Gatwick Airport Northern Runway Project

Transport Assessment

Book 7

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Executive summary

Introduction

1. This document is the Transport Assessment (TA) which accompanies the Development Consent Order (DCO) application for the Northern Runway Project at Gatwick Airport ('the Project'). It summarises the assessment of the potential transport impacts of the Project.

The Project

2. The Project includes the following key components:

- amendments to the existing northern runway to enable dual runway operations;
- reconfiguration of taxiways, piers, stands and other airfield facilities and extensions to the existing airport terminals (north and south);
- provision of additional hotel and office space;
- provision of reconfigured car parking, including new car parks;
- surface access (including highway) improvements;
- demolition and relocation of Central Area Recycling Enclosure (CARE) facility;
- water treatment facilities;
- reconfiguration of existing utilities, including surface water, foul drainage and power; and
- landscape/ecological planting and environmental mitigation.

3. It is anticipated that by 2047 these improvements could increase airport capacity up to 80.2 million passengers per annum (mppa), compared to a forecast throughput in the absence of the Project of 67.2 mppa within the same timescale. This represents an increase of approximately 13 mppa.

4. Gatwick Airport Limited (GAL) has developed a number of Surface Access Commitments (SACs) which are set out in detail in **ES Appendix 5.4.1: Surface Access Commitments** (Doc Ref. 5.3). These represent the outcomes which GAL commits to achieving in relation to surface access at the Airport as part of the Project, together with commitments to surface access interventions and to ongoing monitoring.

5. Highway works are also proposed as part of the Project. These comprise:

- new highway layout in the vicinity of South Terminal Roundabout, providing full grade separation;
- enhancement of the eastbound M23 Gatwick Spur as part of the South Terminal Roundabout improvements;
- new highway layout in the vicinity of North Terminal, including partial grade-separation, removal of the Airport Way eastbound connection from North Terminal Roundabout and adding a new signal-controlled junction on the A23 London Road;
- improvements to Longbridge Roundabout; and
- new and enhanced active travel routes providing safe connections from surrounding areas.

6. The design of the highway works has been the subject of detailed engagement with National Highways and the local highway authorities.

7. Three new car parks would be implemented in the absence of the Project, adding 6,570 spaces and increasing the future baseline car parking provision to around 53,270 spaces in the absence of the Project. The Project would result in the loss of 8,905 car parking spaces, which would need to be re-provided, together with a net increase of up to 1,100 car parking spaces which brings the total to 54,370 spaces.

Site context

8. The airport is located in West Sussex, close to the boundary with Surrey and approximately 38km south of central London. The London to Brighton railway line and the A23 are adjacent to South Terminal and the M23 motorway runs north to south around 1.5km to the east of the Airport.

9. Gatwick can be accessed directly from the national strategic road network via the M23 motorway at Junction 9. The A23, which links Brighton to London, runs parallel to the M23 between Crawley and the M25, continuing into London via Croydon.

10. Gatwick is a transport hub, where a range of transport modes connect, acting as both a destination and an interchange for passengers. It has 24-hour rail, bus and express coach access. The Airport has a fully integrated railway station on the Brighton Main Line and is also served by trains on the North Downs Line and Arun Valley Line. An inter-terminal shuttle system operates between the North and South Terminals. North and South Terminals are also served by a range of bus and coach services.

11. This connectivity means that the airport achieved a high public transport mode share of around 47% prior to the pandemic. In pursuing an increase in public transport mode share, Gatwick has consistently out-performed other major UK airports over the last 10-15 years, seeing considerable growth in the percentage of trips using sustainable modes. The emerging post-pandemic data suggests the Airport is still in recovery, with public transport services not yet returning to pre-pandemic levels and some disruption associated with rail strikes. The Airport is accessible by walking and cycling, with routes into the Airport from Povey Cross, Horley and Crawley. National Cycle Network Route 21 (NCN21) provides a continuous route between Crawley, Gatwick, Horley, Reigate and London.

12. Around six million people live within 40km of the Airport, and around 17 million live within 80km. Approximately 9.3 million people live within a 60-minute journey time, and around 18.6 million people live within a 90-minute journey time.

Policy and planning context

13. The assessment of the impacts of the Project in relation to transport have considered a wide range of national, regional and local policy. The key national policy statements and frameworks include:

- The Airports NPS (DfT, 2018) – although this primarily relates to a new runway at Heathrow Airport, it is a relevant consideration in the determination of other applications for airport infrastructure in the southeast of England;
- The National Policy Statement (NPS) for National Networks (DfT, 2015) – which provides the policy context against which decisions on major road and rail projects are made and has been considered in relation to the highway improvements proposed as part of the Project;
- The Transport Decarbonisation Plan (DfT, 2021) – which sets out the government's commitments and the actions to decarbonise the transport system in the UK; and
- The National Planning Policy Framework (Ministry of Housing, Communities and Local Government, 2021) – which sets out the strategic planning policies for England.

14. Consideration has also been given to a range of other national policy and strategy documents, including the DfT's road investment, strategic aviation framework and 'Jet Zero' strategies, Network Rail's strategic business and delivery plans, and national guidance on active travel.

15. National transport-related guidance such as that in the Design Manual for Roads and Bridges (DMRB) (DfT), Transport Analysis Guidance (TAG) (DfT) and station capacity planning guidance (Network Rail) has informed the design and modelling work which has been undertaken.

16. Regional and local policy considered includes Local Transport Plans and other transport-related strategies (such as those for active travel) where they exist, for the adjacent County Councils, together with local highway authority design standards where relevant.

Assessment methodology

Model suite

17. For this assessment, GAL has developed a suite of strategic modelling tools. The development of these tools has been undertaken in accordance with TAG and shared with key stakeholders. The suite comprises three core model components:

- The demand model – which deals with the distribution and travel mode of non-airport demand and the travel mode for airport demand (employees and passengers);
- Assignment models – which establish the likely routes taken by travellers to and from the Airport; and
- Simulation models – which are used for the detailed operational assessment of transport network performance.

18. The public transport assignment model is based on the DfT's PLANET South model, for the rail network, and a new EMME model for bus and coach travel. The rail model extends from the Sussex Coast to central London and northwards to locations such as Stevenage, Peterborough, and Cambridge. The bus and coach model includes all bus services operating in the area around the Airport together with nationwide coach services.

19. The strategic highway assignment model uses SATURN software and has been developed from National Highways' South East Regional Transport Model (SERTM), refining that model locally to add detail to the modelled network around the Airport. The highway model covers a wide area of south and east England, with increased detail in an area bounded approximately by Brighton, Chichester, Guildford, Woking, the northern arc of the M25, Dartford, Sevenoaks, Tonbridge, Tunbridge Wells, and Hastings.

20. A highway microsimulation model has been developed in VISSIM software for the network in the immediate vicinity of the Airport, extending from M23 Junction 9 to Longbridge Roundabout, including North and South Terminals, and along the A23 southwards into north Crawley. This has been used to provide greater detail on the operation of the highway network in this area.

21. A Legion simulation model has also been used to examine the performance of Gatwick Airport station. This has been developed from a Network Rail model which was originally used to support the Gatwick Station Project, which is now under construction.

Assessment years

22. The transport modelling is based on data originally collected in 2016 during a period where the transport network was operating in a relatively stable condition. During the period of 2018 to 2019, the introduction of the Smart Motorways Scheme between Junctions 8-10 on the M23, and changes in railway timetabling through 2018 and 2019 led to a period of variability in access to the airport. 2016 was considered the best period pre-COVID to base the modelling.

23. The modelling baseline year is 2016, based on a 2016 calibrated and validated transport model. This assessment considers the performance of the transport networks in the future baseline scenario (without the Project) and with the Project, for the following years:

- 2029, representing the assumed first full year of operation of the new northern runway;
- 2032, representing an interim assessment year which assumes that all arrival and departure slots on the new runway have been filled in the three years since runway opening[1]; and that the highway works which form part of the Project have been completed by this year; and
- 2047, representing a year 15 years after the completion of the highway works, reflecting a requirement in DMRB to assess the impacts of a new highway scheme at this time horizon. This scenario also reflects continued steady growth in air passenger numbers between 2032 and 2047.

24. The assessment considers the operational phases of the Project in each of these years, by comparison with the situation in the same year in the future baseline (without the Project). It also considers two construction phases for the Project: one during the peak of airfield construction prior to the northern runway opening and one during the most complex phase of highway construction after the new runway has opened.

25. The assessment is based on a busy June weekday. This represents the conditions anticipated during non-school holiday periods of the year, when non-airport travel demand is at its highest. Daily airport demand on a peak June weekday is exceeded on fewer than 20 weekdays in a year, generally in the school summer holiday period when background traffic is around 2% to 6% lower than in June. The use of a June weekday is an appropriate and reasonable case for the assessment.

Current transport network, operations and performance

Existing airport travel demand

Passengers

26. The COVID-19 pandemic had a severe impact on the global aviation industry in 2020. Gatwick experienced a significant reduction in passenger traffic levels because of restrictions on air travel and reduced passenger confidence. Following the removal of the UK's travel restrictions in April 2022, airline capacity and passenger demand returned. During summer 2022, demand at Gatwick was over 80% of pre-pandemic levels. There is confidence that passenger and airline demand at Gatwick will return to previous levels in the next few years and then continue to grow.

27. Recent CAA passenger survey data shows that just over 80% of Gatwick's air passengers travel from or to destinations in London or the South East. Greater London is the largest source market (42%) and the nearby counties of Kent, Surrey, East and West Sussex account for a further 27%.

28. In 2012, GAL set a target of achieving a 45% public transport mode share as the airport continued to grow beyond 40 mppa. GAL achieved this in 2017, with 39% of passengers coming to the Airport by rail and 6% by bus and coach. Almost 40% of passengers came by private car, either as pick-up and drop-off trips to terminal forecourts or to park their car at the Airport.

29. CAA surveys up to the first quarter of 2020 showed a continuing improvement in public transport mode share year-on-year, up to

[1] Opening of the northern runway is the date at which commencement of dual runway operations occurs, meaning the first day on which commercial air transport movements (excepting diverted or emergency flights) are scheduled to depart from both the northern runway and the current main runway

47.4% in 2019 and 47.8% in the year to March 2020. Post-pandemic mode share data are now emerging. In 2022 the annualised public transport mode share for Gatwick Airport was 43.7%, indicating that the Airport is still in recovery, with public transport services not yet returning to pre-pandemic levels and the effect of rail strikes and related disruption.

Staff

30. Nearly 24,000 people worked at Gatwick in 2016. A staff survey in that year showed that many staff lived within a short distance of the airport with almost half (47%) living within a 16km (10 miles) radius. Half of all employees' journeys to work took 30 minutes or less.

31. The 2016 staff travel survey showed that the sustainable transport mode share for employees was 31% excluding car share (39% including car share).

Existing transport provision

Rail

32. Gatwick Airport station has regular, direct daily services from over 120 stations. Over 1,000 stations are accessible with one interchange. From Gatwick Airport station, it is possible to travel directly to the City of London via the Thameslink route (with interchange for Docklands at London Bridge station on Thameslink and at Farringdon on the Elizabeth Line) and to the West End via London's Victoria station. These services also directly connect the airport to key interchanges at Croydon, Clapham Junction and Brighton.

33. Gatwick Airport enjoys a very high level of rail connectivity, with 19 trains to and from central London in the morning peak hour (nine to London Bridge and ten to London Victoria). Train services can be busy in peak periods in the peak direction, into London in the morning and towards Brighton and the south coast in the evening. However, train services between Gatwick Airport and London now provide capacity for nearly 30,000 passengers per direction per hour overall.

34. The current Gatwick Airport station is capacity constrained despite a number of upgrades in the past. Proposals to further enhance capacity were announced by the Department for Transport in July 2019 and construction of these is under way and due to be completed in 2023.

Bus and coach

35. Gatwick is served by frequent bus and coach services at both North and South Terminals. The operators include Metrobus, National Express, Megabus and Oxford Bus Company. The majority of local bus services are provided by Metrobus and are used by airport staff and some air passengers, as well as by rail passengers accessing Gatwick Airport station.

36. The airport is served by a range of coach services to a variety of destinations around the country, with the majority connecting the Airport to central London. Coach services have yet to fully return to pre-pandemic frequencies but are expected to do so as demand returns to the Airport.

Active travel

37. Very few air passengers walk or cycle to Gatwick Airport and around 4% of staff travel to Gatwick by walking or cycling.

38. Key active travel routes in the area include National Cycle Network Route 21 (NCN21) between Crawley, Gatwick, Horley, Reigate and London. To the south of Crawley, Route 20 continues south towards Brighton and Route 21 continues east towards Royal Tunbridge Wells before heading south towards Eastbourne.

39. On the wider highway network, there is a cycle track and shared pedestrian/cycle space on the A23 London Road between North Terminal and the Longbridge Roundabout. Signal controlled pedestrian crossings are located on all four arms of the Longbridge Roundabout. There are no other pedestrian or cycle facilities along the A23 or M23 to the east.

40. There are pedestrian pathways along internal access and forecourt roads, where pedestrian movements are considered to be appropriate. Zebra crossings are provided at appropriate locations and signage is also provided to direct passengers to the terminals.

Highways

41. Gatwick can be directly accessed from the M23 motorway at Junction 9. The typical journey time from Gatwick to the M25 via the M23 is less than ten minutes.

42. National Highways' M23 Smart Motorway project opened in 2020 and added additional capacity to the strategic network serving Gatwick at peak times. The construction of the Smart Motorway project led to highway disruption between 2018 and 2020, which meant that representative traffic data for the M23 and surrounding roads could not be collected during this period.

43. The A23 passes the Airport to its east and north, connecting Brighton via Crawley, Redhill and Croydon to central London. The A23 connects with the A272 and A27 east-west routes, placing the whole of the south coast between Southampton and Folkestone within approximately 1 hour 20 minutes of the airport.

44. GAL has allocated funding in its Capital Investment Programme to improve South and North Terminal roundabouts to cater for predicted growth without the Project over the coming years.

Forecourts and car parks

45. The North Terminal forecourt is accessed from North Terminal Roundabout and includes access to two multi-storey car parks, three hotels and an area for car rental. There is a bus station on Furlong Way to the south and additional bus stops by the terminal entrance. Drop-off activity currently takes place on Northway, located between the car parks and hotels.

46. The South Terminal forecourt is accessed from South Terminal Roundabout. It includes access to three multi-storey car parks, the Hilton hotel, and an area for car rental. There is a separate coach park on the approach to the forecourt. Bus stops are located by the terminal entrance; drop-off activity takes place on Coach Road. Access to the multi-storey car parks is from Westway.

47. In Spring 2021, GAL introduced forecourt charging at North and South Terminal which is enforced by Automatic Number Plate Recognition. Free drop-off is provided in North and South Terminal long-stay car parks for those who do not wish to pay the forecourt charges.

48. There are currently some 46,700 car parking spaces 'on-airport', including staff parking (around 6,100 spaces), and a further 21,200 authorised spaces 'off-airport'. Gatwick charges air passengers for use of the car parks.

Current Airport Surface Access Strategy

49. GAL is committed to low-carbon growth and its Decade of Change strategy (GAL, 2021) sets ambitious carbon reduction targets. These inform headline mode share targets established for the future baseline, together with surface access measures and interventions to help achieve those targets, all of which are outlined in the latest Airport Surface Access Strategy 2022-2030 (ASAS) (GAL, October 2022).

50. The current ASAS outlines four objectives which have been developed with the Transport Forum Steering Group:

- Objective 1: Continue to innovate as the best connected and most accessible UK airport, delivering integrated surface

transport and sustainable growth by meeting the needs of customers and airport colleagues;
- Objective 2: Manage and monitor behaviour change as a result of major road and rail infrastructure projects, securing safe, efficient and reliable journeys for all users of the transport network, with effective communication;
- Objective 3: Collaborate with key stakeholders and communities in the region to maximise the economic potential from efficient road and rail access to Gatwick; and
- Objective 4: Deliver a new standard in sustainable surface access in support of Gatwick's Decade of Change, using technology, management, information and infrastructure measures to achieve greater choice and efficiency.

Surface Access Commitments for the Project

51. The SACs for the Project contain commitments to achieving certain mode shares for passenger and staff journeys; measures which GAL will put in place to support achieving those mode shares; and the approach to monitoring and reporting to identify progress towards achieving the mode share commitments.

52. In due course GAL will produce a new ASAS as the airport develops, to refresh its strategy and to reflect the SACs for the Project. The future ASAS will be informed by the SACs, providing the wider policy and evidential context within which those commitments are delivered.

53. The SACs are secured as a legally binding commitment under the DCO. Through the SACs, GAL commits to achieving the following annualised mode shares three years after the opening of the new northern runway:

- A minimum of 55% of air passenger journeys to and from the Airport to be made by public transport (rail, local bus, regional/express bus or coach or another commercially-operated shared transport service for public use);
- A minimum of 55% of staff journeys to and from the Airport to be made by public transport, shared travel (a journey made by private car containing more than one person) and active modes (walking and cycling);
- A reduction of air passenger drop-off and pick-up car journeys at the Airport to a mode share of no more than 12% of surface access journeys; and
- A least 15% of airport staff journeys to work originating within 8km of the Airport to be made by active modes.

54. GAL has developed a series of surface access interventions which form part of the SACs. In summary these comprise:

- Financial support for enhanced regional express bus or coach services and local bus services;
- Delivery of active travel infrastructure improvements within the highway works which form part of the Project;
- Enhanced on-site facilities for active travel users;
- Provision of 1,100 net additional car parking spaces for air passengers, to cater for expected increases in parking demand once the new runway is open;
- Funding to support local authorities in implementing additional parking controls or in enforcement action against unauthorised off-airport passenger parking sites;
- Using charges for car parking and forecourt access to influence passenger travel choices;
- Maintaining the number of staff car parking spaces at or below current levels of provision;
- Introducing measures to discourage single-occupancy private vehicle use by staff, incentivise active travel use and increase staff public transport discounts;
- Use of the Sustainable Transport Fund to support sustainable transport initiatives; and
- Provision of a Transport Mitigation Fund to support additional measures should these be needed as a result of growth related to the Airport.

55. GAL will be able supplement these committed measures with other initiatives and interventions if and when appropriate, although the modelling for this assessment indicates that the committed measures alone are sufficient to achieve the committed mode shares.

56. GAL recognises that it is necessary to monitor the actual outcomes that result from deploying the measures listed above and to provide periodic review of whether, and assurance that, the committed mode shares are being achieved. GAL is therefore committing to a monitoring regime and the production of Annual Monitoring Reports.

57. The measures in the SACs are included in the strategic modelling. The measures would lead to an increase in annual average air passenger public transport mode share from around 45% (prior to the Covid-19 pandemic) to 54% in 2029, 55% in 2032 and 56% in 2047 in the with Project scenario. For employees, the strategic model shows that a sustainable transport mode share of up to 50% would be expected in the future baseline, increasing to up to 56% in the with Project scenarios.

Demand forecasts: future baseline and Project scenarios

58. Annual air passenger demand forecasts for the assessment years suggest that by 2029, annual demand would be 57.3mppa in the future baseline. Opening of the northern runway would generate around 4 mppa more demand, giving demand of 61.3 mppa with the Project. Growth to 2032 is forecast take annual demand to 72.3 mppa with the Project compared to 59.4 mppa in the future baseline. By 2047, demand with the Project would increase further up to 80.2 mppa, compared to a forecast of 67.2 mppa in the future baseline.

59. The forecasts indicate that the number of on-airport employees would increase progressively and reach approximately 29,700 by 2047 for the future baseline scenario and approximately 32,800 by 2047 for the with Project scenario, a difference of 3,100 employees.

