Gatwick Airport Northern Runway Project

Environmental Statement

Appendix 16.9.3: Assessment of Surface Access Greenhouse Gas Emissions

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1 Introduction

1.1 General

1.1.1 This document forms Appendix 16.9.3 of the Environmental Statement (ES) prepared on behalf of Gatwick Airport Limited (GAL) for the proposal to make best use of Gatwick Airport's existing runways and infrastructure (referred to within this report as 'the Project').

1.1.2 This document provides the Surface Access Greenhouse Gas (GHG) Assessment Technical Appendix for the Project.

1.1.3 The assessment considers several categories of surface access GHG emissions arising from the Project:

- passenger access to and from the Airport;
- airport staff access to and from the Airport;
- transport associated with commercial freight operations at the Airport; and
- retail freight transport required for food and retail offerings within the Airport.

1.1.4 An indicative estimate of retail freight emissions has been developed in order to determine the likely materiality of this emissions category to the overall surface access assessment. This has concluded that retail freight emissions are not material when considered relative to the overall assessment given their small scale. In the absence of appropriate data to inform a full assessment of impacts from retail freight this has been excluded from the assessment. This materiality assessment is set out in Section 2.4.

1.2 Overview of Methodology

1.2.1 Surface transport is a major source of GHG emissions for the UK, and emissions associated with vehicles accessing the Airport are a key element within the comprehensive GHG assessment of the Project.

1.2.2 GAL has developed a set of specific Surface Access Commitments (SAC) (see **ES Appendix 5.4.1: Surface Access Commitments** (Doc Ref. 5.3)) which commit to achieving specific levels of lower emission transport modes for passengers and staff accessing the airport. The SAC informs the future surface access strategy for Gatwick Airport with the Project. Under both future baseline and with-Project scenarios some increase in surface access emissions would be expected to reflect forecast growth in passenger numbers.

1.2.3 As with all elements of the GHG assessment the quantification of emissions arising from surface access is subject to several key metrics which will change over time. These include:

- The demand for surface access journeys arising from changing patterns of passenger, staff and freight services.
- Measures undertaken by GAL to encourage surface access journeys to be undertaken by more efficient, or lower emitting, transport modes.
- External trends that impact on the energy required to deliver these journeys (such as the shift from fossil fuel powered vehicles to electrically powered vehicles within the national transport fleet).

1.2.4 Demand for trips undertaken by passengers and staff, and vehicle movements associated with freight, are quantified as part of the wider strategic transport modelling for the Project. The modelling reflects the commitments made in the SAC. Details on the methodology undertaken to develop strategic transport modelling are provided in the **Transport Assessment Annex B – Strategic Transport Modelling Report** (Doc Ref. 7.4).

1.2.5 External factors considered in the assessment reflect the UK's national commitments to transport decarbonisation. In order to achieve national targets for GHG reduction the UK needs to decarbonise the transport sector, and this will be achieved through a range of legislative and policy mechanisms. A major contributor to decarbonisation of traffic will be the increased uptake of electric vehicles in preference to internal-combustion-engine (ICE) vehicles. Increased electrification of vehicles, in combination with increasingly decarbonised electricity within the UK, will tend to reduce emissions per passenger or vehicle km.

1.2.6 The assessment includes a range of assumptions, informed by appropriate UK guidance, which reflect the policy commitments of the UK Government to decarbonise transport. These assumptions are used to inform the quantification of GHG emissions for future years within the assessment.

1.3 Guidance Used to Inform the Assessment

1.3.1 The surface access assessment considers several strategic policies and guidance documents which are used to inform the assumptions on future surface transport fleet mix and decarbonisation rates. They also provide good-practice guidance on how the assessment of GHG emissions should be carried out.

Transport Appraisal Guidance (TAG)

1.3.2 Transport Appraisal Guidance (TAG) provides guidance on appraising the impact of transport proposals on the built and natural environment, and on people.

1.3.3 Unit A3 Environmental Impact Appraisal, Chapter 4 Greenhouse Gases (Department for Transport, 2022a) provides guidance and assumptions to support the consistent and transparent estimation of GHG emissions resulting from transport schemes.

