such employment and GVA would not have existed without the air connectivity provided by Gatwick, in addition to that provided by other London airports, bringing sizeable economic benefits to the local area.

6.4.2 Moreover, the growth of international travel is expected to outperform many other parts of the UK economy. Outbound travel is due to grow by 15% compared with 2019 levels by 2027, with inbound travel due to grow by 20% over the same period.[47]

6.4.3 More broadly, the UK Government in the Aviation Policy Framework[48] recognises that the aviation sector contributes significantly to the UK economy. In particular, paragraph 1.16 of the Aviation Policy Framework highlights the benefits of outbound tourism in the UK:

… The Government believes that the chance to fly abroad also offers quality of life benefit including educational and skills development. Overall, the Government believes continuing to make UK tourism more attractive is a better approach both for residents and attracting new visitors. (paragraph 1.16)

6.4.4 More recently, the UK Government reiterated the important role the aviation sector has to play in the UK's economic recovery from the impact of the COVID-19 pandemic in its Flightpath to the Future[49] strategic framework document:

Aviation plays an important role in many of our local communities. It is essential for the jobs and economic activity it directly supports, as well as supporting other parts of the economy, including business and tourism, and attracting inward investment. We are committed to working with the sector to ensure we recognise the existing comprehensive aviation infrastructure across the UK, and continue to support regional airports and airfields. We will also explore ways aviation can help boost UK domestic and union connectivity. (page 42)

6.4.5 In the context of the Project, the additional air connectivity related to expansion at Gatwick would impact local employment by stimulating tourism activity in the local area. While people flying to Gatwick may intend to go to London or beyond, it is also the case that some remain in or visit the local area around the airport (e.g. after arrival or before departure, or as part of a wider visit to the UK). Indeed, promotion of regional tourism is the focus of the 'Gateway Gatwick' initiative—a collaboration between Gatwick and its regional partners.

6.4.6 With respect to the economic assessment in this appendix, local tourism impacts of the Project are captured as part of the induced footprint and catalytic effects estimated above. The increase in the number of tourists visiting the area around Gatwick due to the additional connectivity and employment generated by the Project, is likely to increase local demand for local hospitality and attractions. Therefore, any quantification of

[46] ABTA (2022), 'International Travel: Powering the UK economy', pp. 5–6.
[47] ABTA (2022), 'International Travel: Powering the UK economy', p. 4.
[48] Department for Transport (2013), 'Aviation Policy Framework', paras. 1.15-1.19
[49] Department for Transport (2022), 'Flightpath to the Future', p. 42.

local tourism impacts in terms of GVA and employment would likely result in double-counting benefits due to overlaps with induced and catalytic effects. For this reason, local tourism impacts are not quantified separately in this appendix.

6.4.7 Nonetheless, as an illustration, the local tourism impact of the Project can be demonstrated by assessing the contribution of Gatwick to its surrounding areas. Taking Crawley—where Gatwick is located—as an example, in 2019 inbound travel contributed £237million GVA to the local authority, with around half of these journeys made for leisure purposes, i.e. tourism. In addition, over 1,000 jobs in the local area were within the broad tourism sector, including local attractions, tour operations, travel agents, travel-related retail, accommodation, and food & drink.[50]

6.4.8 As part of its assessment of the economic impact of Gatwick, Oxford Economics examined the impact of the Northern Runway project on tourism in the UK, as presented in Box 6.2.[51]

Box 6.2 The tourism impact of the Northern Runway Project in the UK

Oxford Economics finds that the Northern Runway Project would lead to a substantial increase in the economic contribution of Gatwick-facilitated tourism to the UK economy. Gatwick-facilitated tourism could contribute an additional £1.92 billion in 2038 and £1.98 billion in 2047 (in 2019 prices) to the UK economy with the Northern Runway Project. Gatwick-facilitated tourism would also lead to an increase in employment of 28,700 jobs in 2038 due to the Project. However, as a consequence of improving labour productivity, the employment impact would fall slightly to 26,100 additional jobs with the Project in 2047.

Source: Oxford Economics.

6.4.9 Another example of the impact of the airport on local tourism is Brighton. Sitting on the southern coast of the United Kingdom and within the Six Authorities Area, Brighton & Hove is one of the UK's most popular seaside spots among tourists. Pre-pandemic, tourism was the third biggest sector in Brighton & Hove, contributing to 17.5% of the local economy in 2019. Moreover, of the 5.46 million nights spent by tourists in that year, over 40% of them were spent by overseas visitors. The city's proximity to Gatwick represents a clear advantage in terms of bringing tourists to the destination.

6.4.10 Gavin Stewart, Executive Director of Brighton & Hove Economic Partnership and Chair of Brighton & Hove's Destination Experience Group, noted the following on the topic of Gatwick's importance to the local economy and tourism in particular:

Proximity and easy access from Gatwick are significant contributory factors to Brighton and Hove's performance in international tourism, with 5.5 million overseas visitors arriving via Gatwick pre-pandemic. Brighton & Hove itself receives 1,820 international bed-nights from international visitors who arrived via Gatwick. It is imperative for our local economy that Gatwick Airport continues to thrive and grow.

6.5 Displacement

6.5.1 A marginal part of the local displacement impact (i.e. the extent to which local jobs would be replaced by airport-related jobs) would be related to displaced airport activity due to the Project ('spillover impacts'). ICF passenger forecasts for the London system indicate that in the early assessment years (2029 and 2032) part of the growth in traffic from the Project would come from passengers being diverted from other London airports such as Heathrow, London City, Luton, Stansted, and Southend (close to 80% diversion in 2029, 60% in 2032, 14% in 2038, 0% in 2047). This spillover impact would only be temporary as passenger diversion from other airports only occurs in the early years of the assessment. For example, airlines may add staff at Gatwick with the Project to accommodate the additional traffic in 2029 while they would have done so at Heathrow otherwise.[52]

6.5.2 As some of these airports are close to the Six Authorities Area, in particular London City and Heathrow Airport, displaced jobs may be located within the Six Authorities Area. For example, employment related to activities at Heathrow but located in Surrey (e.g. in the supply chain of the airport) may be displaced to employment related to Gatwick with the Project. In this case, the additional job from the Project that is displaced from Heathrow would not be net additional at the Six Authorities Area level. As London City and Heathrow Airport are closest to the Six Authorities Area, this spillover impact of the Project is likely to occur only with respect to these two airports. Passenger diversion from London City and Heathrow Airport is only forecast to occur in 2029 (45% of additional passengers at Gatwick) and 2032 (22%) such that no spillover impacts are expected after 2032.

6.6 Job productivity impact

6.6.1 Job productivity impacts correspond to the additional productivity generated by jobs related to airport activities (i.e. the increase in GVA associated with individuals switching to work in jobs related to the airport's activities as a result of the Project). To the extent that the productivity of jobs at Gatwick Airport is higher than in the rest of the local area, additional employment at the airport would lead to an increase in overall labour productivity in the local study areas.

6.6.2 When considering jobs that are potentially displaced by the additional activity generated by the Project, they may not provide additional employment compared to what would have occurred absent the Project, but they can still generate additional benefits in the form of job productivity impacts.

6.6.3 In the context of this analysis, it is found that direct jobs on-site at Gatwick Airport are on average more productive than employment in the South East[53] such that additional direct employment would generate job productivity benefits in the local area and at a national scale (to the extent that direct jobs are on average more productive compared to employment in other UK regions).

6.6.4 For other economic footprint impacts generated by the Project, it has been assumed that they would be as productive as an average job in the South East in the absence of any detailed information on the job productivity of employment located outside the airport's campus. For these impacts, there would be no job productivity benefits at a local level as, on average, there would be no change in productivity from moving to a job related

[50] https://www.abta.com/industry-zone/reports-and-publications/international-travel-powering-uk-economy
[51] Oxford Economics (2023), 'The economic impact of Gatwick Airport'.

[52] After 2032, passengers are not diverted from other London airports such that the level of employment related to activities at these other airports would not change between the Baseline and NRP scenarios (no job displacement). In the example given, airline staff at Heathrow would be the same with and without the Project after 2032.

[53] In 2019, the average GVA per job on-site at Gatwick is roughly £67K compared to £62K on average in the South East.

to airport activities. However, to the extent that South East jobs are on average more productive compared to employment in other regions, there may be some job productivity benefits at a national level.

6.7 Summary of the net economic impact

6.7.1 As discussed in this section, the Project will contribute to increased economic activity in terms of both net employment and GVA. Total net impacts are derived from the elasticity analysis. However, net direct, indirect, and induced impacts are not estimated separately as this would require assumptions on the level of job displacement associated with the footprint impacts, for which very limited information is available. These impacts are therefore discussed qualitatively.

6.7.2 On the other hand, it is possible to derive a conservative quantification of the catalytic effect based on the estimated total net impact of Gatwick (section 6.3), and the footprint estimates in section 5. These are discussed in section 6.3.

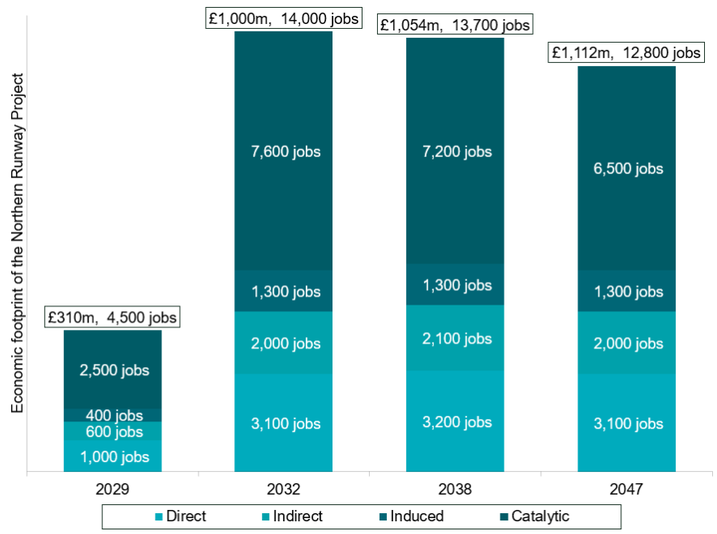
6.7.3 Overall, it is estimated that within the Six Authorities Area, the Project will support 4,500 net additional jobs and £310m of GVA per annum in 2029 when the Project is expected to open. This impact will increase as traffic increases, rising to 13,700 jobs and £1.05bn GVA in 2038, and 12,800 jobs and £1.11bn of GVA in 2047.[54]

7 Conclusion

7.1.1 This appendix presents the findings of a local EIA of Gatwick's Northern Runway Project. The Project will make changes to the northern runway, which, together with lifting the current restrictions on its use, would enable dual runway operations.

7.1.2 The Project is expected to have a significant impact on the local economy. By 2029, an additional 4,500 jobs and £310m in GVA will be created per annum in the Six Authorities area. The Project is then expected to lead to an additional 13,700 jobs and £1,054m GVA in 2038, and 12,800 jobs and £1,112m of GVA in 2047. These total impacts are split into direct, indirect, induced and catalytic impacts in Figure 7.1.

Figure 7.1 Local economic impact of the Project in the Six Authorities Area

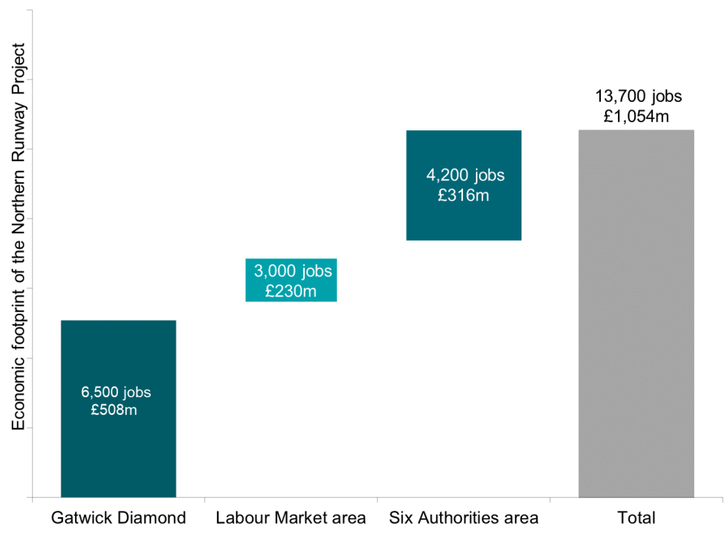


Note: Entries correspond to the incremental difference between the economic impacts of Gatwick with and without the Project. Values may not sum due to rounding. GVA is reported in 2022 prices. Employment figures are expressed as headcounts and are rounded to the nearest hundred. GVA estimates for a particular impact may diverge from the employment estimates over time due to the forecast increase in GVA per worker.