60. Growth in non-airport travel demand has been estimated using industry standard methodology. This is based on published Local Plan data where it exists and then extrapolated.

61. Given the continuing uncertainty surrounding the third runway at Heathrow, the assessment assumes that a third runway does not come forward at Heathrow. If Heathrow third runway was to come forward, air passenger demand at Gatwick would be likely to decline in the period immediately following the opening of R3. However, by 2047, there would be little difference between air passenger demand at Gatwick with or without Heathrow R3.

Public transport: rail

Approach

62. The assessment of the impact of the Project on rail services is based on the levels of crowding experienced by passengers. The following aspects have been considered:

- The line loading (number of passengers on trains) on departure from each station, which indicates total demand on these services;
- The Seated Load Factor, which shows how many seats on trains are occupied. A value of 1.0 indicates all seats occupied; and
- The percentage of standing capacity occupied, which illustrates crowding when standing passengers are expected.

63. The assessments are based on hourly forecasts and individual trains may have higher or lower levels of crowding depending on variations in supply and demand within the hour – these variations are not modelled.

64. The model contains all rail services in the modelled area. However, the assessment focuses on services on the North Downs Line, Arun Valley Line and Brighton Main Line, as these lines provide direct connections to Gatwick Airport and therefore carry all airport-related rail passengers at some stage of their journey. Based on the assessment on line loading and seating and standing capacity, the impact of the Project on crowding on other rail lines is not expected to be significant.

65. Crowding impacts have been assessed for both the Network and Project peak periods. These are defined as follows and are based on the station after which the highest line loading occurs:

- Network peak hour – The hour with highest aggregate line loading, meaning that rail passengers are most sensitive to an increase in passengers and the effects of crowding; and
- Project peak hour – The hour with the highest increase in rail passengers as the result of the Project.

66. Committed third-party rail improvements have been included in the modelling. They include:

- Elizabeth Line services;
- Thameslink service frequency increase (from 20 tph in the modelled baseline to 24 tph in the future baseline scenarios);
- North Downs Line service frequency increase from 2 tph in the modelled baseline to 3 tph in the future baseline scenarios (increasing frequency from 1 tph to 2 tph at Gatwick Airport);
- LUL services on the Northern Line Extension to Battersea Power Station/Nine Elms; and
- LUL/DLR frequency and capacity improvements.

Arun Valley line

67. The impact of the Project on Arun Valley Line services is expected to be very small. Although Seated Load Factors would generally be slightly higher with the Project than in the future baseline, the highest Seated Load Factor of 1.00 would be unchanged from the future baseline. This means that there would be sufficient capacity in all years on the Arun Valley Line services with the Project.

North Downs line

68. The impact of the Project on North Downs Line services is expected to be very small. Seated Load Factors would be slightly higher with the Project than in the future baseline. There would be sufficient seated capacity in all years on the North Downs Line in the with Project scenario, except in 2047 (07:00-08:00) where the Seated Load Factor would increase to just above 1.0 between Reigate and Redhill. This would also occur in the future baseline and would not be worsened by the Project. It indicates low density standing on the short journey leg between Redhill and Reigate, and there would still be spare standing capacity at this time.

Brighton Main Line (BML)

Network peak assessment

69. In the northbound network peak hour, in the morning, the highest increase in line loading due to the Project would be around 330 passengers (2.4%) in 2047. In 2047 the Seated Load Factor would exceed 1.0 on fast services on most of the route north of Gatwick Airport. The Project would add around three percentage points to the standing capacity occupied, which would be around 20% between Gatwick Airport and East Croydon, and around 50% between East Croydon and London Bridge and London Victoria. Spare standing capacity would remain available.

70. In the southbound network peak hour, in the evening, the highest increase in line loading due to the Project would be around 570 passengers (4.3%) in 2047 between central London and Gatwick Airport, where Seated Load Factors would exceed 1.0. The Project would add around seven percentage points to the standing capacity occupied, which would be between 20% and 55% between London Bridge/London Victoria and East Croydon and 20% between East Croydon and Gatwick Airport. Spare standing capacity would remain available.

Project peak assessment

71. In the Project peak hour for the northbound direction, the highest increase in line loading due to the Project would be around 1,400 passengers (20%) in 2047. The Seated Load Factor at East Croydon on services towards London Bridge would exceed 1.0 in the with Project scenario and the percentage of standing capacity occupied would be 24% (with the Project), but spare standing capacity would remain available.

72. In the Project peak for the southbound direction, the highest increases in line loading due to the Project would be around 920 passengers (12%) in 2047. Seats would remain available on all services in this hour with the highest Seated Load Factor being 0.9 between London Bridge and East Croydon towards Gatwick Airport.

73. Overall, the Project would increase the number of rail passengers across the day and across the assessment years, but no significant increase in crowding on rail services is expected as a result of the Project. Where standing is expected, spare standing capacity would remain available. The rail crowding assessment indicates that no additional mitigation is required.

Public transport: railway station

Approach

74. Gatwick Airport station is undergoing further enhancements as part of the Gatwick Station Project, which is due for completion in 2023.

75. Demand in the evening peak period is expected to be higher than in the morning. Both peak periods have been modelled but the assessment concentrates on the evening peak period to determine the impacts of the Project on station performance.

76. The assessment of station performance is based on Fruin Level of Service (LoS) criteria. These are used to describe the density of pedestrians and flow rates for walkways and circulation areas, stairs and in queues. LoS A represents free flow conditions and LoS F a complete breakdown in circulation. There are different LoS values for walkways, where a pedestrian would expect free movement, and queues/waiting areas where pedestrians tolerate higher densities and still consider their environment comfortable.

77. The assessment criteria in Network Rail's Station Capacity Planning Guidance (Network Rail, 2016) suggests the following preferred LoS conditions when assessing normal station operations:

- Concourse circulation areas – LoS C Walkways;
- Concourse waiting areas – LoS B Queuing;
- Gateline queues – LoS D Queuing; and
- Platforms – LoS B/C Queuing.

Station performance – concourse level

78. In the evening peak, station performance at concourse level would be predominantly LoS C or better for Walkways as follows:

- In assessment year 2029 with the Project, 90% of passengers would experience LoS C or better for Walkways compared to 91% in the future baseline;

- In assessment year 2032 with the Project, 85% of passengers would experience LoS C or better for Walkways compared to 91% in the future baseline; and
- In assessment year 2047 with the Project, 81% of passengers would experience LoS C or better for Walkways compared to 87% in the future baseline.

79. Some congestion would occur at the gateline in the North Bridge of the station entry concourse and this is the main cause of passenger time spent at LoS D Queuing by 2047 with the Project. The predicted level of queuing at LoS D is acceptable as it is only for short periods, with flows being one-way and other circulation routes being unaffected. When comparing assessment years:

- In assessment year 2029, 3% of passengers would experience LoS D Queuing in both the future baseline and with Project scenarios;
- In assessment year 2032 with the Project 4% of passengers would experience LoS D Queuing compared to 3% in the future baseline; and
- In assessment year 2047 with the Project, 5% of passengers would experience LoS D Queuing compared to 3% in the future baseline.

Station performance – platform level

80. Station performance at platform level would be predominantly LoS B or better in terms of Fruin Queuing (85% to 95% of passengers depending on scenario), which represents acceptable conditions, as follows:

- In assessment year 2029 with the Project 93% of passengers would experience LoS B or better for Queuing compared to 95% in the future baseline;
- In assessment year 2032 with the Project 89% of passengers would experience LoS B or better for Queuing compared to 93% in the future baseline; and
- In assessment year 2047 with the Project 85% passengers would experience LoS B or better for Queuing compared to 88% in the future baseline.

81. Small areas of localised congestion would occur, with a low proportion of passenger time spent at LoS D (6% or lower depending on scenario). When comparing assessment years:

- In assessment year 2029 with the Project 2% of passengers would experience LoS D Queuing compared to 1% in the future baseline;
- In assessment year 2032 with the Project 4% of passengers would experience LoS D Queuing compared to 2% in the future baseline; and
- In assessment year 2047 with the Project 6% of passengers would experience LoS D Queuing compared to 4% in the future baseline.

82. Network Rail guidelines do not give specific thresholds at which station performance is, or is not, acceptable, but allow the levels of passenger comfort and crowding to be identified and reviewed for overall performance in the context of an operational station. Although the assessment indicates that there would be some congestion by 2047 both without and with the Project, this is limited to peak times when busier conditions would be expected in any event and the degree of congestion indicated is not untypical of busier stations across the rail network.

83. The assessment demonstrates that the Project does not require any additional mitigation works to Gatwick Airport station.

Public transport: bus and coach

Approach

84. The public transport model includes all bus and coach services used to access the airport by air passengers and employees. The information for the model has been obtained through discussions with operators, data from GAL and other publicly available data sources.

85. Based on GAL's experience, bus and coach operators respond to sustained increases in demand by increasing the number of services. GAL holds regular discussions with operators which will help to anticipate potential changes in demand. Given this adaptability, crowding on bus and coach services has not been assessed explicitly. The assessment considers service coverage, frequency and quality as a measure of public transport amenity and is used to test proposed routes and services that could support achieving GAL's mode share commitments.

86. Coach services are considered to be most relevant to air passengers, though some local coach services (eg from Brighton and London) may fulfil a limited commuter role for Airport employees. Local bus services are used predominantly by Gatwick employees and those air passengers living locally.

87. The future baseline scenarios reflect measures which GAL is proposing to support as part of the current ASAS, together with the expected commercial response of the bus and coach industry to increased demand in general. They include:

- Increases to coach frequencies in proportion to growth in air passengers over time, representing the expected commercial response of operators;
- New regional bus or coach routes between Uckfield and Gatwick via East Grinstead, between Chatham and Gatwick via Maidstone and Sevenoaks and between Romford and Gatwick via Upminster and Dartford; and
- Frequency enhancements on local bus routes 4/5, 10, 20, 22 and 100.

88. The following improvements are assumed to be in place by assessment year 2029 in the with Project scenarios, reflecting the additional commitments made by GAL in the SACs:

- Further increases to coach frequencies in proportion to the additional growth in air passengers resulting from the Project, representing the expected commercial response of operators;
- Increased frequency on regional bus or coach route between Chatham and Gatwick via Maidstone and Sevenoaks; and
- New regional bus or coach routes between Bexley and Gatwick via Footscray, between Tunbridge Wells and Gatwick via East Grinstead and between Worthing and Gatwick via Horsham.

Outcomes

89. With the bus and coach service improvements, the modelling work shows that demand on bus and coach services increases from approximately 8,600 daily passengers in the future baseline in 2029 to 13,400 daily passengers with the Project in 2047.

90. Growth on local bus services is modelled to be between around 600 and 800 passengers per day between future baseline and with Project scenarios for each assessment year. This represents an increase of 20% to 27%. Within this overall growth, there would be significant increases in employee travel on local bus services in Crawley.

91. Growth on regional bus and coach services are modelled to be around 1,300 to 2,900 passengers per day between future baseline and with Project scenarios for each assessment year. This represents an increase of 23% to 45%. Demand for coach services to and from London would increase by around 650 daily passengers between the 2047 future baseline and with Project scenarios. Gains in the proportion of total coach trips would occur from Brighton and Hove, reflecting the introduction of a new coach service to Worthing, and in Kent, reflecting new or enhanced services to various destinations in the county.

92. As part of the SACs GAL would provide financial support for a minimum of five years to enable these services to be implemented and operated, or others which result in an equivalent level of public transport accessibility. No further mitigation is considered to be required.

Highway network: strategic modelling

Approach

93. The assessment uses the strategic highway model to assess the impact of the Project across the modelled highway network by comparing the future baseline and with Project scenarios. The performance of the highway network in the immediate vicinity of the Airport has also been assessed using a VISSIM microsimulation model.

94. The future baseline models include highway schemes which are expected to be in place by the respective assessment years, without the Project, as discussed and agreed with National Highways and local highway authorities. The with Project models for 2032 and 2047 include the highway works which form part of the Project, which are expected to be complete by 2032 for the purposes of this assessment.

95. The base year model from which the forecast models are developed is for 2016 and has been calibrated and validated in accordance with DfT guidance in TAG. Discussions have taken place with stakeholders and refinements have been made to the models to address issues raised.

96. The forecast year models have been developed using air passenger and employee forecasts for the future baseline and with Project scenarios in 2029, 2032 and 2047. Growth in non-airport trips has also been allowed for, based on forecast population and employment growth.

97. The time periods modelled in the highway model are:

- AM peak hour 1 – the peak in flows on the strategic road network between 07:00 and 08:00;
- AM peak hour 2 – the peak in flows on the local road network between 08:00 and 09:00;
- Inter Peak (IP) average hour – an average hour flow between 09:00 and 16:00; and
- PM peak average hour – an average hour flow between 16:00 and 18:00.

98. The impact of the Project has been assessed by considering:

- Journey times – end-to-end travel times on key routes within the model, covering the strategic road network, routes in the vicinity of Gatwick and other key distributor roads; and
- The magnitude of Impact at nodes – categorising changes in Volume over Capacity (V/C) ratio at model nodes as negligible, low, medium or high impacts depending on the future baseline operation and the degree of change with the Project.

Distribution of airport-related traffic

99. Comparisons of Annual Average Daily Traffic (AADT) flows for the future baseline and with Project scenarios provide an overview of the general scale of change as a result of the Project.

100. The assessment across all years shows a similar pattern and indicates that beyond the immediate network around the Airport, the key corridor affected by the Project would be the M23 in both directions. Some changes in AADT flows would also occur on the M25 east and west of junction 7 and to a much lesser extent on other key corridors for access to the southwest via the A264 and A24 and across to East Grinstead on the A264 and A22.

101. Around 70% to 75% of airport-related traffic is expected to use the M23 Spur in the peak periods in 2047. About 50% of this traffic would come from the M23 to the north, ie from the M25 and London, and 20% would come from the south, also via the M23. The remaining airport-related road trips would be distributed in smaller proportions across the more local highway network in all directions.

102. The assessment also shows increases and decreases in traffic flows in localised areas some considerable distance from the Airport. Although every effort has been made to ensure the model networks and zoning are appropriate, these effects can be produced by ‘model noise’. This occurs where high levels of congestion are predicted within strategic highway models. It results in traffic switching between routes with very similar journey times, in ways that do not appear logical in the context of the test or the actual highway network.

103. In this assessment, ‘model noise’ has been identified in two particular areas - Croydon and Steyning. These locations have been reviewed in detail and it is clear that airport traffic represents a very small proportion of traffic in these areas (less than 1%). Most changes in traffic flows in these areas are due to background traffic switching between routes within the model, which in practice is unlikely to happen, for instance because the alternative route is unsuitable or is not the signed route.

Journey times

104. The journey time analysis shows the changes in journey time that are expected in the future baseline case, without the Project, and any change in journey times that is indicated with the Project.

105. Key points from the comparison of future baseline and with Project journey times across the modelled time periods and assessment years are:

- M23 – journey times would increase northbound by up to seven minutes from 2029 to 2047 in the future baseline and southbound by around one minute. There would be an increase of no more than one additional minute with the Project;
- M25 from Junction 5 to Junction 10 – journey times would increase eastbound by up to six minutes and westbound by up to nine minutes from 2029 to 2047 in the future baseline. There would be an increase of no more than one additional minute with the Project;
- A23 south of Gatwick – journey times would increase by up to three minutes in each direction from 2029 to 2047 in the future baseline. There would be an increase of no more than one additional minute with the Project.
- A23 north of Gatwick – journey times between Longbridge Roundabout and Merstham would increase by up to six minutes in each direction from 2029 to 2047 in the future baseline. With the Project, northbound journey times would increase no more than an additional two minutes and southbound journey times would decrease by up to three minutes by 2047, compared to the future baseline;
- A217 north of Gatwick – journey times between Longbridge Roundabout and M25 Junction 8 would increase by up to eight minutes northbound and up to three minutes southbound from 2029 to 2047 in the future baseline. With the Project, northbound journey times would decrease by up to five minutes by 2047, and southbound journey times would experience changes ranging between a decrease of two minutes and an increase of one additional minute by 2047, compared to the future baseline;
- A22 from M25 J6 to Maresfield – journey times would increase by up to six minutes northbound and up to nine minutes southbound between 2029 and 2047 in the future baseline. With the Project, the greatest change would be two additional minutes for the northbound journey;
- A2011/A264 from M23 J11 to East Grinstead via Crawley – journey times would increase up by to eight minutes eastbound and up to six minutes westbound. With the

Project, the greatest change would be one additional minute by 2047;
- A24 from M25 Junction 9 to West Grinstead – journey times would increase by up to seven minutes northbound and up to six minutes southbound between 2029 and 2047 in the future baseline. With the Project there would be a change of no more than one additional minute by 2047; and
- A264 from north Horsham to M23 J11 – journey times would increase by up to two minutes eastbound and up to three minutes westbound between 2029 and 2047 in the future baseline. There would be a change of no more than one additional minute with the Project by 2047.

106. The analysis shows that the journey time changes resulting from the Project are not expected to be significant in any location. The greatest increases in journey time would be two minutes in any of the modelled years. Across the key routes in the wider network, the Project is therefore unlikely to have significant impacts on the journey times that would prevail in the future baseline.

Junction performance

107. Where junctions have been identified as experiencing a medium or high impact, based on the assessment criteria, a more detailed review of those locations has been undertaken.

108. In 2029 the assessment indicates that two junctions would experience a medium or high impact. These are in Croydon and Epsom. The review identified that the apparent impacts are the result of 'model noise'. The proportion of airport-related traffic at these junctions is less than 1% of the total traffic volume and the additional number of airport-related trips resulting from the Project is negligible (fewer than five vehicles). No mitigation is required.

109. In 2032 the assessment indicates three locations would experience a medium or high impact. They are:

- an internal junction on Perimeter Road North, part of the Gatwick road network, which would experience an increase in traffic but would continue to operate within capacity;
- some merges and diverges at the M23 / M25 interchange, which would experience additional traffic as a result of the Project but would continue to operate satisfactorily; and
- M23 Junction 9, which has been considered in more detail as part of the VISSIM microsimulation modelling.

110. No mitigation is required at these locations.

111. In 2047 the assessment indicates 18 locations would experience a medium or high impact. Nine of these locations are the result of model noise or are simply zone connections in the model which do not reflect actual junctions. No mitigation is required in the remaining nine locations, which are:

- Selsdon Road/St Peter's Road/Croham Road, Croydon, which would be operating close to capacity in the future baseline and with Project scenarios, but where the proportion of airport-related traffic is less than 1% of the total traffic volume and the Project would add fewer than five vehicles;
- Lower Addiscombe Road/Spring Lane, Croydon, which would operate within capacity in both future baseline and with Project scenarios, the proportion of airport-related traffic is less than 1% of the total traffic volume and the Project would add fewer than five vehicles;
- London Road/Gander Green Lane/Spire St Anthony's Hospital access, which would be operating close to capacity in the future baseline and with Project scenarios, but where the proportion of airport-related traffic is less than 0.5% of the total traffic volume and the Project would add fewer than five vehicles;
- M25 Junction 9 (part), where one signalled entry to the interchange roundabout would operate close to or at capacity in the peak periods in the future baseline and the Project would add around 20 vehicles in one time period, but the performance of this junction would not worsen overall;
- some merges and diverges at the M23/M25 interchange, which would operate within capacity in the future baseline and would experience additional traffic in the with Project scenario suggesting operation above modelled capacity in some time periods. A further review suggests that no additional issues are expected in practice, and the Project would not result in a material change in performance as demonstrated by the journey time assessment;
- Woodhatch Road/Dovers Green Road/Cockshot Hill, which would operate close to or at capacity in certain time periods in the future baseline but where the proportion of airport-related traffic is less than 1% of the total traffic volume, the Project would add around ten vehicles and the junction would continue to operate at modelled capacity;
- Woodroyd Avenue/Brighton Road, Horley, which would operate within capacity in the future baseline but is affected by the highway works that form part of the Project. The junction would continue to operate within capacity in the with Project scenarios;
- A23/Gatwick Road/Perimeter Road East, which has been considered in more detail as part of the VISSIM microsimulation modelling and has shown that no mitigation is required; and
- M23 Junction 9, which has been considered in more detail as part of the VISSIM microsimulation modelling and has shown that no mitigation is required.

