



# Gatwick Airport Northern Runway Project

Environmental Statement

Appendix 17.9.1: Gatwick Construction Workforce Distribution Technical Note

**Book 5**

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## 1 Background

- 1.1.1 Quod was commissioned by Gatwick Airport Limited (GAL) to assess the likely distribution of the Northern Runway Project (NRP) construction workforce. The aim is to understand the spatial distribution of the likely supply of workers, the split of home-based (HB) and non-home based (NHB) workers<sup>1</sup> and the expected demand from NHB workers for temporary accommodation in the area.
- 1.1.2 GAL's construction team has provided its estimate of the size of the workforce over the construction period and the broad skills/occupations that will be required.
- 1.1.3 Quod has produced a Gravity Model to generate an estimate spatial distribution of the workforce to meet that demand, split by HB and NHB categories.
- 1.1.4 This note sets out the technical detail behind the Gatwick Gravity Model (GGM). It explains the inputs into the GGM, the estimated distribution of workers by Local Authority (LA) and the robustness checks undertaken.
- 1.1.5 This note is to be included as an appendix to Environmental Statement Chapter 17: Socio-Economics.

## 2 Introduction

- 2.1.1 A workforce Gravity Model predicts the distribution of a workforce based on the distance to the site and the potential labour supply.
- 2.1.2 The GGM is effectively made of two Gravity Models, one for HB workers and the one for NHB workers.
- 2.1.3 The HB model's potential labour supply is defined by residents working in construction.
- 2.1.4 The NHB model's potential labour supply is defined by housing supply in the private rented sector (PRS).

- 2.1.5 The GGM is informed by key construction industry data from the Construction Industry Training Board (CITB) and the Construction Industry Joint Council (CIJC) Working Rule Agreement.
- 2.1.6 The CITB publishes data on the average distances workers travel to sites for each region of the UK and on the proportion of workers who require or use overnight accommodation.
- 2.1.7 The CIJC Working Rule Agreement specifies the maximum distances for which workers can claim travel expenses (which is 50 miles). Some workers can and do travel for longer, but in practice this is not common, especially on a large project like Gatwick where workers are more likely to take temporary accommodation nearer the site.
- 2.1.8 Together these datasets suggest an outer boundary of around 90 minutes for HB workers (c. 50 miles). For NHB workers, evidence shows they choose temporary accommodation closer to the site. The GM does not set an outer boundary for these, but uses a higher deterrence function which has the effect of concentrating NHB workers closer to the site.

## 3 Building the Gravity Model

### 3.1 Datasets

- 3.1.1 The GGM was built using the following datasets:
  - (1) Gatwick Workforce Profile (2022 – 2038) (supplied by GAL)
  - (2) Gatwick GZones within a 90-minute travel time to Gatwick Airport (Section 3.4 of Transport Assessment Annex B – Strategic Transport Modelling Report)
  - (3) Census 2011 – residents working in construction by Output Area (KS605UK – Industry) (ONS, 2011a)
  - (4) BRES 2011, 2020 – employment working in construction by Region (ONS, 2021)

### 3.2 Geography

- 3.2.1 The GGM assesses the location of workers within 90 minutes of the airport by train, bus or car at peak times. This catchment is defined by GZones provided by Arup<sup>2</sup> and shown in **Annex 1**.
- 3.2.2 As GZones do not nest to statistical ONS geographies it was necessary to create a 'best fit' to estimate residents working in construction and bedrooms in private rented accommodation. This 'best fit' was defined using ONS Output Areas (the smallest statistical geography).

### 3.3 Distance to Gatwick

- 3.3.1 Although GZones are categorised by whether they are in the 90-minute catchment or not, they do not include a journey time estimate to Gatwick.
- 3.3.2 Therefore, it was necessary to calculate a consistent metric of distance to Gatwick for the GGM to be based on.
- 3.3.3 To do this, a distance matrix was created between the central point of Gatwick and the central point of each GZone.