Source: Oxera analysis.

7.1.3 A significant share of this impact is expected to be generated in close proximity to the airport. For example, in year 2038 there are large impacts in the Gatwick Diamond with 6,500 additional jobs and £508m in GVA. The impact of the Project reduces with increased geographic distance from the airport. In the rest of the Labour Market area (i.e. the area that is not included in the Gatwick Diamond) it is estimated the Project would generate £230m in additional GVA and 3,000 jobs, £316m (4,200 jobs) would be generated in the rest of Six Authorities Area. These are shown in Figure 7.2.

Figure 7.2 Economic 'footprint' of the Project across the study areas in 2038



Note: Entries correspond to the incremental difference between the economic footprints of Gatwick with and without the Project. Values may not sum due to rounding. GVA is reported in 2022 prices. Employment figures are expressed as headcounts and are rounded to the nearest hundred. Figures for each study area exclude potential overlaps.

Source: Oxera analysis.

[54] All estimates are reported in 2022 prices. Employment figures are expressed as headcounts.

Annex 1 Policy context

A1.1 This annex summarises the key planning policy documents that inform the local EIA approach and set out its relevance as part of the application for development consent. For additional information on the broader planning policy context, please **refer to ES Chapter 2: Planning Policy Context** (Doc Ref. 5.1).

Airports National Policy Statement

A1.2 The Planning Act 2008 requires that in deciding applications for development consent, regard must be given to any National Policy Statement (NPS) which has 'effect' in relation to development of the description to which the application relates (a 'relevant national policy statement').

A1.3 On 26 June 2018, the Airports NPS (Department for Transport, 2018a) was designated by the Government. The NPS only has 'effect' in relation to the delivery of additional airport capacity through the provision of the Heathrow Northwest Runway project. This includes new terminal capacity between the new runway and the existing northern runway at Heathrow Airport, as well as the reconfiguration of terminal facilities in the area between the two existing runways at Heathrow Airport (paragraph 1.40). Paragraph 1.41 of the NPS makes clear that the NPS does not have 'effect' in relation to an application for development consent for airport development that does not comprise an application relating to the Heathrow Northwest Runway.

A1.4 While the Airports NPS does not have direct effect for the purposes of the Project, it is an 'important and relevant' consideration for the determination of the application for development consent.

A1.5 Paragraph 1.39 of the NPS states that:

… the Government has confirmed that it is supportive of airports beyond Heathrow making best use of their existing runways. However, we recognise that the development of airports can have positive and negative impacts, including on noise levels. We consider that any proposals should be judged on their individual merits.. taking careful account of all relevant considerations, particularly economic and environmental impacts. (paragraph 1.39)

A1.6 Paragraph 4.4 of the Airports NPS provides further detail of the considerations for weighing adverse impacts against benefits for any airport development:

In considering any proposed development, and in particular when weighing its adverse impacts against its benefits, the Examining Authority and the Secretary of State will take into account:

- *Its potential benefits, including the facilitation of economic development (including job creation) and environmental improvement, and any long term or wider benefits; and*
- *Its potential adverse impacts (including any longer term and cumulative adverse impacts) as well as any measures to avoid, reduce or compensate for any adverse impacts.*

A1.7 The Government's policy framework for airports (other than Heathrow), which sets out the Government's support for making best use of existing airports, is summarised below.

Aviation Policy Framework

A1.8 In 2011, the Government commenced the process of preparing a new policy framework for UK aviation to replace the 2003 Future of Air Transport White Paper (Department of Transport, 2003). This was a national aviation policy which set out a strategic framework for the development of airport capacity, supporting the development of new runways at Heathrow and Stansted, and making the best use of other existing airport capacity. At Gatwick, the White Paper found that there '*is a strong case on its own merits for a new wide-spaced runway at Gatwick after 2019*' and that land should be safeguarded for that purpose.

A1.9 The Aviation Policy Framework, published in March 2013 (Department for Transport, 2013), sets out the Government's objectives and principles to guide plans and decisions on airport development at the local and regional level.

A1.10 The Airports NPS also makes clear that its designation does not affect Government policy on wider aviation issues, for which the Aviation Policy Framework and, by implication, subsequent policy statements still apply, including Beyond the Horizon - The Future of UK Aviation: Making Best Use of Existing Runways (HM Government, 2018) and Flightpath to the Future (Department for Transport, 2022a).

A1.11 The Aviation Policy Framework recognises that the aviation sector contributes significantly to the UK economy. In particular, paragraph 1.16 of the Aviation Policy Framework highlights the benefits of outbound tourism in the UK:

… The Government believes that the chance to fly abroad also offers quality of life benefit including educational and skills development. Overall the Government believes continuing to make UK tourism more attractive is a better approach both for residents and attracting new visitors. (paragraph 1.16)

Beyond the Horizon – The Future of UK Aviation: Making Best Use of Existing Runways

In late 2012, during the preparation of the Aviation Policy Framework, the Government set up the Airports Commission. Included within the Airports Commission's brief was the requirement to examine the nature, scale and timing of any requirements for additional airport capacity to allow the UK to maintain its position as Europe's most important aviation hub. Amongst the recommendations of the Airports Commission was the need to make more intensive use of airport infrastructure.

A1.12 The Government published Beyond the Horizon - The Future of UK Aviation: Making Best Use of Existing Runways (HM Government, 2018) in June 2018. The document forms part of the Government's aviation strategy and sets out its policy support for airports making best use of its existing runways:

… the Government is supportive of airports beyond Heathrow making best use of their existing runways. However, we recognise that the development of airports can have negative as well as positive local impacts, including on noise levels. We therefore consider that any proposals should be judged by the relevant planning authority, taking careful account of all relevant considerations, particularly economic and environmental impacts and proposed mitigations. (paragraph 1.29)

A1.13 In addition, in its consultation document Aviation 2050 – the Future of UK Aviation (December 2018), the government clarified that it supports the aviation industry growth and the benefits that it delivers, provided that growth takes place in a sustainable way, with actions to mitigate the environmental impacts.

Flightpath to the Future

A1.14 'Flightpath to the Future' is a strategic framework for the aviation sector that supports the Department for Transport's vision for a modern, innovative and efficient sector over the next ten years (Department for Transport, 2022a).

A1.15 The DfT's report defines ways the UK wants to be the best place in the world for general aviation. One of the key objectives is supporting an innovative, environmentally sustainable sector and encouraging the use of new technology. This document highlights the Government's continued commitment to the sustainable growth of the aviation sector. It also recognises aviation's vital importance to the UK, in terms of economic contribution, jobs, and the personal value it provides to individuals. In addition, it sets out key priorities for the next ten years, including a ten-point plan for delivery, and how the Government will work closely with the sector, including through the new Aviation Council, to implement the commitments established through this framework.

A1.16 The Government recognises that the sector is currently in the recovery stages and there are a number of challenges ahead.

Other relevant policy

A1.17 In addition to the above, the following documents set out airports policy relevant to the Project and have been considered, where appropriate, as part of the EIA process either within the scope of this assessment or in the process of producing the inputs used in this assessment:

- Beyond the Horizon: The Future of UK Aviation. Next Steps Towards an Aviation Strategy (HM Government, 2018b);
- Aviation Strategy Green Paper: Aviation 2050 – The Future of UK Aviation (Department for Transport, 2018b);
- The National Infrastructure Delivery Plan: 2016 2021 (Infrastructure and Projects Authority, 2016);
- Decarbonising Transport: A Better, Greener Britain (Department for Transport, 2021); and
- The Jet Zero Strategy (Department for Transport, 2022b).

Annex 2 Slow growth sensitivity

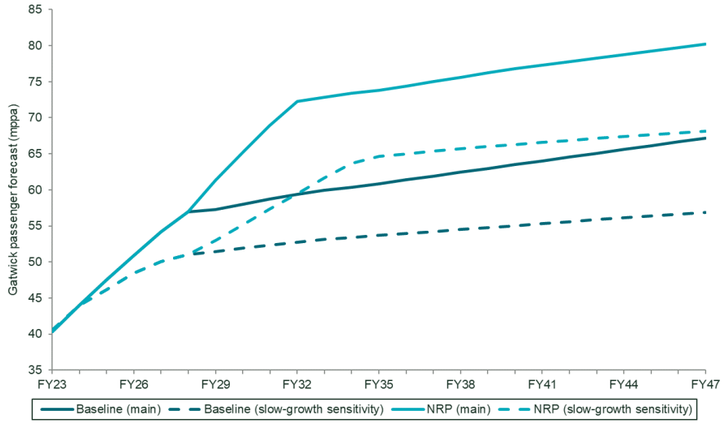
Introduction

A2.1 In addition to the passenger forecasts set out in section 4.4, ICF provided Oxera with a sensitivity scenario with a slower growth forecast for passengers at Gatwick. This slow growth forecast differs from the main forecast in the following three respects:

- it assumes a slower speed of recovery from COVID-19 such that air passenger demand will not return to pre-COVID-19 levels (i.e. 2019) until FY26/27 compared to FY24/25 in the main scenario;
- the additional capacity at Gatwick due to the Project is taken up at a more modest speed, and will not be filled until FY35 instead of FY32;
- in the longer term, it assumes a reduced level of growth at Gatwick (-15% compared to main scenario).

A2.2 Figure A2.1 shows the main and slow growth traffic forecasts for the baseline (without the Project) and NRP (with the Project) scenarios. Compared to the main traffic forecasts, the slow growth scenario forecasts lower passenger growth for both the baseline and NRP. For instance, in 2047, the main forecast of passengers is 67.2m in the baseline scenario and 80.2m in the NRP scenario; while in the slow growth forecast, the passenger numbers are lower at 56.8m in the baseline scenario and 68.1m in the NRP scenario.

Figure A2.1 Slow growth traffic forecasts for Gatwick Airport



Source: Oxera analysis based on ICF traffic data.

A2.3 This Annex presents the results of the local impacts analysis using the slow growth sensitivity passenger forecasts as an input. It then compares the results with the estimates from the main passenger forecast to illustrate the effect of long-term lower growth in demand on the expected economic impact of the Project.

A2.4 The assessment of this sensitivity case suggests that the Project is still expected to bring significant economic benefits to the UK economy even with the slower growth in passenger numbers. When compared to the main scenario presented in sections 5 and 6, it appears that lower passenger numbers have only a transitory effect on the economic benefits of the Project. In the longer term, there is no material difference between the economic footprint in the sensitivity scenario and the main scenario. Overall, slower traffic growth in the sensitivity scenario impacts only the timing of the benefits, but not the overall benefits from the Project, given that the NRP is still expected to be fully utilised in the long run.

A2.5 Separately, the core traffic forecasts used in this report and the sensitivity presented here both assume that there are no major capacity expansions at other London airports during the appraisal period. However, other capacity expansion schemes could affect the local economic impact of the Project quantified in this appendix.

A2.6 In particular, two expansion schemes may have an effect on the benefits of the Project: the planned development of Luton airport[55] and a third runway at Heathrow[56] (the 'R3' scheme).

A2.7 With respect to a Luton expansion, there is limited overlap between Gatwick and Luton airports' core catchment areas (i.e. the areas from which passengers are drawn). This suggests that capacity expansion at Luton is unlikely to have a material impact on the number of additional passengers resulting from the Project at Gatwick,[57] and would therefore have only a marginal effect on the local economic impact of the Project.

A2.8 With respect to a Heathrow expansion, R3 would lead to fewer additional passengers arising from the Project. However, as the sensitivity analysis presented in this section shows, to the extent that R3 only affects the timing within which NRP capacity will be fully utilised in the long run, then it is expected that the local economic benefits of the Project in this report would be realised under a R3 scenario, albeit under a delayed timeframe.