112. Overall, the strategic modelling shows that the additional traffic demand associated with the Project, taking into account the highway improvement works which form part of the Project, can be accommodated on the wider highway network and no significant impacts are identified. No mitigation is considered to be necessary.

Highway network: local modelling

Approach

113. Microsimulation modelling has been undertaken using a VISSIM model for the local highway network for the 2032 and 2047 assessment years. VISSIM modelling provides a more detailed assessment of local highway network performance than the strategic SATURN model and can be used to inform the design of highway proposals.

114. The VISSIM model extends from the junction of Woodroyd Avenue and A23 Brighton Road in south Horley, through Longbridge Roundabout, North and South Terminal Roundabouts and along the M23 Spur to Junction 9 of the M23. It also extends south down the A23 London Road into north Crawley, including roads connecting to the Manor Royal estate.

115. The future baseline highway network includes the completed Smart Motorway scheme on the M23 in the vicinity of Junction 9 and on the M23 Spur. It also includes improvements planned as part of GAL's Capital Investment Plan (CIP), intended to address increases in airport-related and background demand that would occur without the Project. These comprise the signalisation of North Terminal and South Terminal roundabouts and associated physical changes to increase capacity.

116. The highway network in the with Project scenarios includes the highway works that are proposed as part of the Project, which for this assessment are assumed to be completed by 2032.

117. The VISSIM model focuses on the AM and PM peak time periods of 07:00 to 09:00 and 16:00 to 18:00. The validation and performance of the model has been shared with the relevant highway authorities and accepted as suitable for assessing the effects of the Project.

118. The VISSIM model does not produce the direct equivalent of the V/C ratios which can be drawn from the strategic model, but it does allow other information on network performance to be

considered. This includes speed plots (the speed of vehicles at different places on the road network at a given time) which provide an indication of likely queuing levels and therefore also a representation of forecast congestion. Other information, such as on journey times, is also available.

Network performance, 2032

119. In the 2032 future baseline, parts of the network would operate satisfactorily in the morning and evening peaks, although the model shows slower-moving traffic for about half the length of the M23 Spur approaching South Terminal Roundabout, indicating that there would be limited spare capacity available in this part of the network. Busier conditions are also shown at Longbridge Roundabout, and queueing would occur where traffic leaves the South Terminal complex onto South Terminal Roundabout.

120. Southeast of the Airport, where the northbound bus lane on the A23 London Road starts north of the junction with Beehive Ring Road, queueing is indicated in the evening which would extend back to Lowfield Heath roundabout, although this clears by the end of the modelled time periods.

121. The 2032 future baseline results indicate that the level of congestion around the Airport would be becoming more extensive, increasing the potential for impacts on the wider highway network and the operation of the forecourts and suggesting that there would be insufficient capacity to accommodate demand from the Project without the highway works which form part of it.

122. In 2032 with the Project the model shows that the highway works would provide capacity to accommodate the proposed growth in the morning and evening peak periods, with no significant queuing or congestion indicated at any location. The M23 Spur would perform better than in the future baseline and there would be considerably less queuing on the exit from the South Terminal complex. Conditions at Longbridge Roundabout would be similar to those seen in the future baseline, and it should be noted that extra capacity is provided at this junction for active modes within the highway works. The A23 London Road would have slightly slower speeds than in the future baseline, although this reflects a change of speed limit which is part of the highway proposals.

123. The model also shows some slowing of vehicle speeds would occur around the North Terminal area, but this is predominantly as a result of vehicles waiting at the new traffic signal junction with the A23 London Road (rather than U-turning at Longbridge Roundabout). Conditions on the A23 northbound near Beehive Ring Road in the evening peak would be improved as a result of the increase in capacity provided by the Project, with much less delay in the 2032 PM peak compared to the future baseline.

124. The 2032 models therefore confirm that the highway works which form part of the Project would provide additional network capacity to accommodate the increase in airport-related demand resulting from the Project and the growth in non-airport traffic over time.

Network performance, 2047

125. In both peak periods in the 2047 future baseline, the model shows increased westbound congestion would occur along the M23 Spur approaching South Terminal Roundabout, as well as on the A217 and Povey Cross Road approaches to Longbridge Roundabout. M23 Junction 9 would have broadly similar performance to that in the 2032 future baseline. Significant queuing would also occur within and leaving the South Terminal complex and on the entry to the North Terminal complex, showing further deterioration in conditions from those in the 2032 future baseline.

126. The model also shows there would be continuing congestion in the evening peak around the start of the northbound bus lane on the A23 London Road near Beehive Ring Road with queueing for a longer period than in 2032.

127. The VISSIM outputs for the 2047 future baseline indicate a network which would have very limited capacity to accommodate additional demand by this time, leading to poorer overall performance and significant congestion at key locations, both within the Airport network and on the strategic and local network serving the Airport.

128. In 2047 with the Project there would be some increase in queueing and delay during the morning peak period compared to the equivalent scenario in 2032, predominantly around North Terminal Roundabout and the new junction with the A23 London Road, but this does not affect adjacent junctions and clears during the modelled period. M23 Junction 9 would have a very similar level of operation as is seen in the 2047 future baseline assessment. Overall the network would perform much better than in the 2047 future baseline scenario.

129. In the evening peak, conditions would be similar to those for the morning peak but with slightly slower speeds at the A217 and Povey Cross Road approaches to Longbridge Roundabout than are seen in the morning. M23 Junction 9 would continue to operate well, with minimal queueing, and congestion on the M23 Spur would be removed as a result of the highway works for the Project. The A23 northbound merge near Beehive Ring Road would have much better performance than in the 2047 future baseline scenario.

130. Comparison against the 2047 future baseline scenario indicates that overall the network would operate considerably better with the Project and the associated highway works, with reduced congestion at Longbridge Roundabout and at North and South Terminals. Conditions on the M23 Spur would also be much improved, with limited queuing for traffic leaving the Spur to access South Terminal Roundabout.

131. Overall, the future baseline scenarios indicate that without the Project, the network would operate close to capacity in several locations. The inclusion of the highway works as part of the Project prevents unacceptable highway conditions arising.

132. The highway works forming part of the Project will be complete and operational three years after commencement of dual runway operations in line with this assessment.

Active travel: walking and cycling

133. GAL aims to make active travel an attractive and realistic choice for short journeys to and from the Airport. GAL is committed to promoting accessible, safe, and well-planned active travel opportunities by improving facilities for all employees and encouraging modal shift away from car-based transport.

134. The network of walking and cycling routes at the Airport is connected to its surrounding communities by a network of local streets, public footpaths and bridleways, including National Cycle Network Route 21 (NCN21) and the Sussex Border Path.

135. From Horley the primary access point to the Airport at South Terminal by cycle is via the underpass beneath Airport Way, and to North Terminal is via Longbridge Roundabout and a public footpath along the western side of A23 London Road. From Crawley, the NCN21 route provides direct access for pedestrians and cyclists alongside the A23 past Gatwick Airport station.

136. Once at the Airport, the primary route for circulation is via the footpath along Perimeter Road North, which connects the two terminals. There are footways, dropped kerbs and dedicated crossing points within the forecourts.

137. GAL currently provides upwards of 300 cycle parking spaces for airport staff and the general public. Cycle parking is available in several of the staff car parks. Much of the parking is clustered in the vicinity of the NCN 21 cycle route.

138. Approximately 3% of employees walk or cycle to work on an average day. The average travel time for walk-to-work trips is approximately 25 minutes, or about a 2.5km walk. The average travel time for cycling is 22 minutes, indicating a primary catchment of approximately 6km to 8km.

139. Although the overall mode shares for active travel are low when considering all airport employees, they are substantial in the areas immediately surrounding the Airport. In central Horley, more than one third of employees walk or cycle to work, with over 20% doing so from Greenfields to the northwest and 15% from north-east Horley. In sections of Mole Valley including Hookwood and Charlwood lying just west of the Airport, walking and cycling mode share is almost 15%, and in areas of Crawley immediately south of Gatwick, over 8% of staff walk and cycle.

140. Significant improvements for walking and cycling are incorporated in the highway works that form part of the Project. These improvements aim to connect to existing and proposed networks provided by the local authorities, take into account DfT Cycle Infrastructure Design guidance (LTN 1/20) and have been discussed with stakeholders. They include:

- Sections of segregated paths for pedestrians and cyclists around the circulatory carriageway at Longbridge Roundabout; introducing parallel signalised crossings on each arm of the roundabout to replace the existing shared-use toucan crossings; and a shared use path on the eastern side of the roundabout and extended southwards to a new ramp into Riverside Garden Park;
- A new segregated pedestrian and cycle path between Longbridge Roundabout on the western side of the A23 London Road to North Terminal Roundabout and a shared-use path from North Terminal Roundabout to South Terminal via Gatwick Way and Perimeter Road North;
- A new shared-use ramp connection to Riverside Garden Park on the eastern side of the A23 London Road, south of the River Mole and a widened eastern footway of the A23 London Road south of the ramp as far as North Terminal;
- A new pedestrian link to the north of Airport Way between Riverside Car Park and the proposed open recreational space at the current location of Car Park B;
- New signal-controlled pedestrian crossing facilities across the A23 London Road at the proposed new signalised junction on A23 London Road northeast of North Terminal Roundabout; and
- Modifications to the B2036 Balcombe Road footway under the M23 spur bridge and an onward pedestrian link to the existing South Terminal Ring Road footway network.

141. As part of the SACs for the Project, GAL is committed to increasing the active travel mode share for staff who live within walking and cycling distance through the improvements listed above and a range of supporting initiatives to promote and encourage active travel. No further mitigation is required.

Construction

Approach

142. The impacts on the transport network of construction activities related to the Project have been assessed. The assessment is informed by the following documents prepared by GAL and submitted with the DCO application:

- **ES Appendix 5.3.2: Code of Construction Practice** (Doc Ref: 5.3) – The which sets out the overarching approach to construction activities;
- **ES Appendix 5.3.2: CoCP Annex 3 - Outline Construction Traffic Management Plan** (Doc Ref 5.3) – which sets out the approach to managing the potential impacts of construction traffic on surrounding communities and routes;
- **ES Appendix 5.3.2: CoCP Annex 2 - Outline Construction Workforce Travel Plan** (Doc Ref 5.3) – which sets out measures to manage the impact of construction workers travelling to and from worksites.

143. Two construction scenarios have been assessed:

- Airfield construction – the impact of airfield construction activity in the busiest summer period for that phase of construction; and
- Highway construction – the impact of highway construction activity at a point when work is being undertaken in all locations and the traffic management arrangements are at their most complex.

144. The exact details of the construction methodology and programme are expected to evolve over time. An indicative programme of works has been developed for this assessment.

145. Several construction compounds are anticipated to be required, including a main contractor compound to the southeast of the airfield and other compounds at car parks B, Y, Z, Longbridge Roundabout, South Terminal Roundabout and to the northwest of the airfield. The majority of construction workforce car parking is expected to be in the main compound to the southeast of the airfield. Overall, some 890 parking spaces are anticipated to be allocated across the compounds, which represents parking for 65% of the total workforce.

146. Construction traffic will be directed to use the strategic road network for as much of each journey as reasonably possible. A single signed route for construction traffic is proposed, such that most traffic approaches via M23 Junction 9, the M23 Spur, Airport Way, and the A23 London Road. No restrictions on routes are proposed for construction worker vehicles.

147. Off-airport construction vehicle routing will be approved by National Highways and the local highway authorities and enforced by GAL. Dedicated route signs will be set up on the M25, M23, A23 and Airport Way which indicate the approved routes direct to the Airport compounds sites for materials and plant.

Airfield construction

148. The busiest period for airfield construction is expected to occur for the purpose of the assessment in the winter of 2026. However, as this is a lower month for traffic activity on the highway network around the Airport, the busiest summer period of airfield construction has been assessed by combining the activity expected at that time (assumed to be summer 2028) with the 2029 future baseline strategic model.

149. The strategic modelling shows that no road link would experience an increase in total traffic of more than 30%. HGV flows would increase by more than 30% on the strategic roads immediately around the Airport in the morning and evening peaks, which is expected given the requirement for construction HGVs related to the Project to use the strategic road network. The roads include:

- M23 Spur, J9 to South Terminal roundabout;
- Airport Way;
- A23 London Road, North Terminal to Longbridge Roundabout;
- A23 London Road, Beehive Ring Road to South Terminal; and
- A23 London Road, Beehive Ring Road to A23 London Road.

150. The assessment indicates three junction locations which would experience a medium or high impact during airfield construction. Given the relatively small additional hourly volumes of construction traffic expected and the fact that airport-related traffic at these locations is less than 1% of total traffic volumes, these impacts (which occur at locations in Croydon and Epsom) are considered to be the result of model noise. No mitigation is required in these locations.

Highway construction

151. The assessment for the highway construction period is based on the stage in the programme at which there would be concurrent works at Longbridge, North Terminal and South Terminal Roundabouts, requiring traffic management across the whole of the affected area. The most complex phase of traffic management has been selected for the assessment, which is expected to occur for the purposes of the assessment in the second half of 2029 and last for around six months.

152. The construction arrangements at that time have therefore been overlaid on the strategic model for the 2029 with Project scenario, as at this time the northern runway is assumed to have opened and additional demand would be present on the highway network.

153. Modelling of this scenario shows reassignment of traffic would occur because of the traffic management arrangements on the M23 Spur, which would have two narrowed running lanes in this phase of construction. Traffic levels on the M23 itself would also reduce as a result of some drivers choosing alternative routes to avoid the M23 Spur.

154. Increases in traffic would occur on north-south routes between Horley and Crawley, including Balcombe Road and the route to the west of the Airport via Lowfield Heath Road, Horley Road, Charlwood Road and Povey Cross Road. However, these changes would be relatively small, typically being fewer than 500 vehicles AADT, which equates to an average of around one vehicle every two minutes.

155. The assessment indicates nine locations which would experience a medium or high impact during highway construction. Four of these locations are in Croydon or Epsom and given their distance from the Airport, and the fact that airport-related traffic at these locations is less than 1% of total traffic volumes, these impacts are considered to be the result of model noise.

156. Four of the remaining locations fall within the scope of the highway works from Longbridge Roundabout to South Terminal Roundabout and are therefore directly affected by the traffic management arrangements. The model indicates that these locations would operate close to capacity during this period. The final location is identified at the M23/M25 location where the northbound diverge would experience a slight deterioration in performance but would still operate within capacity during the highway construction period. No mitigation is required in this location.

Freight, cargo and logistics

157. In 2019, Gatwick handled over 150,000 tonnes of cargo. Cargo volumes are forecast to grow to over 290,000 tonnes by 2047 in the future baseline and just under 350,000 tonnes with the Project in the same period. In the mid-2000s, the cargo area handled 300,000 tonnes of air freight annually. Therefore, it is envisaged the return to these historic air cargo levels by 2047 can be accommodated within the existing air cargo area.

158. The cargo facility covers an area of 10 hectares. This is made up of 23,000 m² of cargo sheds, office accommodation and areas for loading, unloading and parking. GAL has no direct commercial involvement with the cargo operation, although GAL manages the Border Inspection Post located there. Vehicular access is via the North Terminal Roundabout.

159. The logistics activities which take place at the Airport include:

- The Gatwick Direct consolidation centre, which handles consumer goods sold by retail concessionaires in the terminal buildings;
- Waste movements associated with airside, landside and third party operations;
- Airline servicing activities, covering the provision of fuel, catering and other services, including the consolidation of deliveries from suppliers outside the Airport; and
- Airport servicing, covering movements related to construction, facilities maintenance, air traffic control and other services.

160. The number of cargo-related vehicles travelling to and from the Airport is very small in relation to total traffic volumes on the road network, being in the order of five to ten movements an hour in 2019, typically outside the busiest periods on the highway network.

161. With the Project, cargo tonnage is expected to be around 20% higher in 2047 than it would be in the equivalent future baseline scenario. This suggests around 12 to 24 vehicle movements an hour, an increase of between two and four movements an hour compared to the 2047 future baseline. Cargo-related traffic associated with the Project would therefore have no impact on highway network operation.

Resiliency, reliability and future trends

Operational response

162. GAL currently has a permanent surface transport operational response team available at all times to enable it to react and respond to incidents or accidents at the Airport or on adjacent transport networks. Protocols are in place with key stakeholders and agencies, including West Sussex Police, Network Rail, relevant Train Operating Companies and Transport for London, to deliver a rapid and coordinated response.

Rail network

163. The Brighton Main Line is one of the busiest railway lines in the country. It has a number of built-in diversionary routes, which increase its resilience. There are two independent parallel routes as far north as Purley; three independent routes to different London termini; five tracks north of South Croydon; an independent route to London via Horsham and Epsom; and the ability to turn trains back at Three Bridges using the Thameslink depot there.

164. Network Rail has developed an infrastructure proposal to eliminate bottlenecks in the Croydon area. This is known as the Croydon Area Remodelling Scheme (CARS), although this project is not yet committed and is therefore not included in the future baseline for the assessment of this Project. Network Rail has also been carrying out a progressive series of renewals and repairs to improve reliability and performance on the Brighton-London main line.

165. Gatwick Airport has one of the widest ranges of through train destinations of any station in the south of England, which makes it an ideal transport hub with a number of alternative routes. The busyness of the Brighton-London main line provides a high degree of service resilience for passengers wishing to travel to and from Gatwick Airport.

166. Relationships between GAL and the Train Operating Companies (TOCs) are strong, with joint ownership of issues and contingency response, such that both parties work to resolve incidents jointly using consistent passenger communications.

Highway network

167. Gatwick is well connected to the strategic highway network. There are a number of parallel routes between Gatwick and the M25 that can provide alternatives to the M23 in the event of a major incident and between them can absorb a large volume of traffic, including the A23, A217, A264/A22 and A24. The A23

provides an alternative highway access to the Airport and links it with Crawley and other nearby towns.

168. Safety, congestion and journey times on the M23 are all important considerations. National Highways' completed M23 Smart Motorway Project has enabled proactive management of the M23, including the link roads from/to the M25 at Junction 8, Junction 9 and the Spur to Gatwick, as well as Junction 10. The additional running lane in each direction adds capacity and resilience to the strategic network serving Gatwick at peak times.

169. GAL has a strong working relationship with West Sussex and Surrey County Councils, National Highways and West Sussex Police. Incidents are resolved as quickly as possible using protocols in place with key stakeholders and agencies to deliver a rapid and coordinated response.

Future trends

170. GAL continues to monitor future transport trends and potential opportunities that they may create for the operation of the Airport. These include:

- Mobility-as-a-Service, reflecting a move towards buying transport as a service with travellers having access to up-to-date information to enable them to choose from a range of transport options for any specific journey;
- Electric vehicles and zero-emission vehicles, where GAL can encourage the take-up of such vehicles through the provision of charging infrastructure at the Airport, incentives for staff, use of such vehicles within GAL's own fleet and discussions with bus, coach and freight operators; and
- Autonomous vehicles, where the technology is still at an early stage.

Summary

171. A detailed assessment has been made of the impact of the Project on the transport networks around the Airport and in the wider area.