Transport Decarbonisation Plan (TDP)

1.3.4 The Transport Decarbonisation Plan (TDP) (Department for Transport, 2021) sets out the current challenges and steps to be taken to decarbonise transport, outlining six strategic priorities to deliver a vision of a net zero transport system. The plan builds on the Decarbonising transport: setting the challenge (Department for Transport, 2020) report, which laid out the scale of additional reductions needed to deliver transport's contribution to legally binding carbon budgets and delivering net zero by 2050.

1.3.5 The six strategic priorities are:

- Accelerating modal shift to public and active transport.
- Decarbonising road transport.
- Decarbonising how we get our goods.
- UK as a hub for green transport technology and innovation.
- Place-based solutions to emissions reduction.
- Reducing carbon in a global economy.

1.3.6 The TDP first presents the path to net zero transport in the UK, the wider benefits it can deliver, and sets out the principles that underpin the approach which is to be taken. The second section of the Plan sets out the commitments made by the UK Government and the actions needed to support these and decarbonise transport. Within the TDP the UK Government sets out decarbonisation trajectories for several different transport sectors including buses and coaches, railways, and the road vehicle fleet.

Common Analytical Scenarios (CAS)

1.3.7 The Common Analytical Scenarios (CAS) provide a consistent off-the-shelf set of scenarios for use across modes to cover key areas of national transport uncertainty (Department for Transport, 2022b). The forecasting of travel demand is a key driver of the impacts and benefits a scheme may create, and so the uncertainty around this forecasting is important to understand.

1.3.8 The CAS includes standardised scenarios to bring consistency to the assumptions used in the appraisal of major schemes. These are detailed in Table 11 of the TAG uncertainty toolkit (Department for Transport, 2023) and include factors around:

- growth in the population and the economy;
- distribution of economic activity across the regions;
- technological advances and uptake;
- social and behavioural change; and
- level of decarbonisation and fleet mix ambition.

1.3.9 The CAS projections provide a more ambitious set of decarbonisation scenarios that complement the TAG projections, with higher electric vehicle uptake and better, earlier fuel efficiencies.

DMRB LA 114

1.3.10 Design Manual for Roads and Bridges (DMRB) LA 114 (Highways England (now known as National Highways) 2021) provides the requirements for assessment and reporting the effect on climate of greenhouse gas from construction, operation, and maintenance of National Highways roads projects. While not directly attributed to aviation sector projects it does provide examples of traffic data used to account for the carbon associated with vehicles using highways infrastructure.

2 Baseline

2.1 Baseline Methodology

Passenger and Staff Access

2.1.1 Traffic data reflecting passenger and staff access has been taken from the Gatwick Surface Access Model (GSAM) for the 2018 baseline. Details on how the surface access model has been developed and validated is provided in the **Transport Assessment Annex B – Strategic Transport Modelling Report** (Doc Ref. 7.4).

2.1.2 Passenger and staff access modelling for 2018 was provided in the form of Annual Average Daily Traffic (AADT) and passenger kilometres for:

- passenger access via car (including taxis), rail, and bus and coach; and
- staff access via car, rail, and bus and coach.

2.1.3 The road vehicle split (petrol, diesel, electric) was developed using the fleet mix included in the Common Analytical Scenario Databook for the Vehicle-led Decarbonisation scenario (Department for Transport, 2022b).

2.1.4 Passenger and staff average daily distances were converted to GHG emissions using appropriate carbon intensity factors and were then scaled to a full year of emissions for the baseline year.

Freight Access

2.1.5 Freight trips for 2018 were drawn from the airport forecasts.

2.1.6 Estimated road distances for freight trips were drawn from the 2018 Gatwick Trade Report (Oxford Economics, 2018) that provides estimated freight, by value, by geographic region around Gatwick. An average freight road distance per tonne of 339km was derived from this report.