A2.9 The results of the slower growth sensitivity analyses for the economic 'footprint' are presented below.

Economic footprint - slow growth sensitivity

A2.10 Table A2.1 presents the results for the incremental 'footprint' of the Project (i.e. the additional value of the Gatwick Project over the baseline scenario), using the sensitivity forecasts. As in the main scenario, the results are presented for the four assessment years, 2029, 2032, 2038, and 2047, broken down by type of impact (direct, indirect, induced, and catalytic).

Table A2.1 Economic 'footprint' slow growth sensitivity—Six Authorities Area

	GVA				Employment			
	2029	2032	2038	2047	2029	2032	2038	2047
Direct	£28m	£126m	£226m	£251m	400	1,700	2,800	2,700
Indirect	£22m	£102m	£182m	£202m	300	1,400	2,400	2,400
Induced	£28m	£126m	£226m	£251m	400	1,800	3,000	3,000
Catalytic	£79m	£344m	£618m	£705m	1,200	4,900	8,200	8,300
Total	£157m	£698m	£1,252m	£1,408m	2,300	9,800	16,400	16,400

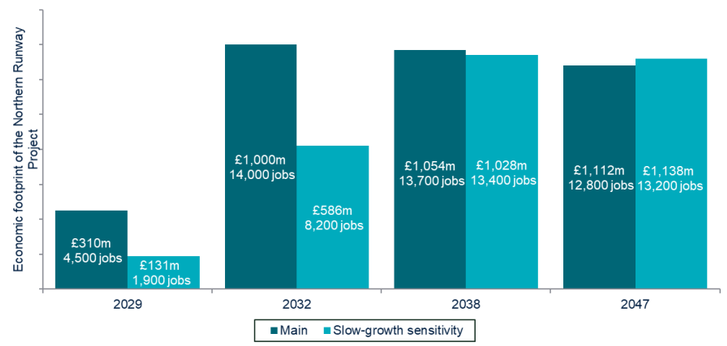
Note: Entries correspond to the incremental difference between the economic footprint of Gatwick with and without the Project. Values may not sum due to rounding. GVA is reported in 2022 prices. Employment figures are expressed as headcounts and are rounded to the nearest hundred.

Source: Oxera analysis.

A2.11 In the early years of the Project, the incremental economic 'footprint' is smaller compared to the main analysis, though it is still significant. For example, the estimates suggest that the Project will generate up to £131m GVA and 1,900 jobs in the Six Authorities Area in 2029. In the long run, the Project's economic footprint will increase to £1,028m GVA and 13,400 jobs in 2038, and £1,138m GVA and 13,200 jobs in 2047.

A2.12 Figure A2.2 compares the incremental economic 'footprint' between the main and slower growth sensitivity scenarios and shows how economic 'footprint' estimates in the sensitivity catch up to the main footprint estimates by 2038. The slower growth of passenger numbers will have its largest (contractionary) impact in the earlier years of the Project, i.e. 2029 and 2032, when traffic levels in the sensitivity are much lower than the main forecast scenario. In later years such as 2038, the economic 'footprint' in the sensitivity scenario starts to catch up the main scenario. By 2047, there is visibly no difference between the two scenarios.

Figure A2.2 Economic 'footprint' (main and slow-growth sensitivity scenarios)



Note: Entries correspond to the incremental difference between the economic footprint of Gatwick with and without the Project. Values may not sum due to rounding. GVA is reported in 2022 prices. Employment figures are expressed as headcounts and are rounded to the nearest hundred.

Source: Oxera analysis.

Conclusion on the sensitivity analysis

A2.13 The Project is still expected to generate significant economic impacts even when using the lower 'slower growth' sensitivity. Compared to the main scenario, there is a noticeable difference in the magnitude of impacts for a limited period of time, such as between 2029 and 2032, due to the slower growth in passenger numbers. However, by 2038 the impact in the sensitivity scenario largely catches up to the main scenario, and in the longer term there is no material difference between the economic impacts in the main scenario and the sensitivity scenario.

Annex 3 ICF direct employment methodology

A3.1 This Annex outlines the methodology that ICF adopted to estimate the direct employment on-site at Gatwick.

Background

A3.2 ICF has provided forecasts of direct employment at Gatwick in the four assessment years: 2029, 2032, 2038, and 2047. The baseline used for the forecasting exercise is the 'Gatwick Employer & Travel to Work Survey', which was last conducted in 2015–16. Conducted every four years pre-pandemic, this survey aims to capture trends in overall levels of employment and the range of job functions at the airport.[58]

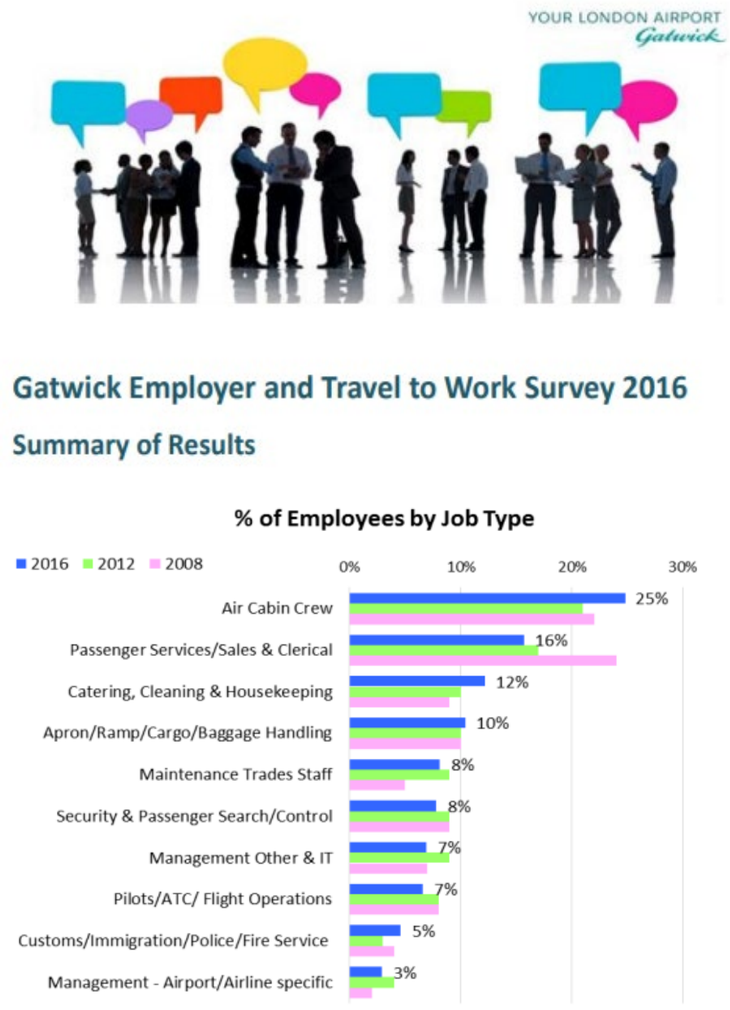
[55] Luton Airport has proposed to increase the capacity of the airport to 32 mppa by expanding terminal capacity, with new terminal infrastructure planned for opening in the late 2030s. See Luton Rising (2023), 'London Luton Airport Expansion: Volume 7 Other Documents – 7.04 Need Case', February.

[56] A proposed third runway at Heathrow was adopted as UK government policy in 2018. See Department for Transport (2018), 'Airports National Policy Statement: new runway capacity and infrastructure at airports in the South East of England', June.

[57] See **Needs Case** (Doc Ref. 7.2), section 6 for further details.

[58] The Travel to Work Survey has not been updated since the 2015–16 edition used as a baseline. A planned update in 2020 was rescheduled due to the impact of the COVID-19

Figure A3.1 Gatwick employer survey and baseline breakdown of job functions



Note: No update is available relating to baseline numbers since the 2015–16 survey.

Source: Gatwick Employer & Travel to Work Survey.

Approach

A3.3 The first step in ICF's forecasting exercise was to split the direct on-site employment data in 2016 into various job function groups, e.g. Air Cabin Crew and Airport/Airline Management. This is to provide a baseline from which to forecast the employment growth at the airport.

A3.4 In the second step, an appropriate air traffic metric was chosen for each job function group. This metric is used to determine future employment growth of the corresponding job function group. For example, ground handling staff are most closely linked to ATMs, while cleaning staff are more closely linked to passenger volumes. Then, the employment elasticity to the traffic metric (that is, the ratio of employment growth to traffic growth) is estimated based on historical patterns and experience at other airports.

A3.5 In addition, the forecast considers a reasonable degree of productivity improvement, depending on the nature of the job and advances in technologies. In particular, ICF imposes the following assumptions about the ongoing efficiency improvements.

- Ground handling technologies, such as autonomous vehicles and terminal robots, will improve operational efficiencies on the ground. Ongoing increases in average aircraft sizes may lead to additional efficiencies, as many job functions are primarily driven by (the number of) aircraft movements rather than passenger volumes.
- Passenger & baggage processing technologies will continue to make the security and customs / immigration processes more efficient. For example, significant developments have been introduced to improve the check-in experience of passengers, and in the long term, there will be opportunities to use remote technologies to support security processes.
- Passenger efficiencies should continue to be realised in many job categories as a result of the relative fixed nature of these job functions. For example, Airline/Airport management and IT functions are expected to scale at a fraction of the passenger growth.
- The growth of away-based carriers, which typically rely on non-UK based staff for much of their operation (e.g. Pilots/Cabin Crew), may lead to less-than-proportionate increases in direct employment than air passenger numbers.

A3.6 Table A3.1 summarises the air traffic metric (i.e. the main driver of growth) assumed for each job category, as well as the corresponding elasticity between employment growth and the air traffic metrics.

Table A3.1 Assumption on the air traffic metric and elasticity for each job category

Job category	Air traffic metric	Resulting elasticity
Air Cabin Crew	Passengers	0.60
Airline/Airport Management	Passengers	0.37
Apron, Ramp, Cargo, Baggage Handling and Drivers	ATMs	0.35
Catering, Cleaning and Housekeeping	Passengers	0.72
Customs, Immigration, Police and Fire Staff	Passengers	0.76
Information Technology	Passengers	0.32
Maintenance Tradespeople	Passengers	0.48
Management and Professional - General	Passengers	0.23
Passenger Services/Sales and Clerical Staff	Passengers	0.19
Pilots/Air Traffic Control/Flight Operations	ATMs	0.53
Security, Passenger Search, Security Access Control	Passengers	0.55
Passengers/ATMs		0.46

Source: ICF.

A3.7 In the final step, employment in each job function group is estimated by applying the employment elasticity to the relevant air traffic metrics for each spot year. These are then summed up to reach the overall level of direct employment at the airport.

pandemic on airport activities. Recent estimates of employment on-site at the airport derived from passholder data however corroborate the results of the analysis based on the Travel to Work Survey.

Output

A3.8 Table A3.1 below summarises the estimated direct employment for the baseline and NRP scenarios for the four assessment years.

A3.9 Under the baseline scenario, direct employment at Gatwick will grow from around 24,000 jobs in 2016 to nearly 30,000 jobs in 2047; while in the NRP scenario direct employment will reach almost 33,000 by 2047.

Table A3.2 On-airport employment (by type)

	2016 Survey	2029		2032		2038		2047	
		Baseline	NRP	Baseline	NRP	Baseline	NRP	Baseline	NRP
Air Cabin Crew	5,791	7,066	7,378	7,227	8,225	7,464	8,481	7,791	8,775
Airline/Airport Management	671	756	777	767	834	783	851	805	871
Apron, Ramp, Cargo, Baggage Handling and Drivers	2,434	2,549	2,605	2,556	2,744	2,571	2,754	2,588	2,760
Catering, Cleaning and Housekeeping	3,061	3,896	4,101	4,001	4,656	4,157	4,823	4,371	5,016
Customs, Immigration, Police and Fire Staff	1,073	1,383	1,459	1,422	1,665	1,480	1,727	1,559	1,799
Information Technology	234	260	266	263	283	268	288	274	294
Maintenance Tradespeople	1,899	2,227	2,308	2,269	2,526	2,330	2,592	2,414	2,667
Management and Professional - General	1,374	1,480	1,506	1,493	1,577	1,513	1,598	1,541	1,623
Passenger Services/Sales and Clerical Staff	3,915	4,158	4,218	4,189	4,380	4,234	4,429	4,297	4,485
Pilots/Air Traffic Control/Flight Operations	1,533	1,645	1,700	1,652	1,836	1,667	1,846	1,684	1,852
Security, Passenger Search, Security Access Control	1,822	2,189	2,278	2,235	2,522	2,303	2,596	2,397	2,680
Total	**23,807**	**27,609**	**28,596**	**28,077**	**31,199**	**28,770**	**31,985**	**29,721**	**32,822**

Source: ICF.