172. The Project includes the provision of highway works in the vicinity of the Airport, together with a range of Surface Access Commitments which will provide a range of transport interventions in order to meet commitments to achieving specific transport mode shares in a specific timescale.

173. The assessment has shown that the growth in passenger and employee numbers as the result of the Project can be accommodated on the public transport networks, with limited changes to crowding on rail services, increases in patronage on bus and coach services and sufficient capacity at Gatwick Airport station.

174. The highway improvement works would provide adequate capacity to cater for background growth and airport-related growth with the Project, providing an overall improvement to local highway network performance when compared to future baseline. They will also deliver key pedestrian and cyclist connections and infrastructure.

175. The assessment concludes that having taken account of the strategies and measures which form part of the Project, there is no requirement for further mitigation.

1 Introduction

1.1 General

1.1.1 The Project proposes alterations to the existing northern runway at London Gatwick Airport which would enable dual runway operations. Together with the alterations to the northern runway, the Project would include the development of a range of infrastructure and facilities to allow increased airport passenger numbers and aircraft operations and to allow Gatwick Airport Limited (GAL) to make best use of its existing runways and infrastructure. A full Project Description is provided in Chapter 5 of the Environmental Statement (ES) and an overview is provided in Chapter 2 of this report.

1.1.2 This document provides the Transport Assessment (TA) for the Project prepared on behalf of Gatwick Airport Limited (GAL).

1.2 Purpose and scope of assessment

1.2.1 This TA is submitted as part of the Development Consent Order (DCO) application for the Project. This report summarises the transport network and includes the requirements set out in paragraph 5.10 of the Airports National Policy Statement (ANPS), which states that the implications of airport expansion on surface access network capacity should be assessed using Transport Analysis Guidance (TAG) methodology, and National Highways, Network Rail and highway and transport authorities, as appropriate, should be consulted on the assessment and proposed mitigation measures. The assessment distinguishes between the construction and operational stages for the Project as required.

1.2.2 The assessment presented in this report assumes certain surface access interventions by GAL as part of the Project. The **ES Appendix 5.4.1: Surface Access Commitments** (Doc Ref. 5.3) represents the outcomes which GAL commits to achieving in relation to surface access at the Airport as part of the Project.

1.2.3 The interventions included in the assessment lead to the mode share outcomes to which GAL is committing as part of the SACs. GAL has the opportunity to use a range of different measures and interventions to influence the mode share of air passenger and staff journeys. Whilst there is some potential flexibility in the combination of measures relied upon to achieve the SACs, the commitment to the assessed outcomes ensures confidence in the robustness of this assessment and its conclusions that the impacts will not be materially worse than stated. The measures set out in the SACs and summarised in Chapter 7 may therefore be varied or supplemented as circumstances require to achieve the mode share commitments set out in the SACs.

1.2.4 As part of the statutory consultation for the Project, a Preliminary Environmental Information Report (PEIR) was issued in September 2021. It presented the preliminary findings of the Environment Impact Assessment (EIA) process for the Project at that time. A Preliminary Transport Assessment Report (PTAR) was prepared to accompany the PEIR. This TA report takes into account consultation comments on the PTAR and successive joint technical working discussions with the local highway and planning authorities, which are summarised in Section 5.2.

1.3 Document structure

1.3.1 The structure of the documents is as follows:

- **Chapter 2: The Project** – provides a description of the Project.
- **Chapter 3: Site Context** – provides an overview of the airport and access.
- **Chapter 4: Policy and Planning Context** – summarises the policies and guidance for the Project.
- **Chapter 5: Assessment Methodology** – summarises the stakeholder engagement and outlines the modelling approach adopted for this Project.
- **Chapter 6: Current Transport Network, Operations and Performance** – summarises the existing conditions for access to Gatwick Airport. More detail is provided in the Chapters pertaining to each mode of transport (Chapter 9 to Chapter 14).
- **Chapter 7: Surface Access Commitments (SACs) for the Project** – sets out the committed mode shares and summarises the measures in the SACs (**ES Appendix 5.4.1: Surface Access Commitments** (Doc Ref. 5.3)).
- **Chapter 8: Demand Forecasts –** provides the demand forecasts for the future baseline and with Project scenarios.
- The assessment of potential impacts of the Project on each mode of transport is contained in the following Chapters:
  - **Chapter 9: Rail**
  - **Chapter 10: Railway Station and Inter-Terminal Shuttle**
  - **Chapter 11: Bus and Coach**
  - **Chapter 12: Strategic Highways**
  - **Chapter 13: Local Highway and Road Network** (including Terminal Forecourts).
  - **Chapter 14: Walking and Cycling**
- **Chapter 15: Construction** – outlines the potential impacts of construction of the Project on the transport network.
- **Chapter 16: Freight, Cargo and Logistics** – summarises these movements for the airport.
- **Chapter 17: Resilience and Reliability of Transport Networks** – provides a summary of the transport network for access to Gatwick Airport.
- **Chapter 18: Future Transport Trends** – outlines the potential transport trends and how GAL may support these.
- **Chapter 19: Conclusions** – summarises the conclusions to this report.
- **Chapter 20: References**
- **Chapter 21: Glossary**

1.3.2 The assessments contained in this report are informed by modelling work. Detailed technical reports have been prepared and attached as annexes:

- **Transport Assessment Annex A – Figures** (Doc Ref. 7.4)
- **Transport Assessment Annex B – Strategic Transport Modelling Report** (covers both highways and rail) (Doc Ref. 7.4)
- **Transport Assessment Annex C – VISSIM Forecasting Report** (Doc Ref. 7.4)
- **Transport Assessment Annex D – Station and Shuttle: Legion Modelling Report** (Document 7.4)
- **Transport Assessment Annex E – Highway Junction Review** (Document 7.4)

2 The Project

2.1 Overview of the Project

2.1.1 The operation at Gatwick Airport is served by a single main runway and two terminals: North Terminal and South Terminal. When the main runway is unavailable, the existing northern runway is used.

2.1.2 The Project includes the following key components:

- amendments to the existing northern runway including repositioning its centreline 12 metres further north to enable dual runway operations;
- reconfiguration of taxiways;
- pier and stand alterations (including a proposed new pier);
- reconfiguration of other airfield facilities;
- extensions to the existing airport terminals (north and south);
- provision of additional hotel and office space;
- provision of reconfigured car parking, including new car parks;
- surface access (including highway) improvements;
- demolition and relocation of Central Area Recycling Enclosure (CARE) facility;
- water treatment facilities;
- reconfiguration of existing utilities, including surface water, foul drainage and power; and
- landscape/ecological planting and environmental mitigation.

2.1.3 It is assumed that by 2047 these improvements could increase airport capacity up to 80.2 million passengers per annum (mppa), compared to a maximum potential capacity based on existing facilities of 67.2 mppa within the same timescale. This represents an increase of approximately 13 mppa.

2.2 Surface access improvements

2.2.1 In order to accommodate the proposed increase in passenger numbers, the following surface access s improvements form part of the Project:

- South Terminal: new highway layout providing full grade separation (indicated in Diagram 2.2.1);
- enhancement of the eastbound M23 Gatwick Spur as part of the South Terminal roundabout improvements (indicated in Diagram 2.2.1);
- North Terminal: new highway layout including partial grade-separation, improving traffic flow. The Airport Way eastbound connection from North Terminal roundabout would be removed with eastbound traffic to travel via a new signal-controlled junction on the A23 London Road and an enhanced eastbound diverge connection onto Airport Way (indicated in Diagram 2.2.1);
- improvements to Longbridge Roundabout where the A23 meets the A217 (indicated in Diagram 2.2.1);
- investment in public transport service enhancements, both locally and to improve accessibility for areas not directly served by rail; and
- new and enhanced active travel routes providing connections from surrounding areas.

2.2.2 The timing of completion of the highway works has been informed by the transport modelling analysis undertaken to support the assessment. The highway modelling is explained in further detail in Chapter 12 and Chapter 13, including the basis on which this timing has been identified. The above works are part of the Project and anticipated to be completed by the summer period after the third anniversary of the opening of the northern runway. Chapter 13 sets out the microsimulation modelling work undertaken to highlight the benefits of the works and further information on each aspect of the highway works is provided below. The design and details of the improvement works have been the subject of detailed engagement with National Highways and the local highway authorities.

South Terminal junction improvements

2.2.3 The South Terminal roundabout (also known as the Welcome Roundabout) is the sole entry point into the South Terminal area and for local access roads, including the terminal forecourt, long stay car parks and commercial premises. It is served by the M23 Gatwick Spur to the east (leading from the M23 Junction 9) and Airport Way from the west (leading from North Terminal roundabout). The majority of Gatwick traffic accesses the airport from the M23 and traffic for both North Terminal and South Terminal must pass through this roundabout.

2.2.4 The westbound M23 Spur was upgraded as part of the National Highways M23 Junctions 8 to 10 Smart Motorway Project, completed in Summer 2020. As part of that work, three lanes were provided approaching the airport. The eastbound M23 Gatwick Spur was not widened at the time of the westbound works. Further local improvements, involving signalisation and minor widening of entries/exits, are proposed in the absence of the Project (see Chapter 13).

2.2.5 A description of the proposed works to the South Terminal roundabout proposed as part of the Project is provided in the paragraphs below.

2.2.6 The South Terminal roundabout would be fully signalised. The M23 Gatwick Spur would be reclassified as an A road. The main carriageway connecting Gatwick Spur and Airport Way would be raised, creating a flyover above the existing roundabout, with on and off slip roads in both directions linking the flyover to the roundabout. The elevated M23 Gatwick Spur/Airport Way would provide clear headroom of 5.7 metres above the roundabout meaning that the road surface of the flyover would be approximately eight metres above the existing ground level at its midpoint after allowing for deck construction and surfacing. The length of the flyover structure would be approximately 130 metres. Earthworks would support the approach to the bridge and reinforced earth-walls or retaining walls would be required between the main carriageway and slip roads.

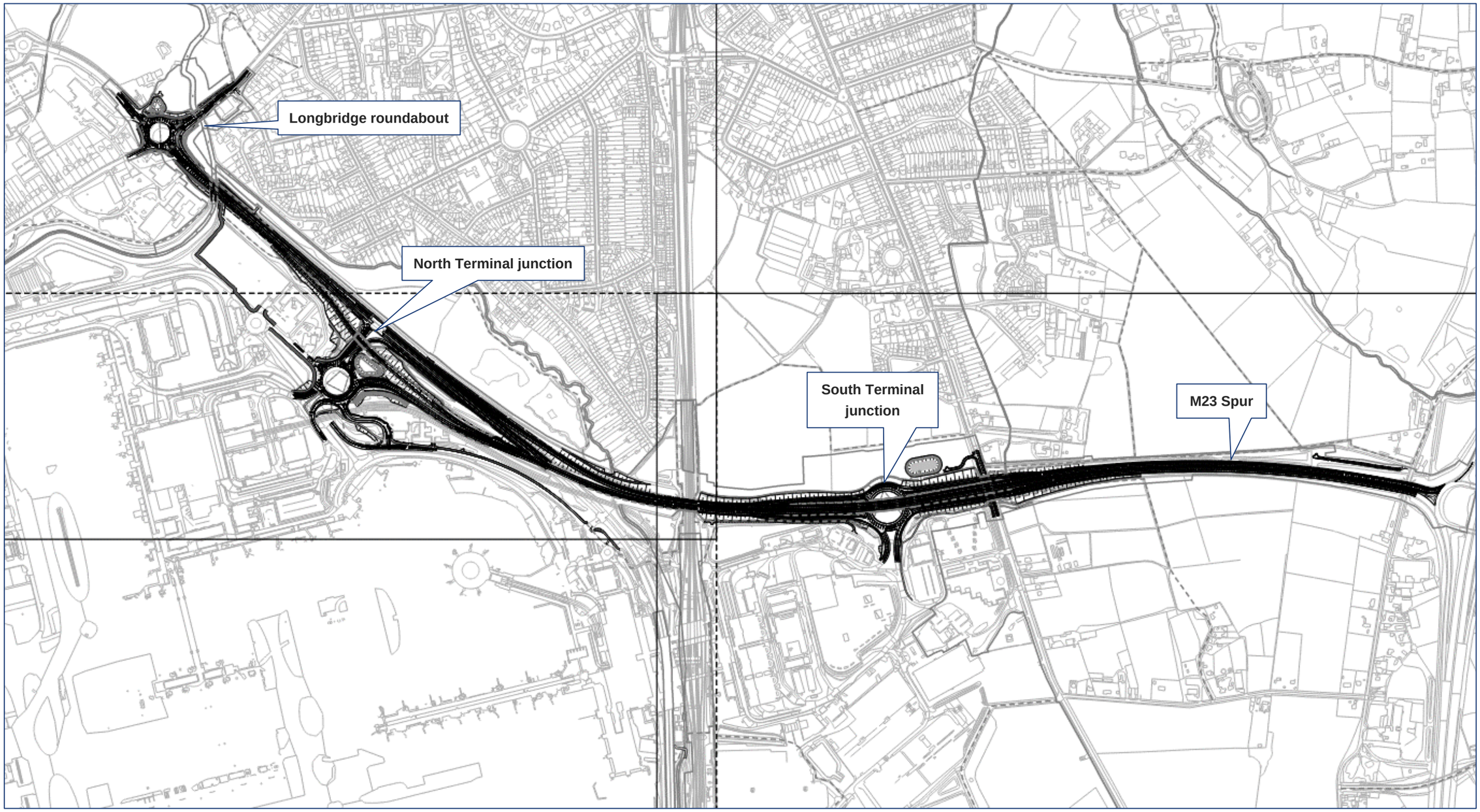
2.2.7 To the west of the roundabout, the main carriageway would tie into the existing alignment before the bridge over the Brighton Main Line railway. A third lane would be added westbound over the railway from where the improved westbound on-slip joins the main carriageway. To the east, the main carriageway flyover and slip roads to/from the roundabout would tie into the existing carriageway approximately 160 metres east of the bridge over the B2036 Balcombe Road. As the flyover would be above the existing road level as it passes over Balcombe Road this means raising the existing road over the bridge approximately 2.2 metres. This would require substantial widening and strengthening of this bridge, and the assumption is for a full replacement. The eastbound M23 Gatwick Spur would be converted to three lanes to match the westbound spur road improvements completed as part of the M23 Smart Motorway Project.

North Terminal junction improvements

2.2.8 The North Terminal roundabout is the entry point to the North Terminal and local access roads, including the northern and east perimeter roads. The existing layout consists of a circular five-arm at-grade roundabout to the northeast of the North Terminal and southwest of the A23 London Road. There is currently no direct entry to the roundabout southbound from Horley and no direct exit from the roundabout on to the A23 London Road southbound towards Crawley.

2.2.9 Local improvements are proposed in the absence of the Project (see Chapter 13).

Diagram 2.2.1: Highway access improvements with the Project



2.2.10 In order to provide for the predicted growth in passengers associated with the Project and increased background traffic, a partial grade-separated junction design is required. The size of the existing roundabout would be increased to a larger diameter to create extra capacity and changes made to entry and exit routes. As part of this solution, an elevated flyover would be built to carry traffic between Airport Way (from South Terminal and the M23) and the A23 London Road towards Horley. This would provide extra capacity for movements to and from the airport and would separate airport and non-airport traffic, reducing conflict in peak periods, thereby reducing congestion. Additional improvements would be made to Gatwick Way to accommodate an increase in traffic flow towards Northgate Road.

2.2.11 The exit from the roundabout eastbound towards Airport Way would be replaced by a connection via a new signalised junction with the A23 London Road. This would remove the need for a merge between traffic leaving the eastbound A23 heading towards the M23 and the eastbound Airport Way. The new junction on the A23 London Road would also facilitate a direct movement from the airport to the southbound A23 towards Crawley, removing a current constraint. It is also proposed to introduce a pedestrian crossing at this junction linking the existing footway along the north side of the A23, which would be improved, to Longbridge Way. Westbound traffic from the roundabout heading towards Horley on the A23 London Road would also use this signalised junction replacing the existing arm from the roundabout. The elevated link from Airport Way towards Horley would sit approximately 8 metres above the new junction to provide the required clearances as stipulated by National Highways' safety and design standards.

Longbridge roundabout

2.2.12 Works are also required to the Longbridge roundabout, including alterations to the existing layout. Options have been considered in relation to operational capacity, compliance with design standards and impact on surrounding land and property.

2.2.13 The proposed solution is to substantially improve the roundabout and provide full-width running lanes throughout the junction, replacing the sub-standard narrow lanes that currently exist. These lanes create a capacity restriction due to goods vehicles needing to straddle two lanes for certain manoeuvres.

2.2.14 The new roundabout would have a slightly larger diameter and would extend further west and north to accommodate the wider circulating lanes, enhanced active travel infrastructure and improved capacity on exit and entry lanes, particularly for the A23 Brighton Road arm to and from Horley. The existing segregated left turn lane from the A23 Brighton Road southbound into the A23 London Road eastbound would be widened along with the associated structures supporting this section of the highway and would incorporate a shared use path heading east from the roundabout. To the northeast of the roundabout, where the A23 Brighton Road crosses the River Mole, an access route for construction would be required via Woodroyd Avenue, past the garages to access to the land to the east of Brighton Road adjacent to the River Mole. The Project site boundary has been modified which enables retention of the vegetation to the east of the roundabout and southwest of the River Mole. Associated drainage works to accommodate any surface water run-off as a result of the highway improvements are included in the Project.

2.2.15 A third lane northbound would be introduced on the A23 London Road between the North Terminal Flyover and Longbridge Roundabout. The A23 London Road bridge over the River Mole would be replaced with a widened structure to accommodate this additional lane and the active travel infrastructure proposed on both sides of the structure. The A23 Brighton Road bridge over the River Mole would be replaced with a widened bridge to accommodate a widened highway and active travel infrastructure at this location.

Public transport service enhancements

2.2.16 Gatwick is served by a range of frequent rail, coach and bus services, as set out in Chapter 6. As part of the Surface Access Commitments (SACs), set out in **ES Appendix 5.4.1: Surface Access Commitments** (Doc Ref. 5.3) and summarised in Chapter 7, public transport enhancements have been identified which will support achieving the mode share commitments set out in the SACs. These enhancements are included in the transport modelling for the with Project scenarios, as they represent committed measures which would be introduced as part of the Project. This allows the assessment to identify any further impacts that may require mitigation. Bus and coach enhancements would be supported by GAL through the Sustainable Transport Fund.

Active travel improvements

2.2.17 Active travel improvements are incorporated into the highway designs. A summary of these is provided below.

2.2.18 South of the M23 Gatwick Spur there would be an additional pedestrian route linking Balcombe Road to the existing footway on the east side of Ring Road South approaching the South Terminal forecourt and railway station.

2.2.19 A section of the National Cycle Route 21 runs north south along the western side of the railway line to the west of the South Terminal. The following enhancements are proposed to this route:

- Wayfinding improvements and enhancements to the condition and alignment of NCR21 where the route passes beneath the railway station and South Terminal buildings, which would supplement any improvements made as part of the future baseline.
- A short section of the path to the south of the railway station would be widened to address an existing narrow section with limited visibility.

2.2.20 To improve active travel routes between Horley and the airport, enhanced active travel infrastructure is proposed (see drawings in Documents 4.5 and 4.6). This would comprise:

- Three-stage staggered signalised crossing for pedestrians at the northern arm of the A23 London Road signalised junction.
- Signalised pedestrian crossing on Longbridge Way between the Shell petrol station and the approach to the north terminal roundabout.
- A footway suitable for future use as a shared path for pedestrians and cyclists, on the northern side of the North Terminal link between A23 London Road signalised crossing and the proposed signalised crossing on Longbridge Way.
- Between North Terminal roundabout and South Terminal there would be a shared use path for pedestrians and cyclists with a signalised crossing at North Terminal Approach leading to a widened footway along the northern side of Perimeter Road North permitting shared use.