2.1.7 An average HGV freight carbon intensity per tonne.km was used to convert this data to GHG emissions.

2.2 Data Sources for 2018 Baseline

2.2.1 The activity data sources detailed in Table 2.2.1 were used to develop the 2018 baseline.

Table 2.2.1: 2018 Baseline Data Sources

Data	Source	Provider
Baseline modelled Passenger and Staff travel	Gatwick Surface Access Model (GSAM), the strategic transport modelling developed for DCO	GAL
Freight surface access	Gatwick's Economic Contribution through Trade and Investment (Oxford Economics, 2018)	GAL
GHG intensity factors for vehicles	Greenhouse gas reporting: conversion factors 2018	Department for Business, Energy & Industrial Strategy (BEIS)
Car fleet mix	Common Analytical Scenario Databook 2022	Department for Transport

2.3 Baseline Year Carbon Intensity Factors

2.3.1 The carbon intensity factors detailed in Table 2.3.1 were used for the baseline year.

Table 2.3.1: 2018 BEIS Conversion Factors for Passenger and Staff Surface Access

Activity	2018 factor	Unit
Average Diesel car	0.17753	$kgCO_2e/km$
Average Petrol car	0.18368	$kgCO_2e/km$
Average Battery electric car	0.06504	$kgCO_2e/km$
Regular Taxi	0.15344	$kgCO_2e$/passenger.km
Average Bus (Coach)	0.02801	$kgCO_2e$/passenger.km
National Rail	0.04424	$kgCO_2e$/passenger.km
Grid electricity	0.222	$kgCO_2e/kWh$

2.3.2 For commercial freight the primary activity reflects volume of goods transported to the airport and the associated distance travelled. This provides a tonne.km value to be included within the carbon calculations using BEIS carbon conversion factor detailed in Table 2.3.2.

Table 2.3.2: 2018 BEIS Conversion Factor for Freight Access

Activity	2018 factor	Unit
Average laden HGV (all HGVs)	0.11360	$kgCO_2e$/tonne.km

2.4 Materiality Assessment for Retail Freight

2.4.1 The impacts of retail freight are not well understood as they rely on transportation of goods to Gatwick largely by, and under control of, third parties and which is not readily available to GAL. Impacts from retail freight were not assessed at Preliminary Environmental Information Report (PEIR) stage but it was noted these would be considered as part of the Environmental Statement reporting.

2.4.2 However, it is expected that the emissions arising from retail freight are unlikely to be material to the GHG assessment given their relatively small scale. In the absence of robust data, a materiality exercise was carried out. This assumed an average purchase quantity of 5kg of goods per passenger (reflecting both consumed food and drink and purchased goods). This is considered a conservative assumption considering:

- a typical litre bottle of alcoholic spirits will weight approximately 1 to 1.5kg; and
- a typical meal will weigh less than 1kg.

2.4.3 Additionally, an assumption was made of a 40km transport distance for all retail freight goods.

2.4.4 On this basis Table 2.4.1 provides the estimated impacts from retail freight, assuming a typical HGV emissions rate of 0.10614 $kgCO_2e$/tonne.km.

Table 2.4.1: Estimated Freight Tonnage, Transport Distance, and GHG Emissions

Year	Passengers	Estimated Retail Freight tonne.km	Estimated Emissions (tCO_2e)
2018	45 mppa	9,000,000	955

2.4.5 In 2018 the resultant emissions are less than 1,000 tCO_2e, which can be compared to the baseline surface access emissions for passengers and staff which are in excess of 350,000 tCO_2e. On this basis, freight transport accounts for around 0.3% of passenger and staff surface access emissions. It is therefore considered reasonable to exclude further assessment of retail freight on the basis it is not material to the overall appraisal of GHG emissions and that data to support quantification is not readily available.

3 Future Baseline

3.1 Passenger and Staff Access

Future Baseline Methodology

3.1.1 The calculation methodology aligns with typical carbon emissions quantification whereby 'Activity levels' (in this case passenger or vehicle kilometres) are modelled using the GSAM and are then multiplied by carbon factors (units of GHG emissions per unit of activity) in order to develop an estimate of GHG emissions for the given activity.

3.1.2 Both Activity levels and carbon factors will change in the future as demand patterns and vehicle modes change, and as technological developments change emissions from vehicles.

3.1.3 Further information on the strategic transport modelling for the wider Project can be found in the **Transport Assessment Annex B – Strategic Transport Modelling Report** (Doc Ref. 7.4).

Traffic Data

3.1.4 Traffic data for the future baseline was sourced from the GSAM, and provided for the following years: 2029, 2032, 2038, and 2047.