Annex 4 Footprint employment disaggregated by local authority district

A4.1 To inform Lichfields' analysis as part of the Socio-Economic Chapter, disaggregated estimates of the employment footprint for each LAD within the Six Authorities Area have been produced.

A4.2 Table A4.1 summarises the methodology used to disaggregate employment estimates at a LAD level.

Table A4.1 Disaggregation into LAD level estimates

	Disaggregation methodology
Direct	Disaggregated at a LAD level on the basis of residency of on-site employees (GAL survey).
Indirect	Disaggregated at a LAD level on the basis of job location (ie where employees work) using the distribution of GVA calculated across LADs in each study area based on ONS data on GVA per LAD.
Induced	Disaggregated at a LAD level on the basis of residency of on-site employees (GAL survey).
Catalytic	Disaggregated at a LAD level on the basis of job location (ie where employees work) using the percentage of passengers departing from Gatwick originating from each LAD (CAA passenger survey).

Source: Oxera.

Table A4.2 Incremental employment generated by the Project (net figure)

Geography	Incremental impact: direct				Incremental impact: indirect				Incremental impact: induced				Incremental impact: catalytic				Incremental impact: indirect/induced/catalytic				Incremental impact: total			
	2029	2032	2038	2047	2029	2032	2038	2047	2029	2032	2038	2047	2029	2032	2038	2047	2029	2032	2038	2047	2029	2032	2038	2047
Adur	11	37	37	36	6	19	20	19	6	19	19	19	32	97	91	83	44	135	130	120	55	172	168	157
Arun	14	45	45	44	12	38	39	38	7	23	24	23	69	211	199	180	88	272	261	241	102	316	307	284
Ashford	2	8	8	8	13	43	44	42	1	4	4	4	34	105	99	90	49	152	147	136	52	160	155	144
Brighton and Hove	46	147	149	144	30	94	97	93	24	75	77	75	311	956	900	817	365	1,125	1,074	985	410	1,272	1,223	1,129
Canterbury	2	5	5	5	11	36	37	36	1	3	3	3	64	197	186	169	77	236	226	207	78	241	231	212
Chichester	6	18	18	18	15	49	50	48	3	9	10	9	63	193	182	165	81	251	242	223	87	269	260	241
Crawley	275	883	894	863	53	167	172	166	143	452	465	449	95	292	275	250	291	910	912	864	565	1,793	1,807	1,727
Croydon	42	137	138	133	33	106	109	105	22	70	72	69	193	594	559	508	249	770	740	682	291	906	879	816
Dartford	2	7	7	7	14	46	47	45	1	3	4	3	33	102	96	87	49	151	146	136	51	158	153	142
Dover	1	4	4	4	8	25	25	24	1	2	2	2	31	95	89	81	39	122	117	108	41	126	121	112
Eastbourne	11	34	34	33	8	24	25	24	5	17	18	17	60	185	174	158	73	226	217	199	84	260	251	232
Elmbridge	3	11	11	11	20	64	66	64	2	6	6	6	62	190	179	162	84	259	250	231	87	270	261	242
Epsom and Ewell	4	12	12	12	14	45	46	44	2	6	6	6	44	134	127	115	60	185	179	165	64	197	191	177
Gravesham	2	8	8	8	7	22	23	22	1	4	4	4	31	95	89	81	39	121	116	107	42	129	124	115
Guildford	5	15	15	14	25	80	82	79	2	7	8	7	84	257	242	220	111	344	332	307	116	359	347	321
Hastings	2	6	6	6	7	22	22	21	1	3	3	3	32	98	92	84	40	122	117	108	41	128	123	113
Horsham	62	201	203	196	30	96	99	96	32	103	106	102	115	354	333	303	178	553	538	500	241	753	741	696
Lewes	14	46	47	45	8	27	27	26	8	24	24	24	68	209	197	179	84	259	249	229	98	306	296	274
Maidstone	5	16	16	15	16	51	53	51	3	8	8	8	67	206	194	176	86	265	255	235	91	281	271	250
Mid Sussex	71	229	232	224	29	91	94	91	37	117	121	116	106	324	305	277	171	533	520	484	243	762	752	708
Mole Valley	13	42	43	41	27	85	88	85	7	22	22	21	58	178	168	152	92	285	278	258	105	327	320	299
Reigate and Banstead	75	241	245	236	38	119	123	118	39	124	127	123	112	342	323	293	188	585	572	534	263	826	817	770
Rother	4	12	12	11	7	23	24	23	2	6	6	6	43	133	125	113	52	161	155	142	56	173	166	153
Runnymede	3	9	9	9	19	59	61	59	2	5	5	5	30	91	86	78	50	155	152	142	53	164	161	151
Sevenoaks	5	16	16	16	14	44	46	44	3	8	9	8	63	193	182	165	80	246	237	218	85	262	253	234
Folkestone & Hythe	1	4	4	4	10	31	32	31	1	2	2	2	34	105	99	90	45	139	134	123	46	143	138	127
Spelthorne	4	13	13	13	13	40	41	40	2	7	7	7	19	58	55	50	34	105	103	96	38	118	116	109
Surrey Heath	3	11	11	10	17	54	55	53	2	5	6	5	37	115	108	98	56	174	169	157	59	185	180	168
Swale	2	8	8	8	13	41	43	41	1	4	4	4	42	130	122	111	57	175	169	156	59	183	177	164
Tandridge	19	62	63	60	16	51	53	51	10	32	33	31	61	188	177	160	87	270	262	243	107	332	325	303
Thanet	2	5	5	5	9	27	28	27	1	3	3	3	36	111	105	95	46	141	135	124	47	146	140	129
Tonbridge and Malling	5	16	16	16	18	57	58	56	3	8	8	8	48	148	139	127	69	213	206	191	74	229	223	207
Tunbridge Wells	5	15	15	14	17	54	55	53	2	7	8	7	62	192	180	164	82	253	243	224	86	267	258	239
Waverley	5	15	15	15	16	51	53	51	2	8	8	8	49	150	141	128	68	209	202	187	72	224	217	202
Wealden	20	64	65	63	12	37	38	37	10	33	34	33	87	268	252	229	109	338	324	299	129	402	389	361
Woking	3	10	10	10	17	55	56	54	2	5	5	5	36	110	104	94	55	170	165	154	58	180	175	163
Worthing	16	52	53	51	13	42	43	41	8	27	28	27	61	187	176	160	82	255	246	228	99	307	299	279
Local Study Area	**293**	**942**	**955**	**921**	**63**	**199**	**205**	**198**	**152**	**482**	**497**	**479**	**128**	**392**	**369**	**335**	**343**	**1,073**	**1,071**	**1,012**	**636**	**2,015**	**2,026**	**1,933**
FEMA	**408**	**1,312**	**1,330**	**1,283**	**112**	**354**	**365**	**352**	**212**	**671**	**692**	**667**	**316**	**970**	**914**	**829**	**640**	**1,996**	**1,970**	**1,849**	**1,049**	**3,308**	**3,300**	**3,131**

Geography	Incremental impact: direct				Incremental impact: indirect				Incremental impact: induced				Incremental impact: catalytic				Incremental impact: indirect/induced/catalytic				Incremental impact: total			
	2029	2032	2038	2047	2029	2032	2038	2047	2029	2032	2038	2047	2029	2032	2038	2047	2029	2032	2038	2047	2029	2032	2038	2047
Labour Market Area	**690**	**2,219**	**2,249**	**2,169**	**315**	**996**	**1,026**	**990**	**359**	**1,136**	**1,170**	**1,128**	**1,428**	**4,384**	**4,129**	**3,748**	**2,102**	**6,515**	**6,325**	**5,866**	**2,792**	**8,734**	**8,574**	**8,035**
Six Authorities Area	**766**	**2,461**	**2,494**	**2,405**	**637**	**2,014**	**2,075**	**2,001**	**398**	**1,259**	**1,297**	**1,251**	**2,473**	**7,593**	**7,152**	**6,491**	**3,508**	**10,866**	**10,524**	**9,744**	**4,273**	**13,327**	**13,017**	**12,149**
National	**987**	**3,122**	**3,215**	**3,101**	**863**	**2,730**	**2,812**	**2,713**	**1,073**	**3,392**	**3,495**	**3,371**	**2,473**	**7,593**	**7,152**	**6,491**	**4,409**	**13,715**	**13,459**	**12,575**	**5,396**	**16,837**	**16,674**	**15,676**

Source: Oxera (2023).

Table A4.3 Incremental GVA Generated by the Project (millions, Net Figure)