2.2.21 Enhanced active travel infrastructure would be provided in the vicinity of the Longbridge roundabout, comprising:

- Significant sections of segregated path for pedestrians and cyclists and signalised crossings allowing enhanced access across all arms of the roundabout.
- Provision of a shared use path between the roundabout and Riverside Garden Park, including upgrading of the proposed ramp to the south-east of A23 London Road River Mole bridge to enable shared pedestrian and cyclist use. Provision of a cyclist ramp on A23 Brighton Road eastbound at the termination point of the shared use path to enable cyclists to re-join the road carriageway.

2.2.22 To improve active travel routes between Longbridge roundabout and North Terminal, enhanced active travel infrastructure is proposed. This would comprise a segregated path for pedestrians and cyclists between Longbridge roundabout and North Terminal roundabout with a localised narrowing to shared use on the A23 London Road bridge over the River Mole.

2.3 Car parking

2.3.1 In addition to the existing provision, three new car parks would be implemented in the absence of the Project to serve the projected increase in passenger numbers in the future baseline. These improvements would add 6,570 spaces and take the future baseline car parking provision to 53,271 spaces in the absence of the Project. The existing and future baseline car parking is set out in Section 6.7.

2.3.2 The Project would result in the loss of some existing car parks and include the provision of new car parking.

2.3.3 Table 2.4.1 shows the overall changes to the number of car parking spaces, taking into account the future baseline, and sets out the spaces that would be permanently lost and replaced and the spaces required for growth with the Project. The overall net increase would be approximately 1,100 spaces.

2.3.4 The following would be lost as part of the Project:

- Summer Special – 3,345 spaces
- North Terminal Long Stay and Flying Pan – 2,465 spaces
- Staff parking (W, B and H) – 1,150 spaces
- Purple Parking – 820 spaces
- Car Park X – 1,125 spaces
- Total = 8,905 car parking spaces lost

2.3.5 New car parking would be required on site in order to meet additional demand generated by the proposed increase in passengers due to the Project, and to replace existing parking spaces that would be lost due to development associated with the Project.

2.3.6 The proposed car parking provision as part of the Project is:

- Car park Y multi-storey, 3,035 spaces
- Car park J multi-storey, 890 spaces
- Car park H multi-storey, 3,700 spaces
- At the existing Purple Parking site, 700 spaces at surface level only
- North Terminal Long Stay (decked parking), 1,680 spaces
- Total = 10,005 proposed spaces

2.3.7 The Project would therefore result in a net increase of up to 1,100 car parking spaces.

2.3.8 The broad sequence of provision of the car parking is anticipated to be as follows:

- Car park J multi-storey: 2025-2026.
- Car park H multi-storey: 2025-2027 (Phase 1).
- Car park X decking (reprovision of Purple Parking): 2025-2026.
- Existing Purple Parking removal: 2026-2027.
- Car park Y multi-storey: 2026-2028 (underground storage works only).
- North Terminal Long Stay: 2027-2029

2.3.9 The locations of car parks in the future baseline and with Project scenarios are shown in Diagram 2.4.1. These car parks and the mix of passenger and staff parking in the GAL car parking strategy are included in the modelling.

2.3.10 No additional car parking for airport staff is proposed. Historically, Gatwick provided around 7,200 spaces for staff. However, as staff car mode share has decreased, GAL has taken steps to reduce this by over 1,000 spaces in the last five years. GAL is currently reviewing the optimum allocation of spaces and location for these staff spaces, taking into account an increase in staff numbers and changing work patterns but alongside promoting use of more sustainable travel to work, including car sharing. Overall, and even allowing for a larger workforce, it is proposed to reduce the total number of spaces provided per 1,000 employees across the airport.

2.4 Forecourts

2.4.1 North Terminal Forecourt comprises North Terminal Approach, Furlong Way, Racecourse Way, Arrivals Road, Departures Road, Coach Road and Northway. These links provide access to the terminal frontage, drop off areas, bus and coach stands, car rental facilities, short stay car park entrances and taxi ranks. Departures Road includes a restricted access link to the Upper Forecourt for premium drop off (limited to certain airlines only). Long stay car parking at North Terminal is accessed via Longbridge Way as a separate access off North Terminal roundabout.

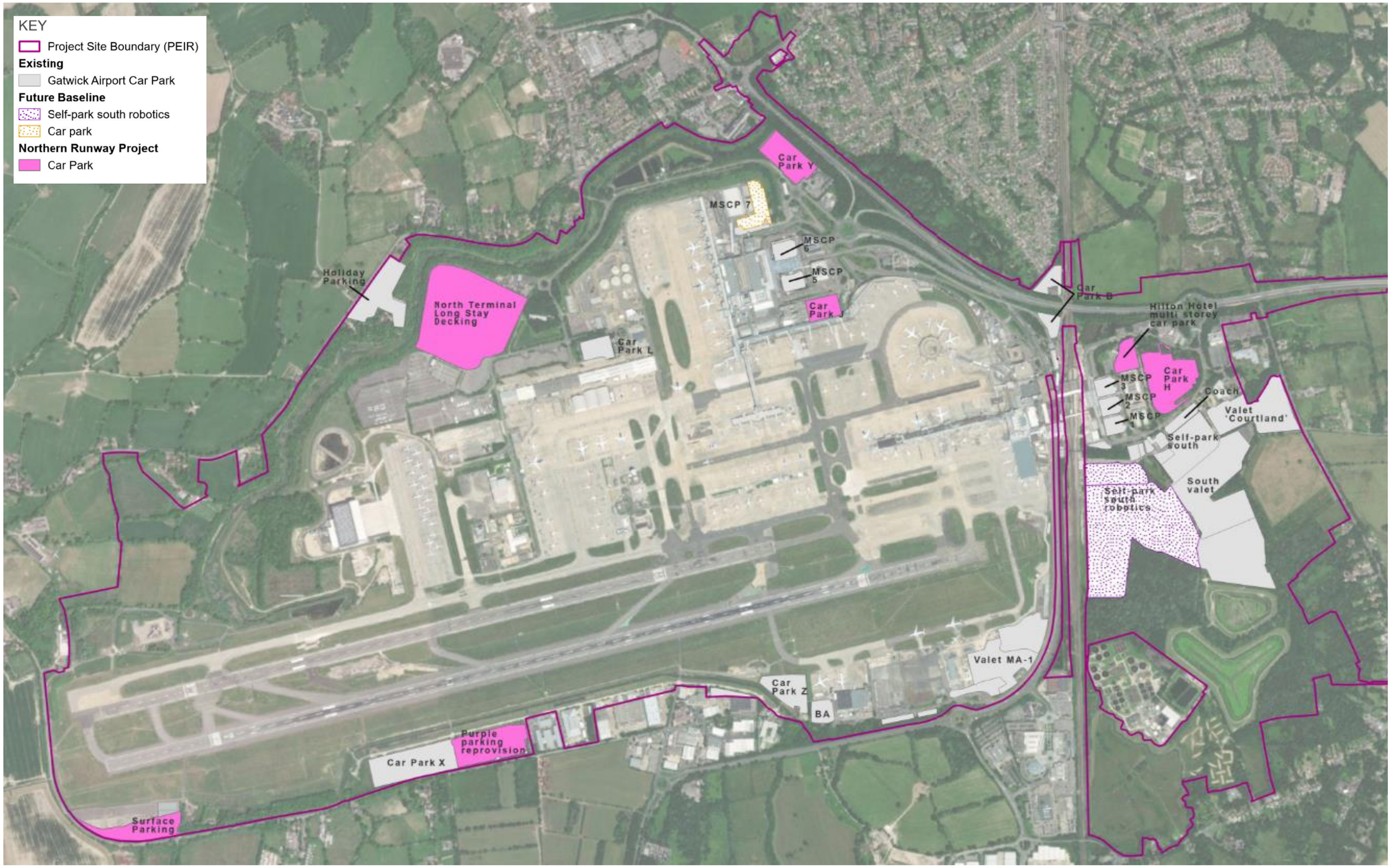
2.4.2 South Terminal Forecourt comprises Ring Road South, Eastway, Westway, Coach Road, Upper Forecourt, Lower Forecourt and Ring Road North. These links provide access to the terminal frontage, drop off areas, bus and coach stands, car rental facilities, long stay and short stay car park entrances and taxi ranks. Upper Forecourt has restricted access and is used for airport taxis, car park shuttle buses and the electric hire car fleet.

2.4.3 The forecourts and approaches to both existing terminals would be enhanced, with routes providing access to the terminal frontage, multi-storey and long stay car parks, hotels and pick-up and drop-off areas for different transport modes. The way in which access is managed for different modes may change in order to optimise the use of available capacity.

Table 2.4.1: Car parking provision for the Project

A Future baseline		B Permanently lost spaces		C Replacing lost spaces - Project		D Required for growth - Project		C+D Total for Project	
MSCP7	+3,250	Summer Special	-3,345	MSCP Car Park Y	+3,035	NT Long Stay Decking	+1,100	MSCP Car Park Y	+3,035
Robotics	+2,500	NT Long Stay and Flying Pan	-2,465	MSCP Car Park J	+890			MSCP Car Park J	+890
Hilton MSCP	+820	Staff parking (W, B & H)	-1,150	MSCP Car Park H	+3,700			MSCP Car Park H	+3,700
		Purple parking	-820	Purple parking (surface only)	+700			Purple parking (surface only)	+700
		Car Park X	-1,125	NT Long Stay Decking	+580			NT Long Stay Decking	+1,680
Total	**+6,570**		**-8,905**		**+8,905**		**+1,100**		**+10,005**

Diagram 2.4.1: GAL car parking locations



3 Site context

3.1 Location

3.1.1 The airport is located in West Sussex, close to the boundary with Surrey and approximately 38km south of central London. The London to Brighton railway line, also known as the Brighton Main Line, and the A23 are adjacent to South Terminal, and the M23 motorway runs north to south around 1.5km to the east of the Airport. Gatwick Airport's location is shown in Diagram 3.1.1.

3.1.2 Gatwick has two passenger terminals, North Terminal which opened in 1988, and South Terminal which opened in 1958. During 2019, Gatwick Airport accommodated 46.6 million passengers, 283,000 commercial Air Traffic Movements (ATMs), 2,000 non-commercial ATMs, and 150,000 tonnes of cargo.

3.1.3 Gatwick is located north of the town of Crawley, West Sussex, along the border with the county of Surrey. The nearest towns are Crawley itself, with its town centre situated approximately 5km to the south of the airport, and the town of Horley, located immediately to the north.

3.1.4 As shown on Diagram 3.1.2, Gatwick is also located near several other populous towns in West Sussex and Surrey, notably Horsham to the southwest, Dorking to the northwest, Redhill and Reigate to the north as well as East Grinstead to the east.

Diagram 3.1.1: Gatwick Airport – location

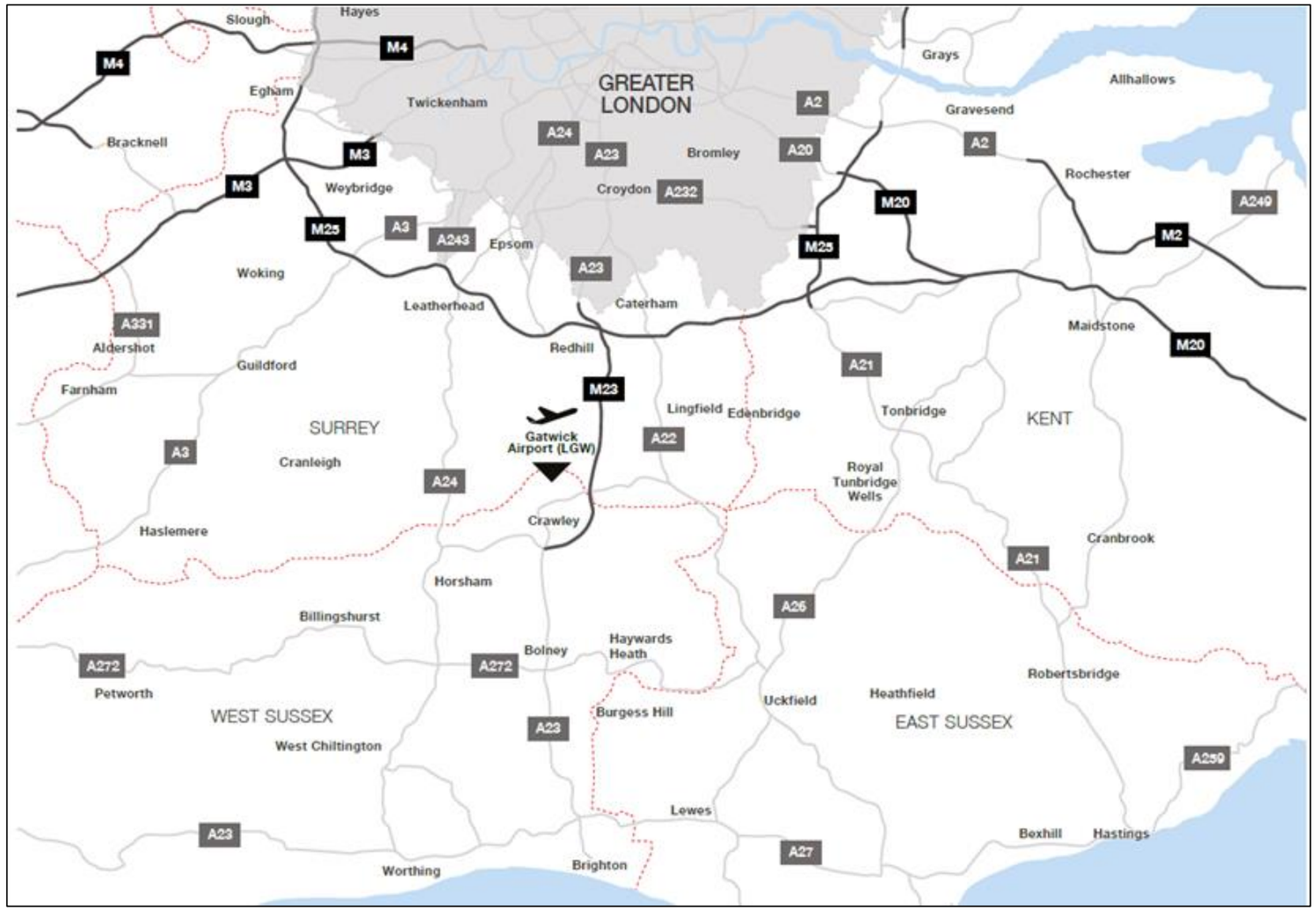
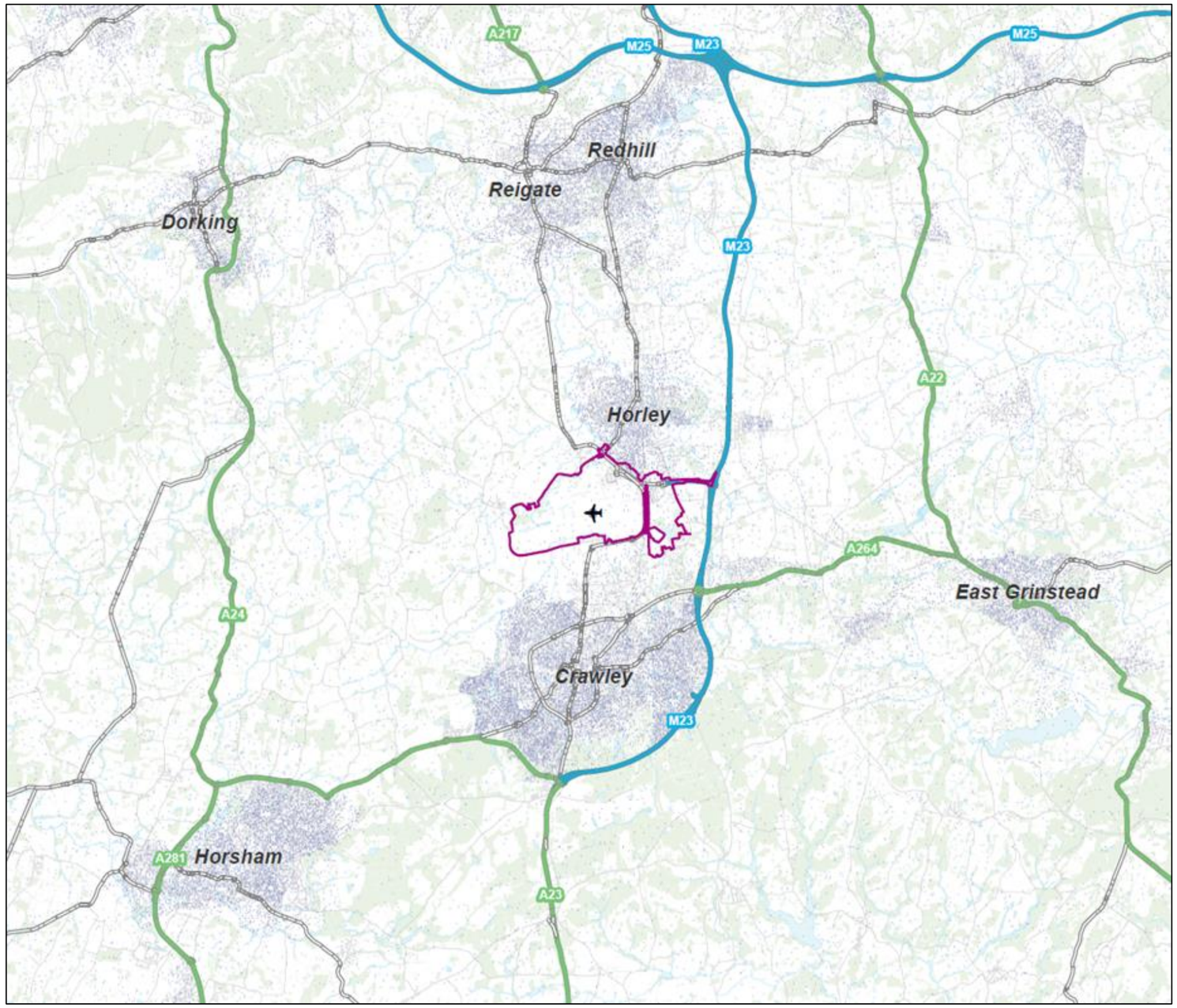


Diagram 3.1.2: Gatwick Airport – surrounding communities



3.2 Site access

3.2.1 Gatwick can be directly accessed from the national strategic road network via the M23 motorway, which runs north-south adjacent to the Airport. Junction 9 of the M23 is the main access point with an onward link of motorway (M23 Spur) to Junction 9a at the Airport's South Terminal Roundabout. National Highways' M23 Smart Motorway Project was completed in Summer 2020. This has added additional running lane capacity to the strategic network serving Gatwick at peak times.

3.2.2 The A23, which runs parallel to the M23, continues north beyond the M25 into London via Croydon and Brixton to the West End and the City. It connects south London and Croydon, through Redhill then Horley and Gatwick, through Crawley and providing a connection to the south through Pease Pottage to Brighton. South of Gatwick, the M23/A23 continues as a strategic highway corridor from London to Brighton on the South Coast.

3.2.3 Gatwick is a transport hub, where a range of modes connect, acting as both a destination and an interchange for passengers. Gatwick Airport has 24-hour rail, bus and express coach access. Access by rail and road are shown on Diagram 3.2.1.