3.1.5 Data was provided as annual and annual average daily traffic for car (in vehicle.km), rail (in passenger.km) and bus/coach (in passenger.km) for passengers (see Table 3.1.1) and airport employees (see Table 3.1.2). Active travel values were also provided for airport employees; however, this has not been included in the calculations as active travel, walking or cycling, is taken to be zero carbon. Active travel modes are not expected at any material scale for passengers travelling to and from the airport.

3.1.6 Intermediate values between discrete modelled years were linearly interpolated to provide a full time series of projected passenger.km for each year between 2018 and 2047 (the last modelled year). For the period after 2047 modelled traffic levels are kept constant (albeit carbon factors and fleet changes still continue to improve between 2047 and 2050, leading to reducing emissions year-on-year for this period).

Table 3.1.1: AADT from GSAM for Airport Passengers Travelling By Car, Rail, and Bus/Coach (Future Baseline)

Year	Car (incl. taxi) ('000 vehicle/km)	Rail ('000 passenger/km)	Bus/Coach ('000 passenger/km)
2029	6,878	3,441	959
2032	6,599	4,996	1,433
2032	6,713	5,264	1,511
2038	6,981	5,484	1,560
2047	7,254	5,706	1,616

Table 3.1.2: AADT from GSAM for Airport Staff Travelling By Car, Rail, and Bus/Coach (Future Baseline)

Year	Car (incl. taxi)	Rail	Bus/Coach
2029	708	145	63
2032	779	186	83
2032	790	193	85
2038	799	205	90
2047	809	223	97

3.1.7 The future car split (petrol, diesel, electric) was developed using the fleet mix included in the Common Analytical Scenario Databook for the vehicle-led Decarbonisation scenario (Department for Transport, 2022b).

3.1.8 Future decarbonisation rates for other vehicles were estimated from the trajectories included in the Transport Decarbonisation Plan Figures 5, 7 and 9 (TDP) (Department for Transport, 2021). While it is acknowledged that the full transport model does not incorporate how the TDP will impact upon travel modes and distances it is reasonable to expect that the underlying parameters that inform the GHG assessment (eg proportion of electric vehicles in the road fleet) provide the most appropriate profiles for assessing future emissions.

3.1.9 An assumption regarding the factors taken from the TDP is that while these represent sectoral decarbonisation for the vehicle type they are considered to reflect future scenarios where vehicle levels are constant or increasing. As such they are considered conservative when used to provide a per-km decarbonisation trend.

Data Sources for Future Baseline

3.1.10 In addition to data sources for the 2018 baseline, the following data sources and forecasts in Table 3.1.3 have informed the future baseline development.

Table 3.1.3: Future Baseline Data Sources

Data	Source	Provider
Future modelled Passenger and Staff travel	Gatwick Surface Access Model (GSAM), the strategic transport modelling developed for DCO	GAL
GHG intensity factors	Greenhouse gas reporting: conversion factors 2022	BEIS

Data	Source	Provider
GHG intensity factors for cars in future years	Common Analytical Scenario Databook 2022	Department for Transport
GHG intensity factors for buses, trains, and HGVs in future years	TDP (2021)	Department for Transport

Future Baseline Carbon Intensity Factors

3.1.11 Carbon emissions factors vary over time and are published annually by BEIS for use in relation to corporate reporting of that specific year's emissions. Future emissions factors will reduce in line with wider national trends towards decarbonisation, and through improved efficiency of vehicles etc. These forecast effects (electricity decarbonisation, vehicle efficiency) are reflected in the individual future baseline and assessment models. These have been sourced from the CAS (for cars) and from the TDP (for rail and coach/bus).

3.1.12 The carbon factors for bus and rail beyond 2022 have been estimated using trajectories to 2050, as set out within the TDP. These factors account for fuel efficiencies and grid decarbonisation considering the current uncertainty surrounding the move to low carbon alternatives of these types of transport (eg hydrogen vs electricity power vehicles). These carbon factors are provided in Table 3.1.4. In the absence of the precise annual decarbonisation values for bus and rail these have been estimated from charts within the TDP.