Geography	Incremental impact: direct				Incremental impact: indirect				Incremental impact: induced				Incremental impact: catalytic				Incremental impact: indirect/induced/catalytic				Incremental impact: total			
	2029	2032	2038	2047	2029	2032	2038	2047	2029	2032	2038	2047	2029	2032	2038	2047	2029	2032	2038	2047	2029	2032	2038	2047
Adur	£0.8	£2.6	£2.8	£3.1	£0.4	£1.3	£1.5	£1.6	£0.4	£1.3	£1.5	£1.6	£2.1	£6.8	£6.9	£7.0	£2.9	£9.4	£9.8	£10.2	£3.7	£12.0	£12.6	£13.3
Arun	£0.9	£3.1	£3.4	£3.7	£0.8	£2.7	£3.0	£3.2	£0.5	£1.6	£1.8	£1.9	£4.7	£14.8	£14.9	£15.3	£6.0	£19.1	£19.7	£20.4	£6.9	£22.2	£23.1	£24.1
Ashford	£0.2	£0.6	£0.6	£0.7	£0.9	£3.0	£3.3	£3.6	£0.1	£0.3	£0.3	£0.3	£2.3	£7.4	£7.5	£7.6	£3.3	£10.7	£11.1	£11.6	£3.5	£11.2	£11.7	£12.2
Brighton and Hove	£3.1	£10.3	£11.2	£12.2	£2.0	£6.6	£7.3	£7.9	£1.6	£5.3	£5.8	£6.3	£21.1	£67.0	£67.7	£69.3	£24.7	£78.9	£80.8	£83.5	£27.8	£89.2	£92.0	£95.7
Canterbury	£0.1	£0.4	£0.4	£0.4	£0.8	£2.5	£2.8	£3.0	£0.1	£0.2	£0.2	£0.2	£4.4	£13.8	£14.0	£14.3	£5.2	£16.6	£17.0	£17.6	£5.3	£16.9	£17.4	£18.0
Chichester	£0.4	£1.3	£1.4	£1.5	£1.0	£3.4	£3.8	£4.1	£0.2	£0.6	£0.7	£0.8	£4.3	£13.6	£13.7	£14.0	£5.5	£17.6	£18.2	£18.9	£5.9	£18.9	£19.6	£20.4
Crawley	£18.6	£61.9	£67.3	£73.2	£3.6	£11.7	£12.9	£14.0	£9.7	£31.7	£35.0	£38.1	£6.4	£20.5	£20.7	£21.2	£19.7	£63.8	£68.6	£73.3	£38.3	£125.7	£135.9	£146.4
Croydon	£2.9	£9.6	£10.4	£11.3	£2.3	£7.4	£8.2	£8.9	£1.5	£4.9	£5.4	£5.9	£13.1	£41.7	£42.1	£43.1	£16.9	£54.0	£55.7	£57.9	£19.8	£63.5	£66.1	£69.2
Dartford	£0.1	£0.5	£0.5	£0.6	£1.0	£3.2	£3.5	£3.9	£0.1	£0.2	£0.3	£0.3	£2.2	£7.1	£7.2	£7.4	£3.3	£10.6	£11.0	£11.5	£3.4	£11.1	£11.5	£12.1
Dover	£0.1	£0.3	£0.3	£0.3	£0.5	£1.7	£1.9	£2.1	£0.0	£0.1	£0.2	£0.2	£2.1	£6.6	£6.7	£6.9	£2.7	£8.5	£8.8	£9.1	£2.8	£8.8	£9.1	£9.5
Eastbourne	£0.7	£2.4	£2.6	£2.8	£0.5	£1.7	£1.9	£2.0	£0.4	£1.2	£1.3	£1.5	£4.1	£13.0	£13.1	£13.4	£5.0	£15.9	£16.3	£16.9	£5.7	£18.2	£18.9	£19.7
Elmbridge	£0.2	£0.8	£0.8	£0.9	£1.4	£4.5	£5.0	£5.4	£0.1	£0.4	£0.4	£0.5	£4.2	£13.3	£13.4	£13.7	£5.7	£18.2	£18.8	£19.6	£5.9	£18.9	£19.7	£20.5
Epsom and Ewell	£0.3	£0.8	£0.9	£1.0	£1.0	£3.1	£3.5	£3.8	£0.1	£0.4	£0.5	£0.5	£3.0	£9.4	£9.5	£9.7	£4.1	£13.0	£13.5	£14.0	£4.3	£13.8	£14.4	£15.0
Gravesham	£0.2	£0.6	£0.6	£0.7	£0.5	£1.6	£1.7	£1.9	£0.1	£0.3	£0.3	£0.3	£2.1	£6.6	£6.7	£6.9	£2.7	£8.5	£8.8	£9.1	£2.8	£9.0	£9.4	£9.7
Guildford	£0.3	£1.0	£1.1	£1.2	£1.7	£5.6	£6.2	£6.7	£0.2	£0.5	£0.6	£0.6	£5.7	£18.0	£18.2	£18.7	£7.5	£24.2	£25.0	£26.0	£7.9	£25.2	£26.1	£27.2
Hastings	£0.1	£0.4	£0.4	£0.5	£0.5	£1.5	£1.7	£1.8	£0.1	£0.2	£0.2	£0.2	£2.2	£6.9	£6.9	£7.1	£2.7	£8.6	£8.8	£9.1	£2.8	£9.0	£9.2	£9.6
Horsham	£4.2	£14.1	£15.3	£16.6	£2.1	£6.7	£7.4	£8.1	£2.2	£7.2	£8.0	£8.6	£7.8	£24.8	£25.1	£25.7	£12.1	£38.8	£40.5	£42.4	£16.3	£52.8	£55.8	£59.0
Lewes	£1.0	£3.3	£3.5	£3.8	£0.6	£1.9	£2.1	£2.2	£0.5	£1.7	£1.8	£2.0	£4.6	£14.7	£14.8	£15.1	£5.7	£18.2	£18.7	£19.4	£6.7	£21.4	£22.2	£23.2
Maidstone	£0.3	£1.1	£1.2	£1.3	£1.1	£3.6	£4.0	£4.3	£0.2	£0.6	£0.6	£0.7	£4.5	£14.5	£14.6	£14.9	£5.8	£18.6	£19.2	£19.9	£6.1	£19.7	£20.4	£21.2
Mid Sussex	£4.8	£16.1	£17.5	£19.0	£2.0	£6.4	£7.1	£7.7	£2.5	£8.2	£9.1	£9.9	£7.2	£22.7	£23.0	£23.5	£11.6	£37.4	£39.1	£41.1	£16.4	£53.4	£56.6	£60.0
Mole Valley	£0.9	£3.0	£3.2	£3.5	£1.8	£6.0	£6.6	£7.2	£0.5	£1.5	£1.7	£1.8	£3.9	£12.5	£12.6	£12.9	£6.2	£20.0	£20.9	£21.9	£7.1	£22.9	£24.1	£25.4
Reigate and Banstead	£5.1	£16.9	£18.4	£20.0	£2.5	£8.3	£9.2	£10.0	£2.6	£8.7	£9.6	£10.4	£7.6	£24.0	£24.3	£24.8	£12.8	£41.0	£43.1	£45.3	£17.8	£58.0	£61.5	£65.3
Rother	£0.2	£0.8	£0.9	£1.0	£0.5	£1.6	£1.8	£1.9	£0.1	£0.4	£0.5	£0.5	£2.9	£9.3	£9.4	£9.6	£3.5	£11.3	£11.6	£12.0	£3.8	£12.1	£12.5	£13.0
Runnymede	£0.2	£0.7	£0.7	£0.8	£1.3	£4.2	£4.6	£5.0	£0.1	£0.3	£0.4	£0.4	£2.0	£6.4	£6.4	£6.6	£3.4	£10.9	£11.4	£12.0	£3.6	£11.5	£12.1	£12.8
Sevenoaks	£0.3	£1.1	£1.2	£1.3	£1.0	£3.1	£3.4	£3.7	£0.2	£0.6	£0.6	£0.7	£4.3	£13.6	£13.7	£14.0	£5.4	£17.3	£17.8	£18.5	£5.7	£18.4	£19.0	£19.8
Folkestone & Hythe	£0.1	£0.3	£0.3	£0.4	£0.7	£2.2	£2.4	£2.6	£0.0	£0.2	£0.2	£0.2	£2.3	£7.4	£7.5	£7.6	£3.0	£9.7	£10.0	£10.4	£3.1	£10.0	£10.4	£10.8
Spelthorne	£0.3	£0.9	£1.0	£1.1	£0.9	£2.8	£3.1	£3.4	£0.1	£0.5	£0.5	£0.6	£1.3	£4.1	£4.1	£4.2	£2.3	£7.4	£7.8	£8.2	£2.6	£8.3	£8.7	£9.2
Surrey Heath	£0.2	£0.7	£0.8	£0.9	£1.2	£3.8	£4.2	£4.5	£0.1	£0.4	£0.4	£0.5	£2.5	£8.1	£8.2	£8.3	£3.8	£12.2	£12.7	£13.3	£4.0	£13.0	£13.5	£14.2
Swale	£0.2	£0.6	£0.6	£0.7	£0.9	£2.9	£3.2	£3.5	£0.1	£0.3	£0.3	£0.3	£2.9	£9.1	£9.2	£9.4	£3.8	£12.3	£12.7	£13.2	£4.0	£12.8	£13.3	£13.9
Tandridge	£1.3	£4.3	£4.7	£5.1	£1.1	£3.6	£4.0	£4.3	£0.7	£2.2	£2.5	£2.7	£4.1	£13.2	£13.3	£13.6	£5.9	£19.0	£19.7	£20.6	£7.2	£23.3	£24.4	£25.7
Thanet	£0.1	£0.4	£0.4	£0.4	£0.6	£1.9	£2.1	£2.3	£0.1	£0.2	£0.2	£0.2	£2.5	£7.8	£7.9	£8.1	£3.1	£9.9	£10.2	£10.5	£3.2	£10.2	£10.6	£11.0
Tonbridge and Malling	£0.3	£1.1	£1.2	£1.3	£1.2	£4.0	£4.4	£4.8	£0.2	£0.6	£0.6	£0.7	£3.3	£10.4	£10.5	£10.7	£4.7	£14.9	£15.5	£16.2	£5.0	£16.1	£16.7	£17.5
Tunbridge Wells	£0.3	£1.0	£1.1	£1.2	£1.1	£3.8	£4.2	£4.5	£0.2	£0.5	£0.6	£0.6	£4.2	£13.4	£13.6	£13.9	£5.5	£17.7	£18.3	£19.0	£5.8	£18.7	£19.4	£20.2

Geography	Incremental impact: direct				Incremental impact: indirect				Incremental impact: induced				Incremental impact: catalytic				Incremental impact: indirect/induced/catalytic				Incremental impact: total			
	2029	2032	2038	2047	2029	2032	2038	2047	2029	2032	2038	2047	2029	2032	2038	2047	2029	2032	2038	2047	2029	2032	2038	2047
Waverley	£0.3	£1.0	£1.1	£1.2	£1.1	£3.6	£4.0	£4.3	£0.2	£0.5	£0.6	£0.6	£3.3	£10.5	£10.6	£10.9	£4.6	£14.7	£15.2	£15.8	£4.9	£15.7	£16.3	£17.1
Wealden	£1.4	£4.5	£4.9	£5.3	£0.8	£2.6	£2.9	£3.1	£0.7	£2.3	£2.5	£2.8	£5.9	£18.8	£19.0	£19.4	£7.4	£23.7	£24.4	£25.3	£8.8	£28.2	£29.3	£30.6
Woking	£0.2	£0.7	£0.7	£0.8	£1.2	£3.8	£4.2	£4.6	£0.1	£0.4	£0.4	£0.4	£2.4	£7.7	£7.8	£8.0	£3.7	£11.9	£12.4	£13.0	£3.9	£12.6	£13.2	£13.8
Worthing	£1.1	£3.7	£4.0	£4.3	£0.9	£2.9	£3.2	£3.5	£0.6	£1.9	£2.1	£2.2	£4.1	£13.1	£13.2	£13.5	£5.6	£17.9	£18.5	£19.3	£6.7	£21.5	£22.5	£23.6
Local Study Area	**£19.9**	**£66.1**	**£71.8**	**£78.1**	**£4.3**	**£14.0**	**£15.5**	**£16.8**	**£10.3**	**£33.8**	**£37.4**	**£40.6**	**£8.6**	**£27.5**	**£27.8**	**£28.4**	**£23.3**	**£75.3**	**£80.6**	**£85.8**	**£43.1**	**£141.3**	**£152.4**	**£163.9**
FEMA	**£27.7**	**£92.0**	**£100.0**	**£108.7**	**£7.6**	**£24.8**	**£27.4**	**£29.8**	**£14.4**	**£47.1**	**£52.0**	**£56.6**	**£21.4**	**£68.0**	**£68.8**	**£70.3**	**£43.4**	**£140.0**	**£148.2**	**£156.7**	**£71.1**	**£232.0**	**£248.3**	**£265.5**
Labour Market Area	**£46.8**	**£155.6**	**£169.2**	**£183.9**	**£21.3**	**£69.8**	**£77.2**	**£83.9**	**£24.3**	**£79.6**	**£88.0**	**£95.7**	**£96.8**	**£307.5**	**£310.7**	**£317.8**	**£142.4**	**£456.9**	**£475.8**	**£497.4**	**£189.2**	**£612.5**	**£645.0**	**£681.3**
Six Authorities Area	**£51.9**	**£172.6**	**£187.6**	**£203.9**	**£43.2**	**£141.2**	**£156.1**	**£169.7**	**£27.0**	**£88.3**	**£97.6**	**£106.1**	**£167.6**	**£532.5**	**£538.0**	**£550.4**	**£237.7**	**£762.0**	**£791.7**	**£826.1**	**£289.6**	**£934.6**	**£979.3**	**£1,030.1**
National	**£72.7**	**£237.8**	**£262.8**	**£285.7**	**£58.5**	**£191.4**	**£211.5**	**£230.0**	**£72.7**	**£237.9**	**£262.9**	**£285.8**	**£167.6**	**£532.5**	**£538.0**	**£550.4**	**£298.8**	**£961.8**	**£1,012.5**	**£1,066.2**	**£371.4**	**£1,199.6**	**£1,275.3**	**£1,351.9**

Source: Oxera (2023).