### 3.4 Residents working in construction

- 3.4.1 The most recent data available on residents working in construction at a low spatial disaggregation is from the Census 2011.
- 3.4.2 Using the Output Area 'best fit' the residents working in construction is estimated by GZone. This is used to approximate the distribution of HB workers.

<sup>1</sup> Home-based workers are those who will commute from their regular place of residence to the Gatwick site. Non-home based workers are those who will live away from home and take temporary accommodation closer to the Gatwick site

<sup>2</sup> GZones are a bespoke geography being used in the transport model.

3.4.3 Then, to approximate current values, percentage increases in construction employment from 2011 to 2020 (most recent) at a regional level were applied to the data from the Census. These estimates are used to check the allocation of HB workers against construction labour supply.

3.4.4 A regional level was considered appropriate to best reflect a functional economic area (ie the spatial level at which local economies actually operate).

### 3.5 Bedrooms in private rented accommodation

3.5.1 Under the CIJC Working Rule Agreement individual workers are able to claim up to £44.58 per night in 2023. According to the ONS Private Rental Market Statistics for June 2022, the upper quartile rents for one-bedroom flats in Crawley were the highest in West Sussex at £895 per month. These would (just) be affordable to an individual worker who worked away for 20 days a month. In practice, workers will often share accommodation and the rent per room decreases - £560 per room per month for a two-bed and £450 for three-bed. The vast majority of the PRS is therefore affordable to workers.

3.5.2 The most recent data available on bedrooms in private rented accommodation at a low spatial disaggregation is from the Census 2011. This is used to approximate the distribution of NHB workers.

3.5.3 Using the Output Area 'best fit' the number of bedrooms is estimated by GZone.

3.5.4 Then, to approximate current values, increases in private dwellings from 2011 to 2021 (most recent) at a regional level were applied to the data from the Census 2011. These estimates are used to check the allocation of NHB workers against PRS housing supply.

## 4 Approach and Assumptions

### 4.1 Gatwick Workforce Distribution

4.1.1 The GGM is based on the peak workers observed from the Gatwick Workforce Distribution. The peak occurs in Year 4, where the workforce is expected to consist of 1,350 workers.

4.1.2 These workers are then split between HB and NHB workers. Two scenarios have been derived for this assumption:

- (1) Scenario 1 (primary) – 80% HB workers and 20% NHB
- (2) Scenario 2 – 100% HB workers

4.1.3 These scenarios test the highest likely proportion of NHB's workers (20%) and the lowest (0%). This compares to CITB survey data which shows 7% of construction workers in the South East were staying in temporary accommodation while working at their site, slightly higher than the UK average (5%).

4.1.4 Scenario 1 is considered the primary scenario as LGW's own experience suggests a higher proportion of NHB workers than the regional average is likely. This is because of the specialist areas of work required and the need to contract for these workers nationally rather than regionally.

4.1.5 Further to this, local authorities around Gatwick have raised concerns about the ability of the accommodation market to cope with the arrival of temporary workers. So the high end of range (20% NHB) has been taken forward as the primary scenario as this would be the worst case scenario in terms of accommodation.

### 4.2 HB Workers

4.2.1 HB workers are distributed by GZone via a function based on:

- (1) The distance from Gatwick to the GZone;
- (2) A deterrence of distance  $^1.5$  (determining the extent to which workers live close to the site); and

- (3) The proportion of residents working in construction in the GZone compared to the whole catchment.

### 4.3 NHB Workers

4.3.1 NHB workers are then distributed by GZone via a function based on:

- (1) The distance from Gatwick to the GZone;
- (2) A deterrence of distance  $^3$  (determining the extent to which workers live close to the site)<sup>3</sup>; and
- (3) The proportion of PRS beds in the GZone compared to the whole catchment.