Table 3.1.4: Future Baseline Carbon Factors by Transport Mode for 2018 – 2050

Year	Petrol Car (based on BEIS Conversion factor) – (gCO_2e/pass.km)	Diesel Car (based on BEIS Conversion factor) – (gCO_2e/pass.km)	Electric Car (based on BEIS Conversion factor) – (gCO_2e/pass.km)	Bus (estimated from TDP decarbonisation trajectory) (gCO_2e/pass.km)	Rail (estimated from TDP decarbonisation trajectory) (gCO_2e/pass.km)
2018	185.56	178.07	53.83	28.010	44.240
2019	182.01	173.09	44.64	27.790	41.150
2020	176.11	168.44	31.82	27.320	36.940
2021	176.14	168.43	27.25	26.500	36.478
2022	172.29	170.82	23.78	25.681	36.017
2023	171.85	170.82	23.09	24.861	35.555
2024	171.86	170.56	25.41	24.042	35.093
2025	171.41	170.82	21.45	23.222	34.631
2026	171.18	170.56	15.84	22.402	34.170
2027	170.95	170.82	13.22	21.583	33.708
2028	170.72	170.56	12.27	20.763	33.246
2029	170.24	170.56	11.33	19.944	32.784
2030	170.24	170.56	9.06	19.124	32.323
2031	170.24	170.56	7.20	18.513	30.673
2032	170.25	170.30	6.26	17.901	29.024
2033	170.25	170.57	5.51	17.290	27.375
2034	170.25	170.31	4.95	16.678	25.726
2035	170.48	170.31	4.38	16.067	24.077
2036	170.48	170.82	3.62	15.455	22.428
2037	170.01	170.31	3.24	14.844	20.779
2038	170.01	170.06	3.24	14.232	19.130
2039	169.55	168.78	3.05	13.621	17.481
2040	169.55	169.06	2.67	13.010	15.831
2041	170.48	171.32	2.29	11.845	14.556
2042	169.79	170.32	2.10	10.681	13.281
2043	169.33	170.82	2.10	9.516	12.006
2044	169.34	170.82	1.91	8.352	10.730
2045	169.58	170.82	1.72	7.188	9.455
2046	169.81	170.57	1.53	6.023	8.180
2047	169.81	170.82	1.33	4.859	6.904
2048	170.26	170.82	1.34	3.695	5.629
2049	170.48	171.07	1.14	2.530	4.354
2050	170.93	170.82	1.14	1.366	3.078

Vehicle Fleet Proportions Per Fuel Type

3.1.13 Projected proportions of petrol, diesel and electric vehicles as wet out in Table 3.1.5 are taken from the CAS databook.

Table 3.1.5: Future Car Fleet Mix for UK – Vehicle Kilometres By Type

Year	Car – Petrol	Car – Diesel	Car – Electric
2018	48.80%	50.59%	0.61%
2020	50.93%	47.61%	1.46%
2021	51.71%	45.55%	2.74%
2022	51.83%	43.44%	4.73%
2023	51.42%	41.09%	7.49%
2024	51.07%	38.84%	10.10%
2025	50.32%	36.31%	13.36%
2026	49.25%	33.63%	17.12%
2027	47.78%	30.78%	21.43%
2028	45.50%	27.62%	26.88%
2029	42.42%	24.22%	33.35%
2030	38.56%	20.71%	40.73%
2031	34.82%	17.59%	47.59%
2032	31.26%	14.87%	53.87%
2033	27.79%	12.55%	59.66%
2034	24.45%	10.56%	64.99%
2035	21.29%	8.83%	69.88%
2036	18.40%	7.33%	74.28%
2037	15.68%	6.03%	78.29%
2038	13.22%	4.94%	81.85%
2039	10.98%	4.02%	85.00%
2040	8.95%	3.25%	87.80%
2041	7.20%	2.60%	90.20%
2042	5.68%	2.07%	92.25%
2043	4.41%	1.63%	93.97%
2044	3.38%	1.27%	95.34%
2045	2.58%	0.99%	96.43%
2046	1.96%	0.76%	97.27%
2047	1.48%	0.59%	97.93%
2048	1.11%	0.46%	98.43%
2049	0.84%	0.36%	98.80%
2050	0.65%	0.29%	99.07%

Source: CAS Databook, Worksheet VL1

Fuel Efficiencies and Grid Decarbonisation

3.1.14 Fuel efficiencies for road vehicles are forecast to improve each year in future years. Projected changes in vehicle efficiency are taken from the CAS databook. For electric cars, an additional efficiency to account for grid decarbonisation until 2050 has been included.