Table A4.4 Gatwick baseline impact in terms of employment and GVA in 2019

Geography	Baseline impact: employment			Baseline impact: GVA (millions)		
	Direct	Indirect	Induced	Direct	Indirect	Induced
Adur	280	146	145	£18m	£9m	£9m
Arun	339	292	175	£21m	£18m	£11m
Ashford	60	327	31	£4m	£20m	£2m
Brighton and Hove	1,116	720	576	£70m	£45m	£36m
Canterbury	39	277	20	£2m	£17m	£1m
Chichester	137	373	71	£9m	£23m	£4m
Crawley	6,704	1,277	3,463	£419m	£80m	£216m
Croydon	1,037	811	536	£65m	£51m	£33m
Dartford	52	351	27	£3m	£22m	£2m
Dover	32	189	16	£2m	£12m	£1m
Eastbourne	257	184	133	£16m	£12m	£8m
Elmbridge	82	492	42	£5m	£31m	£3m
Epsom and Ewell	90	343	47	£6m	£21m	£3m
Gravesham	60	171	31	£4m	£11m	£2m
Guildford	110	611	57	£7m	£38m	£4m
Hastings	43	165	22	£3m	£10m	£1m
Horsham	1,523	737	787	£95m	£46m	£49m
Lewes	352	204	182	£22m	£13m	£11m
Maidstone	119	393	62	£7m	£25m	£4m
Mid Sussex	1,739	700	898	£109m	£44m	£56m
Mole Valley	320	653	165	£20m	£41m	£10m
Reigate and Banstead	1,834	912	947	£115m	£57m	£59m
Rother	88	176	45	£5m	£11m	£3m
Runnymede	71	456	37	£4m	£28m	£2m
Sevenoaks	123	341	63	£8m	£21m	£4m
Folkestone & Hythe	33	238	17	£2m	£15m	£1m
Spelthorne	99	309	51	£6m	£19m	£3m

Surrey Heath	80	412	41	£5m	£26m	£3m
Swale	61	317	31	£4m	£20m	£2m
Tandridge	469	392	242	£29m	£25m	£15m
Thanet	38	206	20	£2m	£13m	£1m
Tonbridge and Malling	122	435	63	£8m	£27m	£4m
Tunbridge Wells	110	411	57	£7m	£26m	£4m
Waverley	114	395	59	£7m	£25m	£4m
Wealden	487	284	252	£30m	£18m	£16m
Woking	74	419	38	£5m	£26m	£2m
Worthing	396	319	205	£25m	£20m	£13m
Six Authorities Area	**18,689**	**15,440**	**9,654**	**£1,168m**	**£965m**	**£603m**
National	**24,094**	**20,928**	**26,009**	**£1,625m**	**£1,308m**	**£1,626m**

Note: Catalytic impact estimates are not provided as they are estimated for the incremental impact of the Project.

Source: Oxera (2023).

Annex 5 Airport activity and local employment in the UK

Introduction

A5.1 This Annex describes the elasticity analysis of the effect of changes in air traffic on local employment in the UK. This analysis is undertaken by replicating an approach used in academic literature with UK data.

A5.2 Increased activity at an airport is expected to have impacts on local and national economies through different mechanisms. In particular, changes in airport activity can typically lead to changes in gross and net local employment, through the four channels of direct, indirect, induced, and catalytic employment.

A5.3 Direct, indirect, and induced gross employment can be estimated using various methodologies, for example surveys and input-output approaches.[59] However, estimation of the total net employment impact, i.e. including catalytic employment and within-region displacement, requires the use of econometric methods. This is due to the absence of extensive surveys to capture catalytic employment impacts and the consequential displacement within an airport's local area.

A5.4 Academic econometric studies analyse the impact of air traffic on employment using a variety of data types and approaches. Overall, these studies conclude that increased air traffic activity is positively associated with increased local employment—the estimated change in regional employment resulting from a unit percentage change in air traffic ranges from 0.02% to 0.18%.

A5.5 Table A5.1 outlines the data types, approaches, and conclusions of these studies. Note that none of these studies uses UK data.

Table A5.1 Literature on positive association between increased air traffic and local employment

	Data type	Approach	Conclusion
Button et al.[1]	Cross-section of US cities	Ordinary least squares	Having a hub airport in a region is associated with, on average, a 71.6% increase in employment in the high-technology sector.
Poort et al.[2]	Pooled panel of European airports	Three-stage estimation	A 1% increase in air traffic increases net local employment in the service sector by 0.18%.
Green[3]	Panel of US metropolitan areas	Two-stage estimation	Passenger activity is a powerful predictor of local employment growth. A 1 standard-deviation increase in air traffic increases local employment growth each decade by 9%. Employment growth each decade in cities with hub airports is higher by 8.4–13.2%.
Brueckner[4]	Cross-section of US metropolitan areas	Two-stage estimation	A 1% increase in air traffic increases net total local employment by 0.09% and net local employment in the service sector by 0.11%.
Blonigen[5]	Panel of US metropolitan areas	Ordinary least squares	A 1% increase in air traffic growth increases net local employment growth by 0.07%.
Percoco[6]	Cross-section of Italian cities	Two-stage estimation with a non-linear first stage and a linear second stage	A 1% increase in air traffic increases net total local employment by 0.02% and net local employment in the service sector by 0.04%. It also has spillover effects on the net total employment level and the service employment level in neighbouring regions by 0.01% and 0.02%, respectively.

Note: A cross-sectional data is a collection of different observations at a point in time. A panel data instead follows the same units of observations, for example cities, over time. A pooled panel assumes observations for the same panel unit are independent from each other.
[1] Button, K., Lall, S., Stough, R. and Trice, M. (1999), 'High-technology employment and hub airports', *Journal of Air Transport Management*, **5**:1, January, pp. 53–59. [2] Poort, J.P., Sadiraj, K. and van Woerkens C.M. (2000), 'Hub, of spokestad? regional-economische effecten van luchthavens', NYFER, p. 14. [3] Green, R.K. (2007), 'Airports and Economic Development', *Real Estate Economics*, **35**:1, February, pp. 91–112. [4] Brueckner, J.K. (2003), 'Airline Traffic and Urban Economic Development', *Urban Studies*, **40**:8, July, pp. 1455–1469. [5] Blonigen, B.A. (2012), 'Airports and Urban Growth: Evidence from a Quasi-Natural Policy Experiment', NBER Working Paper No: 18278, August, p. 34. [6] Percoco, M. (2010), 'Airport Activity and Local Development: Evidence from Italy, *Urban Studies*, **47**:11, September, pp. 2427–2443.

Source: Oxera.

A5.6 In the absence of UK-specific evidence, the results of Percoco's study (which is a variation of Brueckner's study) summarised in Table A5.1 is used as a proxy to assess the local employment impact of an airport in the UK.[60] The approach in Percoco's study is particularly suitable to use in the current context, for a number of reasons:

- it relies on publicly available cross-sectional data that can also be collected for the UK;
- it enables the use of a larger sample size by providing a way to keep spatial units, or locations, for example counties, without active airports in the estimation data.
- it uses a two-stage estimation method to address endogeneity between air traffic and local employment;[61]
- it only allows for the prediction of non-negative passenger numbers in the first stage of the estimation process, which is more in line with reality.

A5.7 Percoco's econometric model, the UK data used, and the results of the current analysis are described in more detail below. The analysis suggests that there is evidence that increased air traffic has a positive impact on local employment levels in the UK. In particular, a unit percentage increase in air traffic increases local employment by 0.13–0.14% on average throughout the UK.[62]

[59] InterVISTAS (2015), 'Economic Impact of European Airports A critical Catalyst to Economic Growth', prepared for ACI Europe, pp. 13–16.
[60] Percoco, M. (2010), 'Airport Activity and Local Development: Evidence from Italy, *Urban Studies*, **47**:11, September, pp. 2427–2443. Percoco's approach is based on Brueckner's approach but alters it in the first stage to allow using locations without active airports and to prevent potentially negative predictions for passenger numbers. Oxera previously used this study as a proxy for the UK to assess the local economic impact of an airport in the UK.
[61] Endogeneity in this setting refers to the contemporaneous relationship between air traffic and local employment—air traffic may affect employment but employment may also partly affect air traffic. For example, spatial units with high employment may attract more business travellers. A two-stage approach addresses this problem by using an 'instrument' in the first stage to predict air traffic and using the predicted air traffic from the first-stage regression in the second stage instead of the observed air traffic.
[62] As the majority of the data used is from 2018 and before, this result is conditional on pre-COVID-19 labour market conditions and air traffic levels.

The econometric approach

A5.8 The model proposed by Percoco takes the form of a two-stage regression analysis.[63] The two stages can be characterised as:

- predict what the air traffic would be at a given location in the first stage;[64]
- use these predictions in the second stage to estimate the impact of a change in air traffic on local employment levels.

A5.9 The first stage of Percoco's model assumes that air traffic at a location is only observed if the location has an 'air traffic potential' above a certain threshold. In other words, airports are only active in areas where there would be demand for their services.[65] The traffic potential x_i^* in the given area is then estimated using the following exponential equation, where z are instrumental variables, d are control variables, β_0 is the constant term, and v_i is a location specific error term:

$$x_i^* = \exp\left(\beta_0 + \sum_{\mathrm{k}=1}^{\mathrm{K}} \beta_k z_{k,i} + \sum_{\mathrm{l}=\mathrm{K}+1}^{L} \beta_l d_{l,i} + \mathrm{v_i}\right)$$

A5.10 The second stage of Percoco's model uses the predicted air traffic potential, $\widehat{x_i^*}$, from the first stage equation above, to estimate the impact of changes in air traffic on local employment. This stage assumes a linear relationship between local employment and predicted air traffic potential:

$$y_i = \alpha_1 + \alpha_2 \widehat{x_i^*} + \sum_{\mathrm{m}=3}^{\mathrm{M}} \alpha_m d_{m,i} + \varepsilon_i$$

where α_2 is the measure of the impact of changes in air traffic on local employment that is being estimated, d are control variables.[66]

A5.11 This model is estimated by constructing a UK dataset, which is described in detail in the next section.

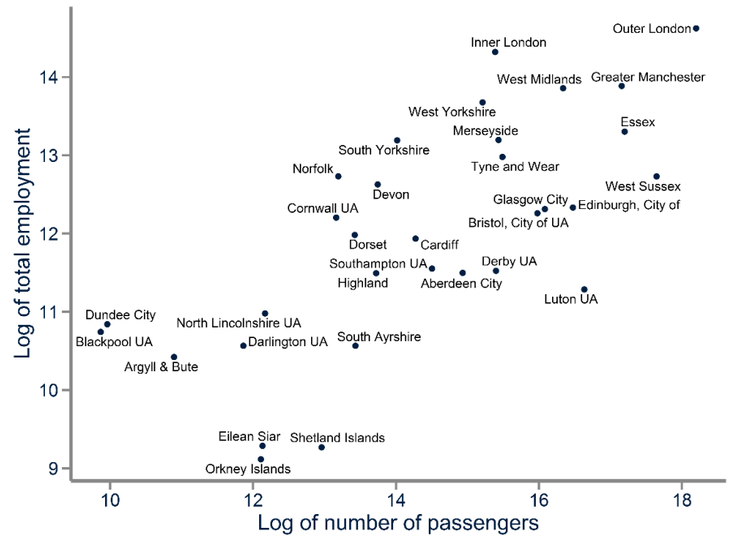
Selection of control variables and construction of the dataset

A5.12 The dataset is constructed using publicly available sources. These sources are presented at the end of this Annex.

A5.13 Data on 2018 local employment levels from NOMIS[67] is used to measure dependant variable, local employment.[68] As a measure of air traffic, 2018 air passenger levels for all UK airports from the CAA is used.[69] A sensitivity is also presented using the number of ATMs instead of air passenger levels as a measure of air traffic.[70]

A5.14 Airports are matched with locations defined at county/unitary authority level. A list of airports and counties considered in the analysis is presented at the end of this Annex.[71] Figure A5.1 illustrates the relationship between the number of air passengers and local employment at locations with an active airport.

Figure A5.1 Air traffic and local employment are positively correlated



Source: Oxera.