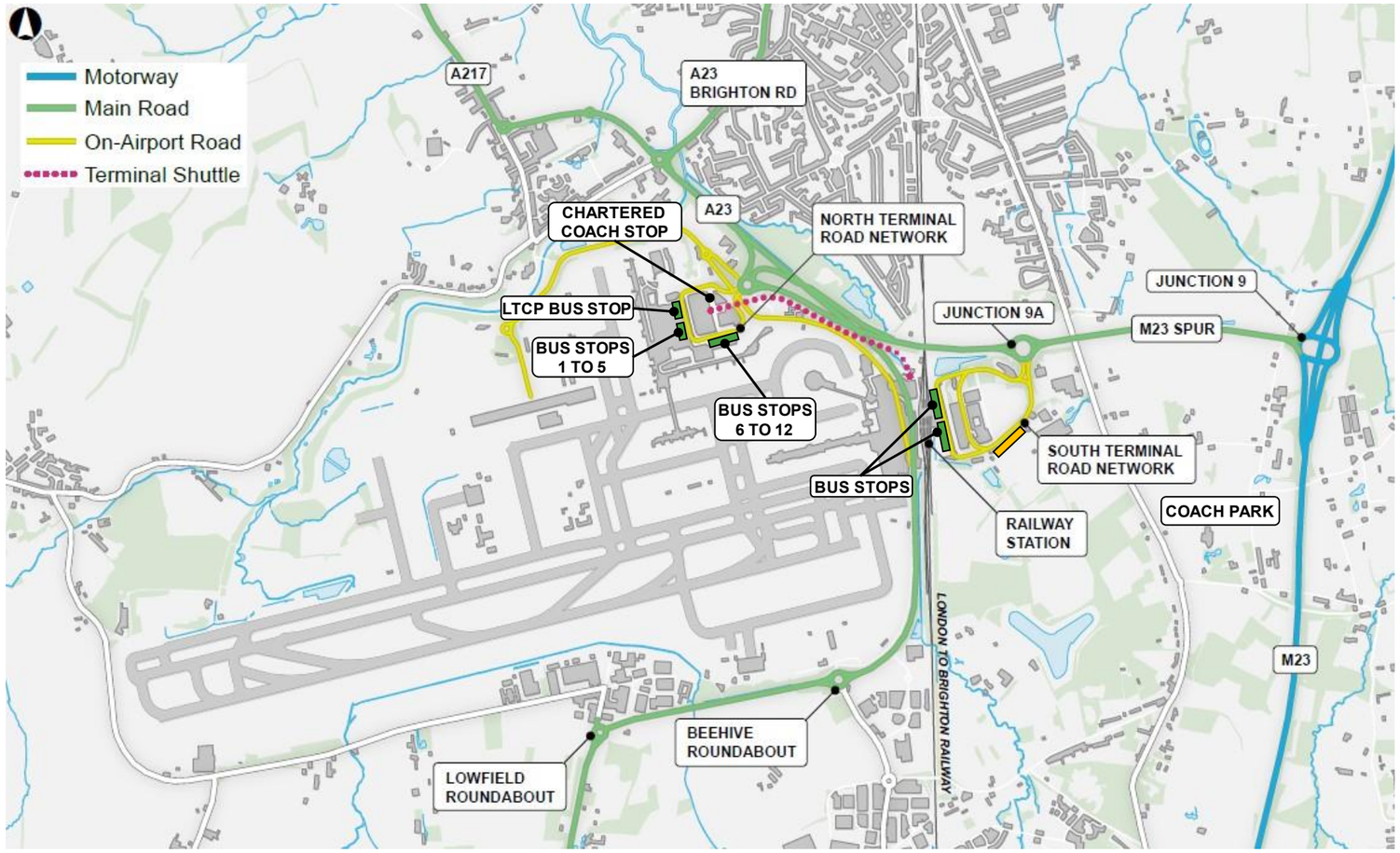
3.2.4 The Airport has a fully integrated railway station adjacent to the South Terminal located on the Brighton Main Line, connecting London to Brighton. The station is also served by the North Downs Line and Arun Valley Line services.

- The Airport can be accessed directly from the national Strategic Road Network via the M23 motorway, which runs north-south adjacent to the airport. Junction 9 of the M23 is the main access point with an onward link of motorway standard dual carriageway to Junction 9a at the airport's South Terminal roundabout. The M23 connects to the M25 around London and the A23 towards Brighton and the South Coast.
- An inter-terminal shuttle system operates between the North and South Terminals.

3.2.5 North and South Terminals are also served by a range of bus and coach services. More information on the routes and frequencies is provided in Section 6.4.

3.2.6 The Airport is accessible by walking and cycling, with routes into the Airport from Povey Cross, Horley and Crawley. National Cycle Network Route 21 (NCN21) provides a continuous route between Crawley, Gatwick, Horley, Reigate and London.

Diagram 3.2.1: Gatwick Airport – transport overview



3.3 Catchment areas

3.3.1 Surface access connectivity is important in terms of widening and spreading the benefits of air traffic growth across the South-East and the rest of the UK. This section sets out the extent of the Airport's catchment, supported by GIS analysis which is provided in **Transport Assessment Annex A – Figures** (Doc Ref. 7.4). This reflects the journey times and accessibility of transport services from parts of the UK as well as proximity and ease of access to Gatwick. In particular, it provides specific "quality of life" analysis of:

- the geographical proximity of Gatwick in 8km, 16km, 40km and under 80km (5 mile, 10 mile, 25 mile and under 50 mile) catchments; and
- the surface access journey time proximity to Gatwick at less than 30 minutes, less than one hour, less than two hours and less than four hours.

Population catchment

Distance

3.3.2 Based on the current geographical location of population, the number of people living in 8km, 16km, 40km and under 80km catchments from Gatwick Airport is as follows (shown in **Transport Assessment Annex A – Figures** (Doc Ref. 7.4)):

- 170,000 people between 0 and 8km;
- 248,000 people between 8km and 16km, equivalent to 418,000 between 0 and 16km of the Airport;
- 5.7 million people within 16km and 40km, equivalent to 5.9 million people between 0 and 40km of the Airport; and
- 11.2 million people within 40km and 80km, equivalent to 16.9 million people within 0 and 80km of the Airport.

Journey times

3.3.3 Diagram 3.3.1 and Diagram 3.3.2 (contained also in **Transport Assessment Annex A – Figures** (Doc Ref. 7.4)) shows the journey time by car and public transport, respectively. Based on the minimum journey time on these modes, as shown in the number of people within two hours of Gatwick Airport are as follows:

- 1.3 million people under 30 minutes;
- 8.0 million people between 30 and 60 minutes, equivalent to 9.3 million under 60 minutes from the Airport;
- 9.3 million people between 60 and 90 minutes, equivalent to 18.6 million people less than 90 minutes from the Airport; and
- 4.4 million people within 90 and 120 minutes, equivalent to 23.0 million people within two hours of the Airport.

Diagram 3.3.1: Travel time isochrones by car

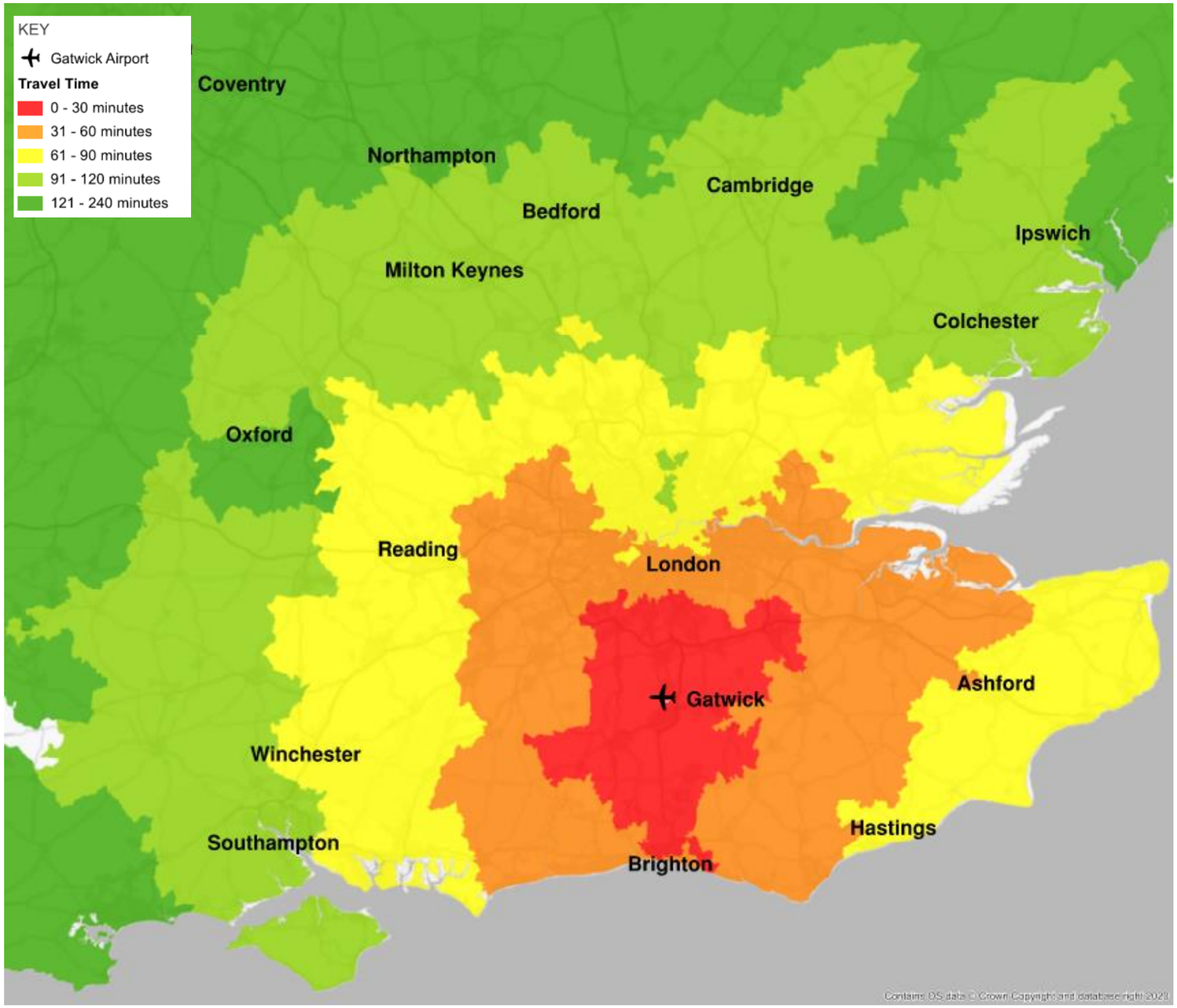


Diagram 3.3.2: Travel time isochrones by public transport

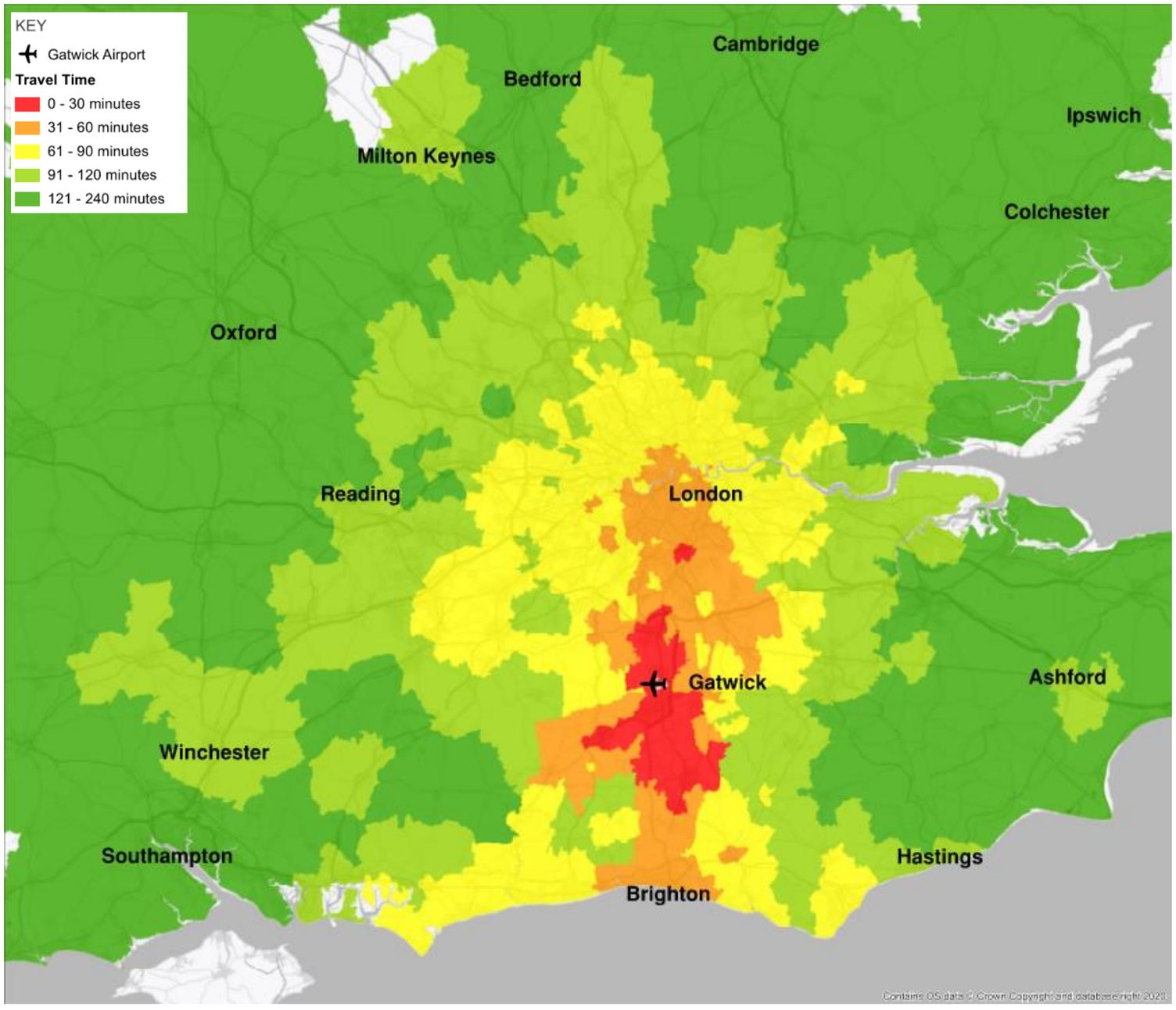
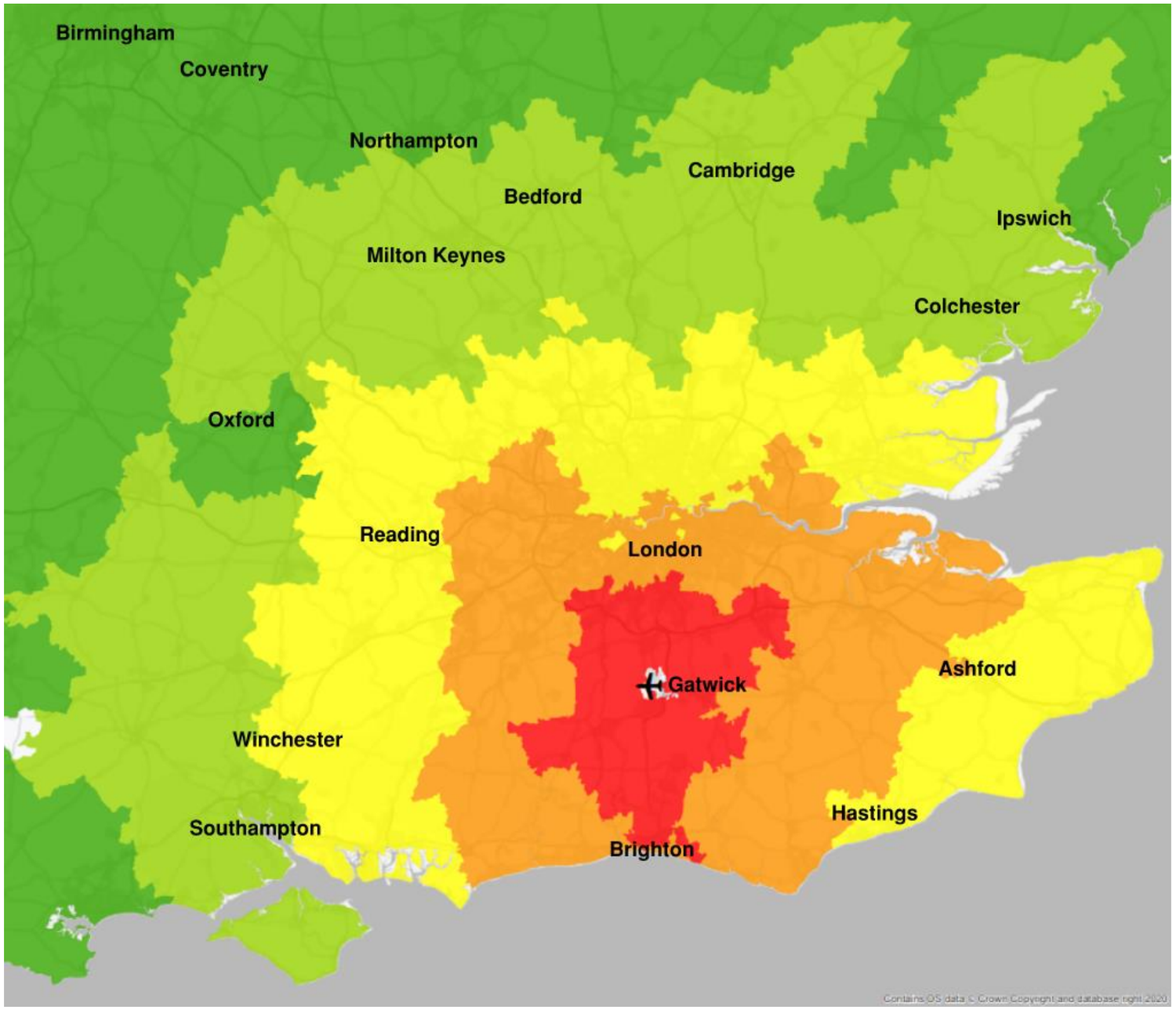


Diagram 3.3.3: Minimum travel time isochrones by car and public transport



4 Policy and planning context

4.1 Introduction

4.1.1 The key legislation and policy documents relevant to traffic and transport and considered within the assessment process are described in this chapter.

4.2 National

4.2.1 The key national policy statements and frameworks considered are as follows:

- **Airports National Policy Statement (ANPS)** (Department for Transport, 2018) – primarily relates to a new runway at Heathrow Airport but is an important and relevant consideration in the determination of other applications for airport infrastructure in London and the southeast of England,
- **National Policy Statement (NPS) for National Networks** (Department for Transport, 2015) – sets out the need for development of road, rail and strategic rail freight interchange projects on the national networks and the policy context against which decisions on major road and rail projects will be made. The NPS has effect for the highway improvements proposed as part of the Project.
- **Transport Decarbonisation Plan**[2] (Department for Transport, 2021) – sets out the government's commitments and the actions to decarbonise the transport system in the UK. It includes the pathway to net zero transport in the UK, the wider benefits net zero transport can deliver, and the principles that underpin our approach to delivering net zero transport.
- **Aviation Policy Framework (APT)** (Department for Transport, 2013) – sets out the government's policy to allow the aviation sector to continue to make a significant contribution to economic growth across the country.
- **National Planning Policy Framework (NPPF)** (Ministry of Housing, Communities and Local Government, 2021) - sets out the planning policies for England.