Table 3.1.6: Annual Change in Fuel Efficiency by Car Fuel Type

Year	Car – Petrol	Car – Diesel	Car – Electric
2018	-	-	-
2019	-0.65%	0.15%	-0.36%
2020	-1.04%	0.00%	-0.59%
2021	-1.05%	0.00%	3.39%
2022	-1.06%	0.00%	3.88%
2023	-0.81%	0.00%	2.92%
2024	-0.81%	0.15%	1.85%
2025	-0.55%	0.00%	1.89%
2026	-0.41%	0.15%	1.67%
2027	-0.28%	0.00%	1.54%
2028	-0.14%	0.15%	1.56%
2029	0.14%	0.15%	1.53%
2030	0.14%	0.15%	1.55%
2031	0.14%	0.15%	1.18%
2032	0.14%	0.30%	1.03%
2033	0.14%	0.15%	0.86%
2034	0.14%	0.30%	0.81%
2035	0.00%	0.30%	0.82%
2036	0.00%	0.00%	0.71%
2037	0.27%	0.30%	0.71%
2038	0.27%	0.45%	0.72%
2039	0.55%	1.19%	0.66%
2040	0.54%	1.03%	0.67%
2041	0.00%	-0.29%	0.67%
2042	0.40%	0.29%	0.62%
2043	0.67%	0.00%	0.62%
2044	0.67%	0.00%	0.62%
2045	0.53%	0.00%	0.56%
2046	0.40%	0.15%	0.57%
2047	0.39%	0.00%	0.57%
2048	0.13%	0.00%	0.51%
2049	0.00%	-0.15%	0.51%
2050	-0.26%	0.00%	0.52%

Source: adapted from CAS Databook, Worksheet VL2

Table 3.1.7: Electricity Grid Decarbonisation

Year	Electricity Emissions Factors to 2100 ($kgCO_2e$)
2018	0.241
2019	0.218
2020	0.194
2021	0.213
2022	0.155
2023	0.143
2024	0.149
2025	0.129
2026	0.096
2027	0.072
2028	0.062
2029	0.053
2030	0.049
2031	0.041
2032	0.032
2033	0.025
2034	0.020
2035	0.020
2036	0.019
2037	0.018
2038	0.018
2039	0.017
2040	0.016
2041	0.015
2042	0.014
2043	0.009
2044	0.008
2045	0.008
2046	0.008
2047	0.005
2048	0.005
2049	0.003
2050	0.002

Source: Department for Business, Energy & Industrial Strategy (2023a) Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal.

3.2 Freight Access

Future Baseline Methodology

3.2.1 Future freight quantities were taken from the freight forecasts included in **ES Appendix 4.3.1: Forecast Data Book** (Doc Ref. 5.3).

3.2.2 Commercial freight projections are provided for the without-Project and with-Project scenarios in Table 3.2.1. These are provided as forecasts for individual years 2018, 2029, 2038 and 2047. Intermediate values have been interpolated. Beyond 2047 freight tonnage is kept constant.

Table 3.2.1: Commercial Freight Tonnage Projection (values in bold show data points, intermediate values interpolated)

Tonnages	Without-Project	With-Project
2018	157,474	157,474
2019	162,726	162,726
2020	1679,78	167,978
2021	173,230	173,230
2022	178,483	178,483
2023	183,735	183,735
2024	188,987	188,987
2025	194,239	194,239
2026	199,491	199,491
2027	208,895	216,599
2028	218,300	233,708
2029	227,704	250,816
2030	230,126	268,752
2031	232,547	286,689
2032	234,969	304,626
2033	238,224	307,680
2034	241,479	310,733
2035	244,733	313,787
2036	247,988	316,841
2037	251,243	319,895
2038	254,498	322,949
2039	258,380	325,804
2040	262,261	328,660
2041	266,143	331,515
2042	270,024	334,370
2043	273,906	337,226
2044	277,787	340,081
2045	282,024	342,864
2046	286,261	345,647
2047	290,499	348,430
2048	290,499	348,430
2049	290,499	348,430
2050	290,499	348,430

3.2.3 In addition to data sources for the 2018 baseline, the following data sources and forecasts in Table 3.2.2 have informed the future baseline development for freight surface access.