A5.15 In the first stage of the regression analysis, the following instrumental variables as discussed by Brueckner and Percoco are used to predict the unobserved air traffic potential:[72]

- hub indicator—defined as one if an airport is a hub airport and zero otherwise;[73]
- centrality—defined as the distance of a location to the UK population centre of gravity;[74]
- proximity indicator—defined as one if a location is within 100km of one of the top five locations with the highest air traffic level.[75]

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[63] See also Brueckner, on which Percoco bases his model.
[64] An instrument is a variable that is related to local employment only through its impact on air traffic. For details see, for example, Cameron, A.C. and Trivedi, P.K. (2005), *Microeconometrics: Methods and Applications*, Cambridge University Press, pp. 95–103.
[65] A traffic potential refers to the expected level of air traffic that would be observed at a location if an airport were active at that location, which is unobserved (or observed as zero) for regions without an active airport. It is called a latent variable, which is a variable that is not directly observed but inferred from observed variables.
[66] The second-stage equation is estimated using an ordinary least squares approach, and standard errors are corrected to account for the variation in the predicted air traffic potential and other potential issues, such as heteroscedasticity, using bootstrapping.
[67] Nomis is a service provided by ONS. On this website, the ONS publishes statistics related to population, society and the labour market at national, regional and local levels. These include data from current and previous censuses.
[68] NOMIS (2018), 'Annual Population Survey T11a Employment by age and industry (SIC 2007)'. The log level of employment in industrial and service sectors excluding Distribution, Hotels, and Restaurants (SIC 2007 codes G and I) at county/unitary authority level is used as a measure of local employment. This category is excluded to avoid endogeneity issues as proposed by Percoco, M. (2010), 'Airport Activity and Local Development: Evidence from Italy, Urban Studies, 47:11, September, p. 2435.
[69] Civil Aviation Authority (2018), 'Airport data Table 8 Air Passengers by Type and Nationality of Operator'. The total number of terminal and transit passengers is used as a measure of air traffic.
[70] Civil Aviation Authority (2018), 'Airport data Table 3 Aircraft Movements'. The sensitivity results are presented in at the end of this Annex.
[71] An airport's employment impact would not be restricted to its county but would have impacts beyond the geographic borders. Ideally, one may calculate exact labour catchment areas for each airport in the UK, construct relevant control variables corresponding to each catchment area, and perform an analysis using this dataset. This means, however, hypothetical catchment areas have to be constructed for regions without an active airport. A simplification is therefore used, and local areas are defined at county/unitary authority level. Brueckner uses 91 US metropolitan areas and Percoco uses 103 Italian provinces as the unit of location.
[72] For a discussion on the validity of these measures as instruments, see Brueckner, J.K. (2003), 'Airline Traffic and Urban Economic Development', *Urban Studies*, **40**:8, July, p. 1459.
[73] In this analysis, only Heathrow Airport is categorised as a hub airport. In this sense, this variable only captures the level difference at Heathrow Airport due to the connecting traffic in predicting passenger potential.
[74] The latitude, the longitude, and 2011 census population of each location are used to calculate the population centre of gravity. The geodesic distance is used to calculate the distance to the centre. The latitudes and longitudes are sourced from Office for National Statistics (2019), 'Local Authority Districts (December 2017) Full Clipped Boundaries in Great Britain'. This variable is measured in logs. As Green also discusses (as summarised at Table A5.1, this variable measures the distance of an airport to a fixed geographic location, which is assumed to be exogeneous and to have no impact on local economic development.
[75] The top five locations with the highest air traffic level are Essex (Southend and Stansted airports), Greater Manchester (Manchester Airport), Luton (Luton Airport), Outer London

A5.16 Furthermore, in line with Percoco and Brueckner's guidance on relevant control variables, the following information is used in both the first- and second-stage regressions:[76]

- average neighbouring population—as areas with higher population levels would have higher employment levels and attract more passengers;[77]
- the share of population older than 65—as age composition of an area could affect its employment level and air traffic potential;
- the level of human capital proxied by the share of population with a Q4 equivalent degree or above—as locations with a higher human capital would be more attractive for some employers and could attract more passengers;
- regional indicator variables for England, Wales, and Scotland—to account for differences in average local employment levels across regions.[78]

A5.17 In addition to these variables, in the second stage of the analysis a measure of air traffic potential in neighbouring counties is constructed to test whether an increase in air traffic in a neighbouring location affects local employment.[79]

A5.18 Table A5.2 presents descriptive statistics for these variables.

Table A5.2 Descriptive statistics for these variables

	Min	Average	Standard Deviation	Max
Employment—total	9,100	177,924	280,080.7	2,240,900
Employment—services	6,500	135,885	232,070.4	1,885,800
Employment—industrial	2,500	42,039	51,890.2	355,100
Number of passengers	0	1,967,354	8,611,065	80,124,537
ATMs	0	15,166	54,422.5	475,714
Local population	21,349	426,174	633,319.5	4,942,040
Average neighbouring population	97,522	397,367	346,418	2,127,979
Share of 65+	0.09	0.20	0.04	0.29
Share of Q4+	0.18	0.36	0.08	0.66
Scotland indicator	0	0.22	0.42	1
Wales indicator	0	0.15	0.36	1
Centrality	3.8	148.3	89.2	547.7
Proximity indicator	0	0.42	0.49	1

Note: Observations are at the county level. Statistics for employment, local population, average neighbouring population, and centrality refer to their levels. In the regressions, these variables are used in the log form. All information relates to 2018, except population, which is sourced from the 2011 census.

Source: Oxera.

Results

A5.19 The purpose of the first stage regression is to use the correlation between instrumental variables, control variables and the dependent variable to obtain accurate predictions of the unobserved air traffic potential.[80] The table below presents the estimates from the first stage regression.

Table A5.3 First-stage regression results

	Estimate
Constant	-51.34***
	(14.18)
Share of 65+	-0.51***
	(0.20)
Population	3.28***
	(0.70)
Centrality	5.49***
	(1.25)
Share of Q4+	-0.03
	(0.08)
Proximity indicator	-1.21
	(1.56)
Hub indicator	0.50
	(1.55)
Scotland indicator	6.49***
	(1.99)
Wales indicator	2.19
	(6.17)
Number of observations	**144**

Note: Estimates are rounded to two decimals. Values in parentheses are standard errors. *** indicates statistical significance at 1% level of confidence. Standard errors and confidence intervals are calculated using bootstrapping with 1000 repetitions without replacement. Population and centrality are measured in logs.

Source: Oxera.

A5.20 Using the first stage regression, a prediction is made of the air traffic potential for all areas in our analysis. The plot below shows the predicted air traffic potential for areas without an active airport on the left pane and for areas with an active airport on the right pane. Intuitively, airport potential of most areas without an active airport is predicted to be lower than the predicted potential for the areas with an active airport.[81]

Figure A5.2 Predictions from the first-stage regression

(Heathrow Airport), and West Sussex (Gatwick Airport). Latitudes and longitudes of each location are used to calculate the distances with a geodesic distance metric. Brueckner uses 240km in the USA as his cut-off parameter.

[76] A control variable is a variable that relates to local employment and air traffic. Such variables, which are also called confounders, have to be controlled for in regressions to ensure that they do not confound the impact of air traffic on local employment. The average population of the closest five counties to each county is used to calculate the neighbouring population.

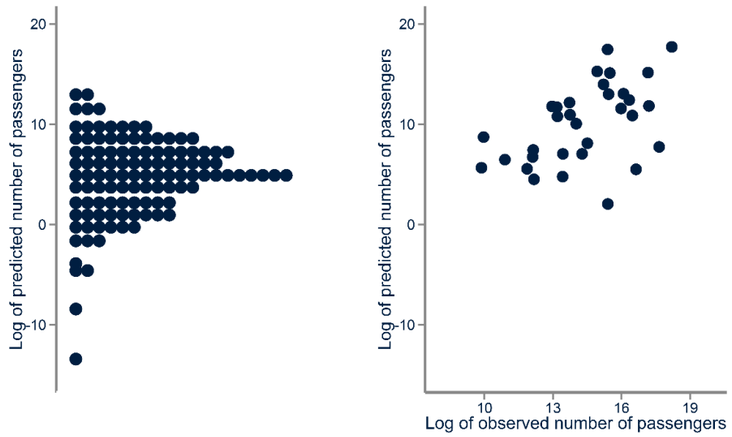
[77] As unobserved factors affecting employment are also likely to affect population, the population level of a given location can potentially be endogenous. Brueckner and Percoco suggest using a past population measure to overcome this problem. Population is therefore used in the first-stage regression to increase the accuracy of the predicted air traffic potential. In the second-stage regression, instead of using a past population measure as a proxy, the population of a region is proxied with the average of the populations of its five closest neighbours using 2011 census estimates. This variable is measured in logs.

[78] An indicator variable for Scotland/Wales is 1 if a location is in Scotland/Wales and zero otherwise. The regressions do not include an indicator variable for England as it is set as the base for regional indicators. This choice does not affect the coefficient estimate of the other variables. The analysis excludes Northern Ireland due to lack of comparable data from the same source on local observables described above.

[79] This variable to measure potential spillover effects has to be generated after the unobserved air traffic potential is estimated. A description of how this variable is constructed is therefore provided in para. A5.20 and Box A5.1. For more details, see Percoco, M. (2010), 'Airport Activity and Local Development: Evidence from Italy, *Urban Studies*, **47**:11, September, p. 2438.

[80] A first-stage regression in a two-stage least squares estimation does not provide a causal interpretation of the relationship between dependent variables and the independent variable.

[81] Even though a high predictive accuracy is not necessary for the consistency of a two-stage least squares estimator, it is a desirable property. However, in this case, it is difficult to assess the predictive accuracy of the first-stage model as what is predicted is an unobserved variable as described in paras A5.7 – A5.10. As shown in the plot, the first-stage regression is able to capture a strong correlation between the predicted number of passengers and the observed number of passengers for counties/unitary authorities with an active airport (with a few outlying observations). It also predicts the air traffic potential at regions without an active airport at the lower end of the distribution, as one would expect if airports were systematically open at locations with demand for their services.



Note: Each point on the plots represent a county. The plot to the left illustrates the distribution of the log of predicted air traffic potential for regions without an active airport, and hence has zero observed air traffic. The plot to the right illustrates the log of predicted air traffic potential for regions with an active airport on the y-axis and the log of observed air traffic on the x-axis.

Source: Oxera.

A5.21 In addition, to measure the spillover effects of increased air traffic in a region on neighbouring counties in the second-stage regression, a variable is constructed to represent the air traffic potential in the neighbouring regions of each county using:

- the predicted air traffic potential of each county;
- weights based on distances between each county;
- a cut-off value to define the neighbouring regions based on distances, as described in Box A5.1.

Box A5.1 Constructing a measure of neighbouring air traffic potential

A measure of neighbouring air traffic potential is needed to test whether changes in air traffic have spillover employment effects in the neighbouring regions. The below explains how this measure is constructed following Percoco's definition.[82]

First, distance weights are calculated. For each location in the dataset, distances to all the other locations using latitudes, longitudes, and the geodesic function are calculated. The closest neighbouring regions to each location are then identified.[83] Using these sets of closest locations, weights are calculated using the squared-inverse distances. For example, if location A has two neighbouring locations B and C at distances 2 and 5, weight for location B at the neighbourhood of location A is calculated as:

$$\frac{\left(\frac{1}{2}\right)^2}{\left(\frac{1}{2}\right)^2 + \left(\frac{1}{5}\right)^2} = 0.86.$$

Second, the predicted air traffic potential of each region in the set of closest locations is multiplied with corresponding weights to calculate the neighbouring traffic potential for each region. For example, if location B has a predicted air traffic potential of 100 and location C has a predicted air traffic potential of 300 from the first-stage regression, location A's neighbouring traffic potential is calculated as:

$$0.86 \times 100 \; + \; 0.14 \times 300 \; = \; 128.$$

Source: Oxera.

A5.22 The employment effect of a change in air traffic is analysed using three different dependent variables: total employment, employment in the service sector, and employment in the industrial sector. Table A5.4 illustrates results from these regressions. The impact of air traffic on total local employment is estimated as 0.14, indicating a 0.14% increase in total employment as a response to a 1% increase in local air traffic on average throughout the UK.[84] The impacts on industrial and service sectors are similar, ranging from 0.13% to 0.14% increases as a response to a 1% increase in local air traffic, respectively.[85] These impacts are statistically significant at the 1% level.[86]

A5.23 A significant spillover employment effect of increased air traffic is identified in the neighbouring region of a county. The estimated coefficient of neighbouring air traffic potential is -0.07, indicating a 0.07% displacement from a region if air traffic in the region's neighbouring area increases by 1%.[87] This finding implies that increased activity at a UK airport could attract employment from neighbouring regions to the area closer to the airport.