4.2.2 A summary of the key national policies is set out in Table 4.2.1.

[2] The Department for Transport published a revised draft National Policy Statement for National Networks ("NPSNN") for consultation on 14 March 2023. The draft NPSNN confirms in paragraph 1.16 that the existing NPSNN remains the relevant government policy and has full force and effect in relation to any applicable applications for development consent accepted for examination before designation of the updated NPSNN. The draft NPSNN further notes in paragraph 1.17 that the emerging draft NPSNN is capable of being an important and relevant consideration in the Secretary of State's decision making process. As such, the Applicant will continue to monitor the progress of the NPSNN review process and incorporate any updates to the Project's application documentation where considered appropriate in due course.

Table 4.2.1: Summary of key national policies

Ref	Description	How and where considered in the TA
Airports NPS		
Para 5.9	The applicant must prepare an airport surface access strategy in conjunction with its Airport Transport Forum, in accordance with the guidance contained in the Aviation Policy Framework.	A description of Gatwick's existing airport surface access strategy (ASAS) is contained in Chapter 6 and the Surface Access Commitments (SACs) for the Project are contained in (**ES Appendix 5.4.1: Surface Access Commitments** (Doc Ref. 5.3)) and summarised in Chapter 7 (along with a description of how such commitments interface with the existing and will inform a future ASAS).
Para 5.10	The applicant should assess the implications of airport expansion on surface access network capacity using the WebTAG methodology stipulated in the Department for Transport guidance, or any successor to such methodology. The applicant should consult National Highways, Network Rail and highway and transport authorities, as appropriate, on the assessment and proposed mitigation measures. The assessment should distinguish between the construction and operational project stages for the development comprised in the application.	Modelling work has been undertaken in accordance with TAG guidance. See Chapters 5 on methodology and Chapters 9 to 14 on the assessment of impacts. Further technical modelling information is contained in the annexes (Doc Ref. 7.4).
Para 5.11	The applicant should also consult to understand the target completion dates of any third party or external schemes included in existing rail, road or other transport investment plans.	This has been undertaken to inform the future baseline modelling. See Chapter 5 and **Transport Assessment Annex B – Strategic Transport Modelling Report** (Doc Ref. 7.4).
Para 5.13	The applicant should have regard to Department for Transport (Department for Transport) Circular 02/2013, The Strategic Road Network and the delivery of sustainable development (or prevailing policy), and the National Networks NPS.	This has been taken into account in the preparation of this report and as part of the modelling work methodology (Chapter 5).
Para 5.14	Where appropriate, the applicant should seek to deliver improvements or mitigation measures that reduce community severance and improve accessibility.	The proposed highway improvement works (Chapter 2) includes improvements for walking and cycling which reduces community severance and improves accessibility.
Para 5.17	Any application for development consent and accompanying airport surface access strategy must include details of how the applicant will increase the proportion of journeys made to the airport by public transport, cycling and walking (with specific targets set for Heathrow in relation to its third runway proposal).	See Chapter 7 for a summary of the SACs, which are in **ES Appendix 5.4.1: Surface Access Commitments** (Doc Ref. 5.3).
Para 5.18	The applicant should commit to annual public reporting on performance against these specific targets.	See Chapter 7 for a summary of SACs and more information on monitoring is contained in the SACs set out in detail in **ES Appendix 5.4.1: Surface Access Commitments** (Doc Ref. 5.3).
NPS for National Networks		
Para 2.12 to 2.17	This section sets out the need for development of the national road network. It identifies the importance of the national road network, how traffic congestion constrains the economy and impacts negatively on quality of life and the Government's options to address the identified need (including demand management and modal shift).	Chapter 8 sets out the Demand Forecasts for the Future Baseline and Project scenarios, Chapter 2 sets out the proposed highway works as part of the Project, and Chapters 12 and 13 provide an assessment of the impact of the Project on the road network.
Para 3.17	The Government expects applicants to use reasonable endeavours to address the needs of cyclists and pedestrians in the design of new schemes.	The proposed highway improvement works (Chapter 2) includes improvements for walking and cycling.
Para 3.20	The Government expects applicants to improve access, wherever possible, on and around the national networks by designing and delivering schemes that take account of the accessibility requirements of all those who use, or are affected by, national networks infrastructure, including disabled users.	Chapter 2 sets out the access improvements.
Para 3.22	Severance can be a problem in some locations. Where appropriate applicants should seek to deliver improvements that reduce community severance and improve accessibility.	The highway improvement works which form part of the Project (Chapter 2) include improvements for walking and cycling which would enhance connectivity between communities and improve accessibility.

Ref	Description	How and where considered in the TA
Para 4.61 and 4.62	The applicant should undertake an objective assessment of the impact of the proposed development on safety including the impact of any mitigation measures. They should also put in place arrangements for undertaking the road safety audit process.	Road Safety Audits have been undertaken to inform the design of the proposed highway improvement works.
Para 5.201-5.212	This section discusses Impacts on Transport Networks and requires the applicant to give regard for policies in local plans, consulting with relevant authorities, support for other transport modes, assessing impacts and mitigation in EIA.	This section summarises the policies which have been taken into account, Chapter 7 provides commitments to support other transport modes, and the impacts are assessed in Chapters 9 to 14 of this report.
Transport Decarbonisation Plan		
2a	Decarbonising all forms of transport – including increasing cycling and walking, zero emission buses and coaches, decarbonising railways, and zero emission fleet of cars, vans, motorcycles and scooters	The proposed highway improvement works (Chapter 2) include improvements for walking and cycling. Chapter 6 sets out the current ASAS, including measures to encourage use of zero emission vehicles. Chapter 7 summarises the SACs for the Project which are set out in **ES Appendix 5.4.1: Surface Access Commitments** (Doc Ref. 5.3).
Aviation Policy Framework		
Para 4.22	The Government recommends that airports continue to produce ASASs to set out targets for reducing the carbon and air quality impacts of surface access to airports, and to measure performance against these targets in a clear and transparent way. Airports may wish to consider whether there is any chance to reduce duplication of the functions and outputs of advisory groups	Current ASAS is contained in Chapter 6 and the SACs for the Project are summarised in Chapter 7 and set out in detail in **ES Appendix 5.4.1: Surface Access Commitments** (Doc Ref. 5.3).
Para 5.11	All proposals for airport development must be accompanied by clear surface access proposals which demonstrate how the airport will ensure easy and reliable access for passengers, increase the use of public transport by passengers to access the airport, and minimise congestion and other local impacts.	The Project description and proposed highway improvements works are contained in Chapter 2. The SACs for the Project to increase the use of public transport are summarised in Chapter 7 and set out in full in **ES Appendix 5.4.1: Surface Access Commitments** (Doc Ref. 5.3).
Para 5.12	The general position for existing airports is that developers should pay the costs of upgrading or enhancing road, rail or other transport networks or services where there is a need to cope with additional passengers travelling to and from expanded or growing airports. Where the scheme has a wider range of beneficiaries, the Government will consider, along with other relevant stakeholders, the need for additional public funding on a case-by case basis.	GAL will fund the delivery of the highway works associated with the Project, which are described in Chapter 2. The measures in the SACs (Chapter 7) for bus and coach enhancements will be funded through the Sustainable Transport Fund.
Para B13 -B14	This section provides the suggested content for airport surface access strategies	Current ASAS is contained in Chapter 6 and the SACs for the Project are summarised in Chapter 7 and set out in full in **ES Appendix 5.4.1: Surface Access Commitments** (Doc Ref. 5.3).
NPPF		
Para 10	At the heart of the Framework is a presumption in favour of sustainable development.	This is noted.
Para 104	Transport issues should be considered from the earliest stages of plan-making and development proposals, so that potential impacts can be address and opportunities are realised.	Highway improvement works are proposed as part of the Project, as described in Chapter 2.
Para 110	In assessing applications for sites that may be allocated for development in plans, or specific applications for development, it should be ensured that appropriate opportunities to promote sustainable transport modes can be taken up, safe and suitable access to the site can be achieved for all users, and any significant impacts from the development on the transport network can be cost effectively mitigated to an acceptable degree.	See Chapter 2 on the proposed highway improvement works, Chapter 6 on the current ASAS and Chapter 7 for a summary of the SACs for the Project, set out in full in **ES Appendix 5.4.1: Surface Access Commitments** (Doc Ref. 5.3).
Para 111	Development should only be prevented or refused on highways grounds if there would be an unacceptable impact on highway safety, or the residual cumulative impacts on the road network would be severe.	This is noted and Chapters 12 and 13 provide an assessment of the Project on the highway network.

4.2.3 Other national guidance which has been considered in developing this TA, in terms of modelling work, design of the surface access improvement works and the approach to sustainable development, includes:

- National Planning Practice Guidance (NPPG) (Ministry of Housing, Communities and Local Government, 2019) - Supports the NPPF and provides guidance across a range of topic areas, including 'Travel Plans, Transport Assessments and Statements'
- Road Investment Strategy 2: 2020-2025 (Department for Transport, 2020) – Sets out the five-year strategy for investment in and management of the Strategic Road Network.
- The Strategic Road Network and the Delivery of Sustainable Development (Department for Transport, 2013)
- South East Route Control Period 6[3] Delivery Plan, Network Rail, March 2019 – This includes reference to support for a 45% rail mode share target for Gatwick Airport.
- Strategic Business Plan 2019-2024 (Network Rail, 2018); and
- Periodic Review 2018 (PR18) (Office of Rail and Road, 2018) – PR18 will establish outputs and funding for Control Period 6 (CP6) from 1 April 2019 to 31 March 2024.
- Flightpath to the Future (Department for Transport, 2022a) – A strategic framework for the aviation section that supports the DfT's vision for a modern, innovative and efficient sector over the next ten years.
- The Jet Zero Strategy (Department for Transport, 2022b) – Sets out a commitment that the DfT will encourage passengers and employees to travel by sustainable modes of transport to and from the Airport where possible.
- LTN 1/20 (Department of Transport, 2020) – Provides guidance and good practice for the design of cycle infrastructure, in support of the DfT's Cycling and Walking Investment Strategy.
- Active Travel England: framework document (Active Travel England, 2022) – The document explains Active Travel England's responsibilities, its relationship with the Department for Transport and their common objective of delivering increases in active travel to 50% of all journeys in urban areas.

4.3 Regional and local

4.3.1 Gatwick lies within the administrative area of Crawley Borough Council and adjacent to the boundaries of Mole Valley District Council to the northwest, Reigate and Banstead Borough Council to the northeast and Horsham District Council to the southwest. The administrative area of Tandridge District Council is located approximately 1.9 km to the east of Gatwick, while Mid Sussex District Council lies approximately 2 km to the southeast. Other local highway authorities are at county level, and these are East Sussex (12km southeast) and Kent (15km east). Gatwick is located in West Sussex and immediately adjacent to the bordering county of Surrey.

4.3.2 The relevant local planning policies applicable to Traffic and Transport based on the extent of the study area for this assessment are summarised in Table 4.4.1 and explained further in the paragraphs below.

4.4 Other related plans and policies

4.4.1 Other plans and strategies have also been considered and these include:

- West Sussex Local Transport Plan 2011-2026 (LTP3) (West Sussex County Council, 2011)
- West Sussex Walking and Cycling Strategy 2016-2026 (West Sussex County Council, 2016)
- West Sussex County Council Highway Infrastructure Policy and Strategy 2018 (West Sussex County Council, 2018)
- West Sussex Transport Plan 2022-36 (West Sussex Country Council 2022)
- West Sussex Speed Limit Policy (West Sussex County Council, 2022)
- Mid Sussex Infrastructure Delivery Plan 2016 (Mid Sussex District Council, 2016)
- Surrey Local Transport Plan 2022-2032 (LTP4) (Surrey County Council, 2021)
- East Sussex Local Transport Plan 2011-2026 (East Sussex County Council, 2011)
- Kent Local Transport Plan 2016-2031 (Kent County Council, 2017)

4.4.2 The following guidance has been considered:

- Design Manual for Roads and Bridges (DMRB) Standards for Highways
- WebTAG (Transport Analysis Guidance) (Department for Transport, 2019)
- Station Capacity Planning Guidance (Network Rail, 2016)
- Local highway authority standards, where relevant if these differ from DMRB

4.4.3 Additional studies and strategies which have also been reviewed as part of this TA report:

- West Sussex Infrastructure Studies (AECOM, 2016)
- West Sussex Guidance on Parking at New Developments (West Sussex County Council, 2020)
- West Sussex Transport Assessment Methodology (West Sussex Couny Council, 2007)
- West Sussex Cycling Design Guide (West Sussex County Council, 2019)
- Crawley Local Cycling and Walking Infrastructure Plan, consultation draft (Crawley Borough Council, 2020)
- Horsham District Council, Draft Infrastructure Delivery Plan (Horsham District Council, 2020)
- Horsham District Council Draft Infrastructure Delivery Plan (Horsham District Council, July 2021)
- Reigate and Banstead Local Walking and Cycling Infrastructure Plan (Reigate and Banstead District Council, 2022)
- The London Plan 2021 (Greater London Authority, 2021)
- The Mayor's Transport Strategy 2018 (Greater London Authority, 2018)
- South East Route - Sussex Area Route Study Final (Network Rail, 2015)
- Strategic Economic Plan (2018-2030) (Coast to Capital, 2018)
- Transport Strategy (being developed) (Transport for the South East, 2019)
- A Strategic Investment Plan for the South East (Transport for the South East, 2023)

[3] Control Periods are 5 year periods used by Network Rail to specify planning and investment in railway infrastructure. Control Period 5 runs from 2014 to 2019, Control Period 6 from 2019 to 2024, and so on.

- Manual for Streets (Department for Transport, 2007)
- Manual for Streets 2 (Chartered Institute of Highways and Transportation, 2010)

4.4.4 Table 4.4.1 shows that most of the policies have common themes and these are address in this report in the following chapters:

- Sustainable development – see Section 2.2 on the surface access improvements, Section 6.10 on the current ASAS and Chapter 7 on the SACs for this Project.
- Car parking – see Section 2.3.
- Railway station – see Chapter 6 on current operation and Chapter 10 on the station assessment.

Table 4.4.1: Summary of key regional and local policies

Policy	Description
Crawley 2030: Crawley Borough Local Plan 2030	
IN3 Development and Requirements for Sustainable Transport	Supports guiding development toward existing sustainable travel networks and requires satisfactory mitigations for unacceptable cumulative impacts on the networks. For major projects, requires preparation of a Transport Assessment.
IN4 Car and Cycle Parking Standards	Calls for developments within the Borough to include sufficient car and cycle parking per relevant planning obligations and agreements. Standards for non-residential developments to be based on particular requirements of the development.
IN5 The Location and Provision of New Infrastructure	States support for infrastructure improvements where these are required to support development within the Borough. Major facilities should be located in locations with high levels of multi-modal accessibility.
IN6 Improving Rail Stations	Improvements to Gatwick Station should support its function as an airport related interchange as well as enhancing the broader functions as a multi-modal interchange for rail, coach, and bus users.
GAT1 Development of the Airport with a Single Runway	Support development that contributes safe and efficient operations within the existing airport boundary, provided satisfactory mitigations are in place for surface access and other environmental impacts. Currently, the Council supports development of the airport in its existing configuration as a two-terminal, single runway facility with growth up to 45 mppa.
GAT3 Gatwick Airport Related Parking	Policy calls for new or replacement airport parking to be based on demonstrated need and to be sited within the existing airport boundary. This policy is guided by a desire to limit spill over of parking facilities into local communities and need to maintain high mode-share targets for sustainable transport to the airport.
Draft Crawley Borough Local Plan 2021 – 2037 (January 2021) – Consultation closed at the end of June 2021.	
SD1 Presumption in Favour of Sustainable Development	When considering development proposals the council will take a positive approach to approving development which is sustainable. Strategic objectives are provided and development will be supported where it meets the objectives.
SD2 Enabling Healthy Lifestyles and Wellbeing	New development must be designed to achieve healthy, inclusive and safe places, which enable and support healthy lifestyles and address health and wellbeing needs in Crawley, as identified in the Crawley Joint Strategic Needs Assessment.
ST1 Development and Requirements for Sustainable Transport	Development should be located and designed so as to encourage travel via the walking and cycling network and public transport routes, while reducing dependency on travel by private motor vehicle. Developments should meet the access needs they generate and not cause an unacceptable impact in terms of increased traffic congestion or highway safety. Developments will be considered acceptable in highways terms unless there would be an unacceptable impact on highway safety, or the cumulative impact on the transport network is severe and cannot be satisfactorily mitigated. Developments that generate a significant amount of movements should be supported by a Transport Statement / Assessment.
ST2 Car and Cycle Parking Standards	Development will be permitted where the proposals provide the appropriate amount and type of car and cycle parking (including electric vehicle charging infrastructure) to meet its needs when it is assessed against the borough council's car and cycle parking standards.
ST3 Improving Rail Stations	Any improvements or developments at Gatwick Station should support its function as an airport-related interchange and provide opportunities for broadening the function of the station as an interchange for surface travellers using rail, coach, Fastway and other buses consistently with the safe and efficient operation of the airport.
ST4 Safeguarding of a Search Corridor for a Crawley Western Relief Road	The Local Plan Map identifies a Search Corridor for a Crawley Western Link Road linking the A264 with the A23. This Search Corridor will be safeguarded from development which would be incompatible with the future delivery of a full Crawley Western Link Road.
GAT1 Development of the Airport with a Single Runway	The council will support the development of facilities which contribute to the sustainable growth of Gatwick Airport as a single runway, two terminal airport provided that the proposed use is appropriate within the airport boundary and contributes to the safe, secure and efficient operation of the airport, the impacts of the operation of the airport on the environment are minimised, adequate supporting infrastructure (particularly for surface access) can be put in place, and benefits to Crawley's local economy and community are maximised.
GAT3 Gatwick Airport Related Parking	The provision of additional or replacement airport-related parking will only be permitted where i) it is located within the airport boundary; and ii) it is justified by a demonstrable need in the context of proposals for achieving a sustainable approach to surface transport access to the airport.

Policy	Description
Reigate and Banstead Local Plan: Core Strategy 2014 (Reigate and Banstead Borough Council, 2014), Reviewed in 2019	
Policy CS17 Travel Options and Accessibility	States broad council commitment to working with relevant parties to manage travel demand, improve network efficiency for all road users, and facilitate sustainable transport choices.
Reigate and Banstead Borough Development Management Plan (Reigate and Banstead Borough Council, 2019)	
TAP1 Access, Parking and Servicing,	Sets forth highway design, multi-modal access, and car and cycle parking requirements for proposals within the Borough, as well as stating preference for proposals to promote safe, sustainable travel and incorporate travel demand measures. Requires a Transport Assessment as appropriate.
TAP2 Airport Car Parking	Precludes permission for airport related parking, including additional or replacement parking, within the district.
HOR09 Horley Strategic Business Park	The site is allocated for a strategic business park of predominantly offices, with a complementary range of commercial, retail and leisure facilities and at least 5 ha of new high quality public open space. It should be demonstrated through a Transport Assessment that there will be no severe residual impact on the local and strategic road network. Development will be subject to requirements / considerations, including a new dedicated, direct access onto the strategic road network (M23 spur), a secondary access to the site from Balcombe Road for use by emergency services, public transport and other sustainable transport modes, measures and improvements to manage the impact of additional traffic on surrounding local roads, and improvements to pedestrian / cycle routes. In the Examination in Public, it was concluded that access to the business park would range from “a new access to the existing roundabout through to a grade-separated junction, depending on the level of development traffic”.
Mole Valley Core Strategy 2009 (Mole Valley District Council, 2009)	
CS18 Transport Options and Accessibility	States council preference for development with high levels of multi-modal accessibility on the existing network, and for schemes that include improvements for cyclists, pedestrians, and public transport users. Requires submission of Travel Plans to accompany major developments, to be implemented under an s106 agreement.
Mole Valley Local Plan 2000 (Mole Valley District Council, 2000)	
RUD28 Off Airport Car parking	Precludes permission for airport related parking, including additional or replacement parking, within the district.
MOV2 The Movement Implications of New Development	Proposals for development within the District should demonstrate compatibility with existing transport infrastructure and environmental character. As appropriate developers should provide for schemes and initiatives to provide adequate capacity for the development and provide provisions for all road users.
MOV5 Parking Standards	States that current car parking standards are applied as maximums for developments within the district and should be examined in regard to the site's accessibility by other modes and opportunities to contribute to improved public transport networks.
Draft Future Mole Valley 2020-2037: Proposed Submission Version	
INF1 Promoting Sustainable Transport and Parking	New development will be required to contribute to the delivery of an integrated, accessible and safe transport network, and maximise the use of sustainable transport modes; including walking, cycling and public transport. Where practical, taking account of the scale and nature of the development, the policy sets out requirements for proposals. New development will be required to provide and contribute towards suitable access, transport infrastructure and services that are necessary to make the development acceptable, including the mitigation of its otherwise adverse material impacts. Development of new off-airport car parking facilities or extensions to existing sites related to Gatwick Airport will not be supported unless a specific need can be demonstrated, and all realistic alternatives have been examined.
Horsham District Planning Framework (excluding South Downs National Park) 2015 (Horsham District Council, 2015)	
Policy 40 Sustainable Transport	Encourages and supports development proposals seeking to manage travel demand by promoting and improving sustainable transport options.
Policy 41 Parking	Calls for adequate parking, including for cars, bicycles, and motorcycles, to be provided within new developments generally. Precludes permission for airport-related parking within the district, unless no feasible alternative is available to meet a demonstrated need.