Table 3.2.2: Future Baseline Data Sources

Data	Source	Provider
Freight surface access	ES Appendix 4.3.1: Forecast Data Book (Doc Ref. 5.3).	GAL
GHG intensity factors	Greenhouse gas reporting: conversion factors 2022	BEIS
GHG intensity factors for other vehicles	TDP	UK Government

Future Baseline Carbon Intensity Factors

3.2.4 As stated in Section 3.1 above, future emissions factors will differ from the carbon emissions factors published annually by BEIS, reducing in line with national trends in decarbonisation and improved engine efficiency. The future carbon factors for heavy duty vehicles (HDV) are not currently available, however for the purposes of these calculations using the 2022 BEIS average laden HGV factor, a percentage rate of decarbonisation for freight has been taken from the Transport Decarbonisation Plan (Department for Transport, 2021). In the absence of the precise annual decarbonisation values for bus and rail these have been estimated from the charts within the TDP.

4 Future With Project

4.1.1 The development of the assessment of the Project scenario follows the same approach as for development of the baseline, whereby activity data for future years is taken from strategic modelling, and commercial freight forecasts.

4.1.2 All carbon intensities and fleet mixes within the with-Project scenario are the same as are used for the future baseline modelling.

4.2 Passenger and Staff Access

4.2.1 Traffic data, as sourced from the GSAM, was provided for the following years:

- 2018 – Baseline
- 2029 – for the Project
- 2032 – for the Project
- 2038 – for the Project
- 2047 – for the Project

4.2.2 Data was provided as for the Project for airport passengers (Table 4.2.1) and airport staff (Table 4.2.2).

Table 4.2.1: AADT from GSAM for Airport Passengers Travelling By Car, Rail, and Bus/Coach

Year	Car (incl. taxi) ('000 vehicle/km)	Rail ('000 passenger/km)	Bus/Coach ('000 passenger/km)
2018	6,319	3,108	867
2029 NRP	6,538	5,554	1,723
2032 NRP	7,425	6,625	2,060
2038 NRP	7,742	7,105	2,193
2047 NRP	7,937	7,494	2,295

Table 4.2.2: AADT from GSAM for Airport Staff Travelling By Car, Rail, and Bus/Coach

Year	Car (incl. taxi)	Rail	Bus/Coach
2018	709	139	61
2029 NRP	776	213	101
2032 NRP	845	232	113
2038 NRP	856	244	117
2047 NRP	866	259	122

5 Evaluation of Surface Access GHG Emissions

5.1 2018 Baseline Emissions

5.1.1 Current baseline emissions modelled (not measured data) for 2018, provided by passengers and employees is provided in Table 5.1.1.

Table 5.1.1: 2018 Baseline Surface Access Emissions

Year	Passengers ($MtCO_2e$)	Staff ($MtCO_2e$)	Freight ($MtCO_2e$)
2018	0.332	0.031	0.006

5.2 Future Baseline Emissions

5.2.1 Future baseline emissions for surface access, in the absence of the Project, are provided in Table 5.2.1.

Table 5.2.1: Future Baseline Emissions from Surface Access

Year	Passengers ($MtCO_2e$)	Staff ($MtCO_2e$)	Freight ($MtCO_2e$)
2018	0.332	0.031	0.006
2019	0.324	0.030	0.006
2020	0.311	0.029	0.006
2021	0.309	0.029	0.006
2022	0.303	0.028	0.006
2023	0.297	0.028	0.007
2024	0.292	0.027	0.007
2025	0.285	0.027	0.007
2026	0.275	0.026	0.007
2027	0.265	0.025	0.007
2028	0.253	0.023	0.007
2029	0.237	0.022	0.007
2030	0.220	0.020	0.006
2031	0.202	0.018	0.006
2032	0.184	0.016	0.006
2033	0.168	0.014	0.005
2034	0.152	0.012	0.005
2035	0.137	0.011	0.005
2036	0.122	0.010	0.005
2037	0.109	0.008	0.004
2038	0.097	0.007	0.004
2039	0.085	0.006	0.003
2040	0.074	0.005	0.003
2041	0.065	0.005	0.003
2042	0.056	0.004	0.002
2043	0.049	0.003	0.002
2044	0.042	0.003	0.001
2045	0.036	0.002	0.001
2046	0.030	0.002	0.001
2047	0.025	0.002	0.001
2048	0.020	0.001	0.001
2049	0.016	0.001	0.001
2050	0.012	0.001	0.001

5.3 Future Project Emissions

5.3.1 The Project is assumed to open in 2029. Emissions arising from the Project in opening year are provided in Table 5.3.1.