## 5 Results

5.1.1 The tables below show the estimates for Scenario 1 and Scenario 2 in the ten LAs that are expected to see the most workers, as well as the total number of workers from the Six Authorities Area (London Borough of Croydon, East Sussex, West Sussex, Kent, Brighton & Hove, Surrey). **Annex 2** presents the detailed data across the entire study area.

**Table 5-1: Scenario 1 - Ten LAs that are expected to see the most workers**

Local Authority	HB Workers	NHB Workers	Total Workers
Reigate and Banstead	137	110	<b>247</b>
Crawley	136	115	<b>251</b>
Mid Sussex	43	6	<b>48</b>
Croydon	42	2	<b>45</b>
Mole Valley	33	10	<b>43</b>
Tandridge	32	4	<b>36</b>
Sutton	31	1	<b>32</b>
Bromley	29	1	<b>30</b>
Horsham	28	3	<b>31</b>
Merton	19	1	<b>20</b>

<sup>3</sup> The increased deterrence function for NHB workers reflects the likelihood that those choosing temporary accommodation are likely to live closer to the site.

**Table 5-2: Scenario 2 - Ten LAs that are expected to see the most workers**

Local Authority	HB Workers	NHB Workers	Total Workers
Reigate and Banstead	171	0	171
Crawley	170	0	170
Mid Sussex	53	0	53
Croydon	53	0	53
Mole Valley	42	0	42
Tandridge	40	0	40
Sutton	39	0	39
Bromley	36	0	36
Horsham	35	0	35
Merton	24	0	24

**Table 5-3: Number of workers located within the Six Authorities Area**

Local Authority	HB Workers	NHB Workers	Total Workers
1 (80% HB, 20% NHB)	633	254	887
2 (100% HB)	791	0	791

5.1.2 The full estimates for both scenarios are set out in the annex of this note.

## 6 Robustness Checks

### 6.1 Industry average

6.1.1 The CITB 'Workforce Mobility and Skills in the UK Construction Sector 2018/19' South East Report (CITB, 2019) states that the mean average distance from workers' current residences (inc. temporary) to their current site was 27 miles.

6.1.2 The proportion of workers by distance was as follows:

- (1) 29% travelled less than 10 miles;
- (2) 21% travelled between 10 and 19 miles;
- (3) 33% travelled between 20 and 49 miles;
- (4) 16% travelled between 50 and 99 miles; and

(5) 1% travelled more than 100 miles.

6.1.3 The tables below detail the above proportions against those in the GGM.

**Table 6-1: Scenario 1 workers by distance to the site**

Distance Travelled	Workers	%	CITB South East Average
0 – 10 miles	604	44.5%	29%
10 – 19 miles	269	19.8%	21%
20 – 49 miles	479	35.3%	33%
50 – 99 miles	4	0.3%	16%
Greater than 100 miles	0	0.0%	1%
Total	1,357	-	-

**Table 6-2: Scenario 2 workers by distance to the site**

Distance Travelled	Workers	%	CITB South East Average
0 – 10 miles	450	33.1%	29%
10 – 19 miles	322	23.7%	21%
20 – 49 miles	580	42.8%	33%
50 – 99 miles	5	0.4%	16%
Greater than 100 miles	0	0.0%	1%
Total	1,357	-	-

6.1.4 Scenario 1 models a higher proportion of workers travelling less than 10 miles (44.5%) than the average observed in the South East (29%). However, Scenario 1 is based on a higher proportion of NHB workers (20%) than the average for the South East (7%).

### 6.2 HB Workers Check

6.2.1 The table below details the allocation of HB workers by LA against the potential labour supply for both Scenarios.

6.2.2 The highest penetration in both scenarios is in Crawley: Scenario 1 – 2.94%, Scenario 2 – 3.68%. Given the low level of penetration, neither scenario would be expected to have a negative impact on the local labour supply.