Table A5.4 Second-stage regression results

	Estimate (log of total employment)	Estimate (log of industrial employment)	Estimate (log of service employment)
Constant	3.58***	3.08***	3.01***
	(1.16)	(1.08)	(1.19)
Air traffic	0.14***	0.13***	0.14***
	(0.03)	(0.03)	(0.03)
Neighbouring air traffic potential	-0.07***	-0.07***	-0.07***
	(0.02)	(0.02)	(0.02)
Population proxy	0.48***	0.50***	0.50***
	(0.09)	(0.08)	(0.09)
Share of 65+	0.03*	0.05**	0.03
	(0.03)	(0.03)	(0.03)
Share of Q4+	0.03***	0.02*	0.04***
	(0.01)	(0.01)	(0.01)
Scotland indicator	-0.87***	-0.68***	-0.92***
	(0.15)	(0.15)	(0.15)
Wales indicator	-0.28	-0.24	-0.30

[82] Percoco, M. (2010), 'Airport Activity and Local Development: Evidence from Italy, *Urban Studies*, **47**:11, September, p. 2438.
[83] For each location, all the other locations are sorted from the closest to the farthest and the closest 5% are defined as the neighbouring locations.
[84] All interpretations assume all else remains equal, represent average impacts, and are conditional on the prevailing labour market conditions and air traffic levels in the UK in 2018.
[85] Brueckner estimates the impact of a 1% change in air traffic at the US metropolitan areas on employment in the service sector as 0.11% and on total employment as 0.09%. The difference between the total employment estimates and the service sector employment compared to the current study is because Brueckner's preferred specification does not yield a significant impact of air traffic on industrial employment. His sensitivities, however, indicate a negative impact of increased air traffic on industrial employment levels, which may be driven by his sample selection of metropolitan areas. Percoco estimates a 0.04% impact on employment in the service sector and a 0.01% impact on total employment. Percoco interprets the very low impact relative to the rest of the literature as evidence for stickiness of the Italian labour market and limitations imposed by the labour market institutions in Italy.
[86] The statistical significance test provides the probability that one would estimate a non-zero effect given the dataset and the model, if in fact the effect were zero. Common thresholds are 10%, 5% and 1%. Statistical significance therefore gives the degree of confidence that the observed relationship is not due to pure coincidence.
[87] Neighbouring air traffic potential is a weighted average of all neighbouring regions of a location as described in Box A5.1. All else remaining the same, a 1% increase in the air traffic of a single neighbouring region therefore would be a less than 1% increase in the neighbouring air traffic potential.

	(0.69)	(0.67)	(0.70)
Number of observations	**144**	**144**	**144**

Note: Estimates are rounded to two decimals. Values in parentheses are standard errors. ***, **, and * indicate statistical significance at 1%, 5%, and 10% levels of confidence. Dependent variables stated at the top of each column and independent variables, air traffic, neighbouring air traffic and population proxy are measured in logs.

Source: Oxera.

A5.24 It is worth noting, though, that if recent changes towards remote working patterns become permanent, this would have an effect on the relationship between air traffic and local employment levels; for example, working from home may reduce the employment response in the service sector resulting from increased air traffic. In the context of this EIA and absent sufficient information on the impact of the COVID-19 pandemic on remote working in the long term, it has been assumed that the empirical relationship estimated between air traffic levels and local employment pre-pandemic still holds.

A5.25 Presented below is a sensitivity of these results using ATMs instead of passenger numbers as a measure of air traffic. The outcome of this sensitivity is similar to the analysis above, however it suggests a higher employment impact and displacement from neighbouring regions as a response to changes in ATMs at around 0.19% and -0.11% compared to 0.13% and -0.07% discussed above. The elasticity estimates from the passenger number analysis are used in main assessment of this appendix as passenger traffic is the main driver of the economic activity (employment and value added) measured.

A5.26 In the subsequent sections, additional information is provided on the sensitivity analysis undertaken.

Sensitivity results

Using ATMs as a measure of air traffic

A5.27 The tables below present a sensitivity to the main analysis using ATMs as a measure of air traffic instead of passenger numbers. The second-stage regression results suggest a local employment impact from a 1% increase in air traffic at 0.19–0.20% spread across industrial and service employment levels. Other results indicate similar magnitudes and impacts between the control variables and the local employment levels as discussed above.

Table A5.5 First-stage regression results

	Estimate
Constant	-32.93***
	(9.56)
Share of 65+	-0.35***
	(0.13)
Population	2.11***
	(0.46)
Centrality	3.82***
	(0.89)
Share of Q4+	-0.02
	(0.06)
Proximity indicator	-0.58
	(1.01)
Hub indicator	0.50
	(1.09)
Scotland indicator	4.57***
	(1.31)
Wales indicator	1.18
	(4.95)
Number of observations	**144**

Source: Oxera.

Table A5.6 Second-stage regression results

	Estimate (log of total employment)	Estimate (log of industrial employment)	Estimate (log of service employment)
Constant	3.32***	2.76***	2.75***
	(1.16)	(1.10)	(1.19)
Air traffic	0.20***	0.19***	0.20***
	(0.05)	(0.05)	(0.05)
Neighbouring air traffic potential	-0.11***	-0.11***	-0.11***
	(0.04)	(0.04)	(0.04)
Population proxy	0.50***	0.46***	0.51***
	(0.09)	(0.09)	(0.09)
Share of 65+	0.04*	0.05***	0.03*
	(0.03)	(0.02)	(0.03)
Share of Q4+	0.04***	0.02*	0.04***
	(0.01)	(0.01)	(0.01)
Scotland indicator	-0.88***	-0.74***	-0.93***
	(0.14)	(0.14)	(0.14)
Wales indicator	-0.29	-0.24	-0.32***
	(0.96)	(0.93)	(0.960)
Number of observations	**144**	**144**	**144**

Source: Oxera.

Using alternative control variables

A5.28 As an additional sensitivity, the following alternative control variables are used:

- the closest ten regions are used to calculate the average neighbouring population;
- 150km is used as the cut-off parameter to define the proximity indicator;
- 10% of the sample (14 given the sample size of 144) is used to define the neighbouring region for the neighbouring air traffic potential.

A5.29 Table A5.7 presents the sensitivity of the results to these variable choices. It indicates that the results are robust to the choice of control variables.

Table A5.7 Sensitivities to control variables

	Effect on total employment (%)	Effect on industrial employment (%)	Effect on service employment (%)
Use the closest 10 regions to define neighbouring population	0.13*** (0.09–0.19)	0.13*** (0.08–0.18)	0.13*** (0.09–0.19)
Use 150 kms as the cut-off point to define the proximity indicator	0.13*** (0.09–0.18)	0.12*** (0.08–0.18)	0.13*** (0.09–0.19)
Use 10% of the sample to define the neighbouring region	0.13*** (0.08–0.18)	0.12*** (0.08–0.17)	0.13*** (0.09–0.18)

Note: Values indicate the employment response to a 1% change in air traffic. Values in parentheses are the 95% confidence interval of the estimated response. (***) represents statistical significance at the 1% level.

Source: Oxera.

Summary of the study

A5.30 This Annex makes use of the variation between locations in the UK to assess the impact of increased air traffic on local employment levels, based on an approach used in the economic literature. It suggests that a 1% increase in air traffic levels increases local employment levels on average in the UK by 0.13%, given the labour market conditions and air traffic levels prevalent in the UK in 2018. As noted above, it has been assumed that the empirical relationship estimated between air traffic levels and local employment pre-pandemic still holds.

A5.31 Additional information on the data sources used in the analysis, and the list of airports, counties, and unitary authorities included in the analysis is provided below.

Data sources

A5.32 Below are the data sources used to construct the airport and county/unitary authority level dataset.

Table A5.8 Data sources

Label	Explanation	Source
Employment	2018 employment level	NOMIS (2018), 'Annual Population Survey T11a Employment by age and industry (SIC 2007)', May.
Service employment	2018 employment level in the service sector excluding tourism	NOMIS (2018), 'Annual Population Survey T11a Employment by age and industry (SIC 2007)', May.
Industrial employment	2018 employment level in the industrial sector	NOMIS (2018), 'Annual Population Survey T11a Employment by age and industry (SIC 2007)', May.
Number of air passengers	Total terminal and transit passengers	CAA (2018), 'Airport data Table 8 Air Passengers by Type and Nationality of Operator', April.
Population	2011 population level	Office for National Statistics, National Records of Scotland, Northern Ireland Statistics and Research Agency (2016), 2011 Census aggregate data. UK Data Service (Edition: June 2016).
Share of 65+	Share of population above 16 years old who are aged 65 and above	NOMIS (2018), 'Annual Population Survey T1 Economic activity by age', May.
Share of Q4+	Share of population aged between 16 and 64 with a Q4 equivalent education or above	NOMIS (2018), 'Annual Population Survey T19 Qualification by age - NVQ', May.
Geographical locations	Latitudes and longitudes of each county/unitary authority	ONS (2019), 'Local Authority Districts (December 2017) Full Clipped Boundaries in Great Britain', May.
Number of air passengers	Total terminal and transit passengers	CAA (2018), 'Airport data Table 8 Air Passengers by Type and Nationality of Operator', April.
Number of ATMs	Total number of aircraft movements	CAA (2018), 'Airport data Table 3 Aircraft Movements', April.

Source: Oxera.

Airports and counties/unitary authorities used in the analysis

Counties/unitary authorities

Aberdeen City; Aberdeenshire; Angus; Argyll & Bute; Bath and North East Somerset UA; Bedford UA; Blackburn with Darwen UA; Blackpool UA; Blaenau Gwent; Bournemouth UA; Bracknell Forest UA; Bridgend; Brighton and Hove UA; Bristol, City of UA; Buckinghamshire; Caerphilly; Cambridgeshire; Cardiff; Carmarthenshire; Central Bedfordshire UA; Ceredigion; Cheshire East UA; Cheshire West and Chester UA; Clackmannanshire; Conwy; Cornwall UA; County Durham UA; Cumbria; Darlington UA; Denbighshire; Derby UA; Derbyshire; Devon; Dorset; Dumfries & Galloway; Dundee City; East Ayrshire; East Dunbartonshire; East Lothian; East Renfrewshire; East Riding of Yorkshire UA; East Sussex; Edinburgh, City of; Eilean Siar; Essex; Falkirk; Fife; Flintshire; Glasgow City; Gloucestershire; Greater Manchester (Met County); Gwynedd; Halton UA; Hampshire; Hartlepool UA; Herefordshire, County of UA; Hertfordshire; Highland; Inner London; Inverclyde; Isle of Anglesey; Isle of Wight UA; Kent; Kingston upon Hull City of UA; Lancashire; Leicester UA; Leicestershire; Lincolnshire; Luton UA; Medway UA; Merseyside (Met County); Merthyr Tydfil; Middlesbrough UA; Midlothian; Milton Keynes UA; Monmouthshire; Moray; Neath Port Talbot; Newport; Norfolk; North Ayrshire; North East Lincolnshire UA; North Lanarkshire; North Lincolnshire UA; North Somerset UA; North Yorkshire; Northamptonshire; Northumberland UA; Nottingham UA; Nottinghamshire; Orkney Islands; Outer London; Oxfordshire; Pembrokeshire; Perth & Kinross; Peterborough UA; Plymouth UA; Poole UA; Portsmouth UA; Powys; Reading UA; Redcar and CleAppendixveland UA; Renfrewshire; Rhondda Cynon Taf; Rutland UA; Scottish Borders; Shetland Islands; Shropshire UA; Slough UA; Somerset; South Ayrshire; South Gloucestershire UA; South Lanarkshire; South Yorkshire (Met County); Southampton UA; Southend-on-Sea UA; Staffordshire; Stirling; Stockton-on-Tees UA; Stoke-on-Trent UA; Suffolk; Surrey; Swansea; Swindon UA; Telford and Wrekin UA; The Vale of Glamorgan; Thurrock UA; Torbay UA; Torfaen; Tyne and Wear (Met County); Warrington UA; Warwickshire; West Berkshire UA; West Dunbartonshire; West Lothian; West Midlands (Met County); West Sussex; West Yorkshire (Met County); Wiltshire UA; Windsor and Maidenhead UA; Wokingham UA; Worcestershire; Wrexham; York UA.