Table 5.3.1: Future With Project Surface Access Emissions

Year	Passengers ($MtCO_2e$)	Staff ($MtCO_2e$)	Freight ($MtCO_2e$)
2018	0.332	0.031	0.006
2019	0.324	0.030	0.006
2020	0.311	0.029	0.006
2021	0.309	0.029	0.006
2022	0.303	0.028	0.006
2023	0.297	0.028	0.007
2024	0.292	0.027	0.007
2025	0.285	0.027	0.007
2026	0.275	0.026	0.007
2027	0.265	0.025	0.007
2028	0.253	0.023	0.007
2029	0.246	0.020	0.007
2030	0.238	0.018	0.008
2031	0.227	0.017	0.008
2032	0.216	0.016	0.008
2033	0.197	0.014	0.007
2034	0.179	0.013	0.007
2035	0.162	0.011	0.006
2036	0.146	0.010	0.006
2037	0.131	0.009	0.005
2038	0.117	0.008	0.005
2039	0.104	0.007	0.004
2040	0.091	0.006	0.004
2041	0.080	0.006	0.003
2042	0.070	0.005	0.003
2043	0.061	0.005	0.002
2044	0.052	0.004	0.002
2045	0.045	0.003	0.001
2046	0.038	0.003	0.001
2047	0.031	0.002	0.001
2048	0.025	0.002	0.001
2049	0.020	0.002	0.001
2050	0.014	0.001	0.001

5.3.2 The net change arising from the Project for the period 2018-2050 is provided in Table 5.3.2.

Table 5.3.2: Net Change in GHG Surface Access Emissions Arising from the Project

Year	Net Change ($MtCO_2e$)
2018	-
2019	-
2020	-
2021	-
2022	-
2023	-
2024	-
2025	-
2026	-
2027	-
2028	-
2029	0.007
2030	0.018
2031	0.026
2032	0.033

Year	Net Change ($MtCO_2e$)
2033	0.031
2034	0.029
2035	0.027
2036	0.025
2037	0.023
2038	0.022
2039	0.020
2040	0.018
2041	0.017
2042	0.015
2043	0.014
2044	0.012
2045	0.010
2046	0.009
2047	0.008
2048	0.006
2049	0.005
2050	0.003

6 Mitigation

6.1.1 The traffic modelling used for the assessment incorporates the measures contained in **ES Appendix 5.4.1: Surface Access Commitments** (Doc Ref. 5.3).

7 References

Department for Business, Energy & Industrial Strategy (2018) *Government conversion factors for company reporting of greenhouse gas emissions.*

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Department for Transport (2022b) *Common analytical scenarios Databook for the Vehicle-lead Decarbonisation scenario.*

Department for Transport (2023) *TAG uncertainty toolkit.*

National Highways (2021) *Design Manual for Roads and Bridges LA 114 Climate.*

Oxford Economics (2018) *Gatwick's Economic Contribution through Trade and Investment.*

8 Glossary

8.1 Glossary of Terms

Table 8.1.1: Glossary of Terms

Term	Description
AADT	Annual Average Daily Traffic
BEIS	UK Government Department for Business Energy and Industrial Strategy
CAS	Common Analytical Scenarios
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalent
DCO	Development Consent Order
DMRB	Design Manual for Roads and Bridges
ES	Environmental Statement
GAL	Gatwick Airport Limited
GHG	Greenhouse Gas
GSAM	Gatwick Surface Access Model
HDV	Heavy Duty Vehicle
HGV	Heavy Goods Vehicle
ICE	Internal Combustion Engine
mppa	Million passengers per annum
NRP	Northern Runway Project
PEIR	Preliminary Environmental Information Report
SAC	Surface Access Commitments
TAG	Transport Appraisal Guidance
TDP	Transport Decarbonisation Plan