**Table 6-3: Scenario 1 - HB Workers as a % of residents working in construction**

Local Authority	HB Workers	Residents working in construction (2020)*	HB Workers as a % of residents working in construction
Reigate and	137	7,913	1.73%
Crawley	136	4,618	2.94%
Mid Sussex	43	7,370	0.58%
Croydon	42	17,390	0.24%
Mole Valley	33	4,673	0.71%
Tandridge	32	5,408	0.59%
Sutton	31	12,539	0.25%
Bromley	29	16,475	0.17%
Horsham	28	6,797	0.41%
Merton	19	9,927	0.19%

\*only includes supply within 90 mins of Gatwick

**Table 6-4: Scenario 2 - HB Workers as a % of residents working in construction**

Local Authority	HB Workers	Residents working in construction (2020)*	HB Workers as a % of residents working in construction
Reigate and Banstead	171	7,913	2.16%
Crawley	170	4,618	3.68%
Mid Sussex	53	7,370	0.72%
Croydon	53	17,390	0.30%
Mole Valley	42	4,673	0.89%
Tandridge	40	5,408	0.74%
Sutton	39	12,539	0.31%
Bromley	36	16,475	0.22%
Horsham	35	6,797	0.51%
Merton	24	9,927	0.24%

\*only includes supply within 90 mins of Gatwick



### 6.3 NHB Workers Check

6.3.1 The table below details the allocation of NHB workers by LA against the supply of PRS beds for Scenario 1 (Scenario 2 models no NHB workers).

6.3.2 The highest penetration is in Crawley (0.68%). Given the low level of penetration this would not be expected to have a negative impact on the local housing market.

**Table 6-5: Scenario 1 - Workers as a % of PRS beds**

Local Authority	NHB Workers	PRS bed supply (2021)*	Workers as a % of PRS beds
Reigate and Banstead	110	18,251	0.60%
Crawley	115	16,965	0.68%
Mid Sussex	6	19,994	0.03%
Croydon	2	74,402	0.00%
Mole Valley	10	11,546	0.09%
Tandridge	4	10,463	0.03%
Sutton	1	29,455	0.00%
Bromley	1	44,267	0.00%
Horsham	3	18,140	0.01%
Merton	1	51,035	0.00%

\*only includes supply within 90 mins of Gatwick

### 6.4 Essex Allocation

6.4.1 Quod notes that the GGM allocates a small number of HB workers to four Essex LAs in both scenarios (Brentwood, Chelmsford, Epping Forest and Thurrock).

6.4.2 Although unintuitive, this is in line with the methodology set out in Section 3 of this note as the LAs include GZones that are within the 90-minute journey time catchment of Gatwick.

6.4.3 As they meet this threshold, worker distribution is decided by the number of construction workers and distance to Gatwick (as the crow flies). Therefore, because of the high number of construction workers, they still see a handful of workers even though they are relatively far away.

6.4.4 The number of HB construction workers in Essex is summarised in the table below.

**Table 6-6: HB Construction workers in Essex**

Local Authority	Scenario 1	Scenario 2	Residents working in construction (2020)*
Brentwood	3	3	4,424
Chelmsford	4	5	10,075
Epping Forest	1	2	2,520
Thurrock	6	8	7,795
Total	14	18	-

\*only includes supply within 90 mins of Gatwick

## 7 References

Construction Industry Training Board, 2019. Workforce Mobility and Skills in the UK Construction Sector 2018/19, South East Report. Available here: <https://www.citb.co.uk/media/th1cj2si/18-19-workforce-mobility-skills-south-east.pdf>

Department for Levelling Up, Housing and Communities, 2021. Table 100: Number of Dwellings by Tenure and district. Available here: <https://www.gov.uk/government/statistical-data-sets/live-tables-on-dwelling-stock-including-vacants> (accessed 8th September 2022)

Office of National Statistics, 2011a. Census KS605UK – Industry. Available here: [https://www.nomisweb.co.uk/sources/census\\_2011](https://www.nomisweb.co.uk/sources/census_2011) (accessed 8th September 2022)

Office of National Statistics, 2011b. Census LC4405EW - Tenure by household size by number of bedrooms. Available here: [https://www.nomisweb.co.uk/sources/census\\_2011](https://www.nomisweb.co.uk/sources/census_2011) (accessed 8th September 2022)

Office of National Statistics, 2021. Business Register and Employment Survey (BRES), Employment in Construction. Available here: <https://www.nomisweb.co.uk/sources/bres> (accessed 8th September 2022)

## 8 Glossary

### 8.1 Glossary of terms

**Table 8-1**

Term	Description
CIJC	Construction Industry Joint Council

CITB	Construction Industry Training Board
GAL	Gatwick Airport Limited – the company which operates Gatwick Airport
GGM	Gatwick Gravity Model
GZones	GZones are a bespoke geography being used in the transport model.
Home-based workers	Home-based workers are those who will commute from their regular place of residence to the Gatwick site.
LA	Local Authority
Non-home based workers	Non-home based workers are those who will live away from home and take temporary accommodation closer to the Gatwick site
ONS	Office of National Statistics
Output Area	Output Areas are the lowest level of geographical area for census statistics and were first created following the 2001 Census.
Private Rented Sector	Any property that is privately owned and being rented out as housing

## Annex 1

### Scenario 1 Output – 80% HB workers and 20% NHB

Local Authority	HB Workers	NHB Workers	Total Workers
Reigate and Banstead	137	110	247
Crawley	136	115	251
Mid Sussex	43	6	48
Croydon	42	2	45
Mole Valley	33	10	43
Tandridge	32	4	36
Sutton	31	1	32
Bromley	29	1	30
Horsham	28	3	31
Merton	19	1	20
Ealing	18	1	18
Bexley	17	0	18
Brighton and Hove	16	1	17
Wandsworth	15	1	16
Wealden	14	0	15
Newham	14	0	15
Lambeth	14	1	15
Lewisham	14	1	15
Greenwich	13	0	14
Kingston upon Thames	13	1	14
Hillingdon	13	0	13
Havering	12	0	13
Sevenoaks	12	0	13
Hounslow	12	1	13
Medway	12	0	12
Guildford	12	0	12
Epsom and Ewell	11	1	12
Southwark	10	1	11
Elmbridge	10	1	11
Barnet	10	0	10
Waltham Forest	9	0	10
Waverley	9	0	9
Tonbridge and Malling	9	0	9

Local Authority	HB Workers	NHB Workers	Total Workers
Barking and Dagenham	9	0	9
Maidstone	9	0	9
Haringey	9	0	9
Tunbridge Wells	8	0	9
Brent	8	0	9
Richmond upon Thames	8	1	9
Dartford	7	0	7
Redbridge	7	0	7
Woking	7	0	7
Arun	7	0	7
Spelthorne	7	0	7
Lewes	7	0	7
Hammersmith and Fulham	6	1	7
Gravesham	6	0	6
Thurrock	6	0	6
Worthing	6	0	6
Hackney	6	0	6
Runnymede	5	0	6
Tower Hamlets	5	1	6
Rushmoor	5	0	5
Bracknell Forest	5	0	5
Adur	5	0	5
Portsmouth	5	0	5
Surrey Heath	5	0	5
Islington	5	0	5
Westminster	5	1	5
Wokingham	5	0	5
Slough	5	0	5
Windsor and Maidenhead	4	0	5
Chichester	4	0	4
Havant	4	0	4
Chelmsford	4	0	4
Swale	4	0	4

Local Authority	HB Workers	NHB Workers	Total Workers
Basingstoke and Deane	4	0	4
Camden	4	0	5
Eastbourne	4	0	4
East Hampshire	4	0	4
Wycombe	4	0	4
Ashford	4	0	4
Kensington and Chelsea	4	1	4
Reading	4	0	4
Hart District Council	3	0	3
Hastings	3	0	3
Rother	3	0	3
Harrow	3	0	3
St Albans	3	0	3
South Bucks	3	0	3
Brentwood	3	0	3
Canterbury	2	0	2
Three Rivers	2	0	2
Folkestone and Hythe	2	0	2
West Berkshire	2	0	2
Epping Forest	2	0	2
Winchester	1	0	1
Chiltern	1	0	1
South Oxfordshire	1	0	1
Enfield	1	0	1
Watford	1	0	1
Hertsmere	0	0	0
City of London	0	0	0

*n.b. numbers may not sum due to rounding*

## Annex 2

### Scenario 2 Output – 100% HB workers

Local Authority	HB Workers	NHB Workers	Total Workers
Reigate and Banstead	171	0	171
Crawley	170	0	170
Mid Sussex	53	0	53
Croydon	53	0	53
Mole Valley	42	0	42
Tandridge	40	0	40
Sutton	39	0	39
Bromley	36	0	36
Horsham	35	0	35
Merton	24	0	24
Ealing	22	0	22
Bexley	22	0	22
Brighton and Hove	20	0	20
Wandsworth	19	0	19
Wealden	18	0	18
Newham	18	0	18
Lambeth	18	0	18
Lewisham	17	0	17
Greenwich	17	0	17
Kingston upon Thames	16	0	16
Hillingdon	16	0	16
Havering	16	0	16
Sevenoaks	15	0	15
Hounslow	15	0	15
Medway	15	0	15
Guildford	15	0	15
Epsom and Ewell	14	0	14
Southwark	13	0	13
Elmbridge	12	0	12
Barnet	12	0	12
Waltham Forest	12	0	12
Waverley	11	0	11
Tonbridge and Malling	11	0	11

Local Authority	HB Workers	NHB Workers	Total Workers
Barking and Dagenham	11	0	11
Maidstone	11	0	11
Haringey	11	0	11
Tunbridge Wells	10	0	10
Brent	10	0	10
Richmond upon Thames	10	0	10
Dartford	9	0	9
Redbridge	9	0	9
Woking	9	0	9
Arun	8	0	8
Spelthorne	8	0	8
Lewes	8	0	8
Hammersmith and Fulham	8	0	8
Gravesham	8	0	8
Thurrock	8	0	8
Worthing	7	0	7
Hackney	7	0	7
Runnymede	7	0	7
Tower Hamlets	7	0	7
Rushmoor	6	0	6
Bracknell Forest	6	0	6
Adur	6	0	6
Portsmouth	6	0	6
Surrey Heath	6	0	6
Islington	6	0	6
Westminster	6	0	6
Wokingham	6	0	6
Slough	6	0	6
Windsor and Maidenhead	6	0	6
Chichester	5	0	5
Havant	5	0	5
Chelmsford	5	0	5
Swale	5	0	5

Local Authority	HB Workers	NHB Workers	Total Workers
Basingstoke and Deane	5	0	5
Camden	5	0	5
Eastbourne	5	0	5
East Hampshire	5	0	5
Wycombe	5	0	5
Ashford	5	0	5
Kensington and Chelsea	5	0	5
Reading	5	0	5
Hart District Council	4	0	4
Hastings	4	0	4
Rother	4	0	4
Harrow	4	0	4
St Albans	4	0	4
South Bucks	3	0	3
Brentwood	3	0	3
Canterbury	3	0	3
Three Rivers	3	0	3
Folkestone and Hythe	3	0	3
West Berkshire	2	0	2
Epping Forest	2	0	2
Winchester	2	0	2
Chiltern	1	0	1
South Oxfordshire	1	0	1
Enfield	1	0	1
Watford	1	0	1
Hertsmere	1	0	1
City of London	0	0	0

*n.b. numbers may not sum due to rounding*