Policy	Description
Draft Horsham District Local Plan 2019-2036 (Horsham District Council, 2020)	
Strategic Policy 41 - Infrastructure Provision	The release of land for development will be dependent on there being sufficient capacity in the existing local infrastructure to meet the additional requirements arising from new development, or suitable necessary mitigation arrangement for the improvement of the infrastructure, services and community facilities caused by the development being provided. Where there is a need for extra capacity, this will need to be provided in time to serve the development or the relevant phase of the development, in order to ensure that the environment and amenities of existing or new local residents is not adversely affected. To ensure required standards are met, arrangements for new or improved infrastructure provision will be secured by Planning Obligations/Community Infrastructure Levy, or in some cases contributions attached to a planning permission, so that the appropriate improvement can be completed prior to occupation of the development, or the relevant phase of the development.
Strategic Policy 42 - Sustainable Transport	There is a commitment to developing an integrated community connected by a sustainable transport system. In order to manage the anticipated growth in demand for travel, development proposals which promote an improved and integrated transport network, with a re-balancing in favour of non-car modes as a means of access to jobs, homes, services and facilities, will be encouraged and supported.
Policy 43 – Parking	Adequate parking and facilities must be provided within developments to meet the needs of anticipated users. Consideration should be given to the needs of cycle parking, motorcycle parking, and vehicles for the mobility impaired. Adequate parking and plug-in charging facilities must be provided to cater for the anticipated increased use of electric, hybrid or other low emission vehicles. Planning permission will not be granted for off-airport parking facilities related to Gatwick Airport unless a need can be demonstrated and no other realistic alternatives is available.
Policy 44 - Gatwick Airport Safeguarded Land	Land identified on the Local Plan Policies Map will be safeguarded from development which would be incompatible with expansion of the airport to accommodate the construction of an additional wide spaced runway (if required by national policy) together with a commensurate increase in facilities that contribute to the safe and efficient operation of the expanded airport. Minor development within this area, such as changes of use and small scale building works, such as residential extensions, will normally be acceptable. Where appropriate, planning permission may be granted on a temporary basis. The airport operator will be consulted on all planning applications within the safeguarded area.
Tandridge District Core Strategy 2008 (Tandridge District Council, 2008)	
Policy CSP12 Managing Travel Demand	Developments to provide transport infrastructure improvements as appropriate, inclusive of all road users. Improvements to key corridors are supported, including the M23/A23 corridor.
Tandridge Local Plan Part 2: Detailed Policies 2014-2029 (Tandridge District Council, 2014)	
Policy DP5 Highway Safety and Design;	In addition to adherence to relevant highway design guidance, requires developments to avoid creating unnecessary traffic flow impediments or roadway hazards, ensure safe and suitable access to all road users, to maintain existing active travel networks, and to fund, as appropriate, mitigation measures for significant impacts. Calls for a Transport Assessment for developments generating significant amounts of traffic.
Emerging Our Local Plan 2033 (Regulation 22 Submission) 2019 (Tandridge District Council, 2019)	
Policies TLP50 Sustainable Transport and Travel	Calls for proposals to demonstrate broad conformity with the vision and objectives in the Surrey Local Transport plan, especially as regards active travel and air quality, and seeks to guide development to appropriate locations with a range of transport options. Requires preparation of a Transport Assessment and Travel Plan, as appropriate, to ensure appropriate mitigation measures for adverse impacts to traffic and the environment. Sets forth objectives to promote and enhance public transport, electric vehicle infrastructure, and active travel networks.
TLP51 Airport Related Parking	Precludes permission for airport related parking, including additional or replacement parking, within the district.
Mid Sussex District Plan 2014-2031 (Mid Sussex District Council, 2018)	
Policy DP21 Transport	Requires developments within the District to support West Sussex Transport Plan (2011-2026) objectives, which promote ensuring provision of high quality, resilient, safe and healthy, and sustainable transport network and outlines evaluation criteria for support. Transport Assessment along with Travel Plans are required as appropriate for developments generating significant amounts of movement.

Policy	Description
Saved policies from the Mid Sussex Local Plan 2004 (Mid Sussex District Council, 2004)	
T4 New Development	Calls for new development to adhere to sustainability requirements through siting in built up areas near existing public transport provision, seeking to limit new private car trips, and providing convenient and safe cycling and pedestrian infrastructure.
T5 Parking Standards	Proposals should adhere to latest parking standards for the district, and not provide parking in excess of guidance.

5 Assessment methodology

5.1 Introduction

5.1.1 This chapter describes the methodology, including modelling approach and assumptions, used to assess the impact of the additional passengers, staff and cargo forecast for the Project on the surface transport networks. The base model is built in the context and consideration of guidance specified within DfT's TAG Unit M3.1, May 2020[4] and the generalised costs used in the model were taken from TAG Data Book November 2021 (v1.17).

5.1.2 The methodology and the inputs described have been discussed with key stakeholders in a series of meetings held through 2019-2023, which is summarised in Section 5.2.

5.1.3 In particular, strategic modelling has been developed with input from key stakeholders including DfT, National Highways, Network Rail, Transport for London and Local Authorities including West Sussex and Surrey County Councils through a series of technical workshops and reviews of specific modelling technical notes when the base model was being developed (2019 to early 2020 for PEIR). These workshops restarted in July 2021 to finalise the base and forecast year models to inform this DCO application.

5.2 Stakeholder consultations

5.2.1 Stakeholder engagement meetings and workshops are documented in Table 5.2.1.

[4]https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/938864/tag-m3-1-highway-assignment-modelling.pdf

Table 5.2.1: Ongoing stakeholder engagement

Consultee	Date	Details
Department for Transport	23 April 2019	Meeting held to discuss master plan scenarios and modelling approach to assess the potential effects on the transport network.
	30 June 2021	Meeting to provide briefing on the Project, surface access proposals, key issues and proposed modelling approach.
National Highways	Various, early 2019	Initial briefing sessions held in early 2019 to discuss master plan scenarios and National Highways expectations around both modelling and testing of effects and potential mitigation on the highway network.
	1 October 2019	Meeting with National Highways to discuss modelling approach for PEIR, potential surface access improvement options, strategic highway modelling. Also covered process, engagement and interface between NH and GAL.
	26 November 2019	Meeting on governance and forward engagement, design progress, surface access modelling programme, PINS engagement and DCO programme.
	7 January 2020	Meeting to discuss potential concepts for surface access improvements on the Strategic Road Network.
	13 February 2020	To discuss VISSIM modelling outputs in the context of different highway options for 2047 future baseline and 2047 with Northern Runway Project (NRP).
	26 October 2020	A meeting with National Highways to confirm the recommencement of the Project after a pause because of the Covid-19 pandemic. This included a recap on where the work had got to in Spring 2020 and next steps.
	2 February 2021	Given a change in personnel on the National Highways team considering GAL's DCO application, a briefing on all aspects of the project including proposed surface access improvements, VISSIM modelling demonstrating the appropriateness of the surface access improvements, strategic transport modelling including highway modelling and a proposed engagement schedule with National Highways.
	13 April 2021	The purpose of this meeting was to provide new team members at National Highways with an overview of the highway network serving GAL and the design development of surface access improvements to support growth at the Airport with NRP.
	May 2021 to date	Meetings to discuss project governance, National Highways engagement and milestones to DCO submission.
	Engagement related to transport modelling	
	6 July 2021	Meeting held with National Highways to discuss the status of strategic modelling and to set out the strategy for engagement through to DCO submission.
	12 August 2021, 15 October 2021, 21 January 2022, 17 March 2022	Workshops held to discuss the base strategic model for DCO, including calibration, validation and the Local Model Validation Report for the strategic model suite.
	28 March 2022, 30 May 2022	Meetings held to discuss the forecasting assumptions and model scenarios for the DCO application.
	7 July 2022, 22 September 2022, 6 October 2022, 21 October 2022, 2 November 2022, 24 November 2022 16 December 2022, 19 January 2023	Workshops held to discuss the emerging outputs from the strategic modelling for the DCO application, covering an overview, specific scenarios and responses to queries raised by National Highways through this series of workshops.
	Engagement related to highway design	
	8 July 2021, 3 August 2021, 26 August 2021, 6 October 2021, 14 October 2021, 18 October 2021, 28 October 2021, 4 November 2021, 12 November 2021, 23 November 2021, 29 November 2021, 2 December 2021, 8 December 2021, 14 December 2021, 13 January 2022, 20 January 2022, 24 January 2022, 10 February 2022, 15 March 2022, 5 April 2022, 19 May 2022, 13 June 2022, 28 June 2022, 13 July 2022,	Series of meetings to discuss the highway proposals presented in the PEIR, examine alternative options and develop updated highway proposals for the DCO application. Topics included: • Introduction to scheme concept technical design proposals • Proposed highway geometry • NH feedback on concept design • Gatwick design deliverables • Historical options development for the PEIR proposals • Revised concept design options for the highway proposals • High-level traffic modelling information for options • Options Assessment Matrix and key performance criteria Technical specialisms including structures, drainage, geotechnics, technology, lighting, departures, and pavement Design.

Consultee	Date	Details
	25 July 2022, 18 August 2022, 28 September 2022, 19 October 2022, 9 November 2022, 29 November 2022	
West Sussex County Council (note joint engagement has also taken place and is covered later in this table)	15 April 2019	Meeting held with West Sussex surface access and modelling leads on to discuss master plan scenarios, West Sussex's expectations, a potential modelling approach and study area, including access to the Crawley model network.
	14 July 2021	Meeting held with West Sussex CC to discuss the status of strategic modelling and to set out the strategy for engagement through to DCO submission.
	26 August 2022	Structures design meeting with West Sussex CC covering scheme update, structures options proposals and technical notes.
Surrey County Council (note joint engagement has also taken place and is covered later in this table)	7 July 2021	Meeting held with Surrey CC to discuss the status of strategic modelling and to set out the strategy for engagement through to DCO submission.
	23 February 2022	Structures design meeting with Surrey CC covering scheme update, review of affected Surrey CC structures, availability of existing information.
	2 March 2022	Drainage meeting with Surrey CC covering updates on design, overview of existing drainage, proposed drainage strategy and design and affected Surrey CC assets.
	22 July 2022	Structures design meeting with Surrey CC covering scheme updates since previous meeting.
	27 July 2022	Meeting with Surrey CC to discuss noise barrier proposals including findings of analysis by GAL and impacts of including or excluding the noise barrier in the highway proposals.
Highway Authorities (jointly)	11 November 2019	Meeting held with National Highways, West Sussex CC and Surrey CC to discuss strategic modelling and the Model Specification Report (MSR), covering demand types, time periods, strategic model to VISSIM integration, committed highway schemes to be included in the modelling etc.
	12 December 2019	Meeting held with National Highways, West Sussex CC and Surrey CC to discuss strategic modelling, including model validation, demand forecasting, future transport schemes and forecast scenarios.
	25 February 2020	Meeting held with National Highways, West Sussex CC and Surrey CC to discuss strategic modelling technical notes issued by Arup on behalf of GAL.
	6 September 2021	Meeting held with National Highways, West Sussex CC and Surrey CC to discuss the potential scope of forecast scenarios for the strategic transport modelling.
	11 January 2022	Highway design meeting with West Sussex CC and Surrey CC covering overview of scheme, traffic considerations, highway ownership, existing constraints, walking, cycling and horse-riding proposals and next steps.
	19 January 2022	Highway design meeting with West Sussex CC and Surrey CC covering review of highway geometry proposals for Longridge roundabout, North Terminal junction proposals and South Terminal area, including proposed speed limit changes.
	7 February 2022	Highway design meeting with West Sussex CC and Surrey CC covering walking, cycling and horse-riding proposals, journey time impacts and feedback on design layouts and documents.
	30 March 2022	Structures and drainage design meeting with West Sussex CC and Surrey CC covering overview of proposals and discussion of further background information.
	8 September 2022	Drainage meeting with West Sussex CC and Surrey CC covering updates on design, overview of existing drainage, proposed drainage strategy and design.
	23 September 2022	Meeting to provide an update on the status of the strategic and microsimulation modelling for the DCO application, including forecasting assumptions and methodology for assessing effects.
	12 October 2022	Technology and traffic signal meeting with West Sussex CC and Surrey CC, covering scheme background, summary of proposals, requirements for technology and signals and approach to provision.
	14 October 2022	Meeting to present considerations around seasonality, the outputs from the strategic modelling core scenarios and emerging outputs from cumulative scenarios, and to discuss sensitivity tests.
	17 November 2022	Drainage meeting with West Sussex CC and Surrey CC covering review of drainage strategy report, update on design and discussion on discharge rates, culverting proposals.
	17 November 2022	Meeting to discuss further actions and queries arising from meeting on 14 October 2022 in relation to strategic modelling.

Consultee	Date	Details
	30 November 2022	Meeting with West Sussex CC and Surrey CC covering Flood Risk Assessment and including highway culverting proposals.
Network Rail	13 February 2019	Meeting held with Network Rail to discuss master plan scenarios and potential impacts on the station, South Terminal and inter-terminal shuttle. Network Rail agreed to release the Legion model used for business case modelling of the station project for use by GAL in relation to the DCO.
	11 July 2019	Meeting to discuss and agree preliminary Legion modelling of the station.
	04 December 2019	Meeting to discuss use of rail to transport project-related construction materials and spoil.
	10 December 2019	Meeting to discuss further Legion modelling of the station and to discuss route capacity enhancements.
	8 November 2021	To provide an overview of the current status of strategic modelling and the assessment presented in the PEIR.
	9 November 2022	To provide an update on the strategic modelling for the DCO application, covering general context and the outcomes related to rail crowding.
	1 December 2022	Meeting to discuss Legion modelling undertaken for Gatwick Airport station, including outputs from core scenarios.
Transport for London	16 April 2019	Meeting held with Transport for London to discuss master plan scenarios and the approach to modelling and testing effects, including access to the London Highway Assignment Model (LoHAM) model network.
	04 November 2019	Meeting to discuss expectations for assessment, potential modelling approach and study area, assumptions regarding rail access and onward travel across London.
	14 April 2021	Update on progress towards DCO submission, in particular the outline programme to consultation, progress and forthcoming outputs on surface transport modelling and transport assessment. Other subjects covered included the recently introduced Forecourt Charging at Gatwick and the Mayor's Financial Sustainability Plan with potential user charging concepts for London.
	22 October 2021	To provide an overview of the current status of strategic modelling and the assessment presented in the PEIR.
	20 October 2022	To provide an overview of the transport modelling for the DCO application including the approach to forecasting, selected model scenarios and modelling for the rail network.
	30 November 2022	To provide an update on the transport modelling for the DCO application including model outputs and addressing queries from previous meeting.
Local Authorities	21 August 2019	Meeting with Mid Sussex DC, West Sussex CC, Mole Valley DC, Crawley BC, Surrey CC, East Sussex CC, Tandridge DC, Reigate and Banstead BC to describe approach for the Project, including PEIR.
	04 February 2020	Meeting with Mid Sussex DC, West Sussex CC, Mole Valley DC, Crawley BC, Surrey CC, East Sussex CC, Kent CC, Tandridge DC, Reigate and Banstead BC to describe approach for the Project, including an update on the assessment for PEIR and the Airport Surface Access Strategy.
	27 July 2021	Meeting with Mid Sussex DC, West Sussex CC, Mole Valley DC, Crawley BC, Surrey CC, East Sussex CC, Kent CC, Tandridge DC, Reigate and Banstead BC to describe approach for the Project, including an update on the assessment for PEIR and draft actions and targets in the Airport Surface Access Strategy.
	17 May 2022	Topic Working Group (invited Mid Sussex DC, West Sussex CC, Mole Valley DC, Crawley BC, Surrey CC, East Sussex CC, Kent C, Tandridge DC, Reigate and Banstead BC, National Highways) providing update on statutory consultation, intended reporting, transport model development for DCO application; changes to proposed highway works, sustainable travel, and car parking proposals.
	15 June 2022	Topic Working Group (invited Mid Sussex DC, West Sussex CC, Mole Valley DC, Crawley BC, Surrey CC, East Sussex CC, Kent CC, Tandridge DC, Reigate and Banstead BC, National Highways) providing update on active travel infrastructure proposals.
	26 July 2022	Topic Working Group (invited Mid Sussex DC, West Sussex CC, Mole Valley DC, Crawley BC, Surrey CC, East Sussex CC, Kent CC, Tandridge DC, Reigate and Banstead BC, National Highways) providing update on public transport proposals forming part of the SACs and matters related to bus infrastructure and emerging update of rail assessment.
	28 July 2022	Topic Working Group (invited Mid Sussex DC, West Sussex CC, Mole Valley DC, Crawley BC, Surrey CC, East Sussex CC, Kent CC, Tandridge DC, Reigate and Banstead BC, National Highways) providing update on transport modelling outputs for core scenarios; overview of approach to construction; and key considerations for further active travel infrastructure.
	27 September 2022	Topic Working Group (invited Mid Sussex DC, West Sussex CC, Mole Valley DC, Crawley BC, Surrey CC, East Sussex CC, Kent CC, Tandridge DC, Reigate and Banstead BC, National Highways) providing update on active travel infrastructure options study; information on construction sequencing and impacts; initial discussion on mode shares and draft SACs targets.

Consultee	Date	Details
	1 November 2022	Topic Working Group (invited Mid Sussex DC, West Sussex CC, Mole Valley DC, Crawley BC, Surrey CC, East Sussex CC, Kent CC, Tandridge DC, Reigate and Banstead BC, National Highways) providing update on cumulative development scenarios and details of the SACs including measures, targets and monitoring approach.
	5 December 2022	Topic Working Group (invited Mid Sussex DC, West Sussex CC, Mole Valley DC, Crawley BC, Surrey CC, East Sussex CC, Kent CC, Tandridge DC, Reigate and Banstead BC, National Highways) providing update on transport modelling outputs for core scenarios; overview of approach to construction; and key considerations for further active travel infrastructure.
	31 January 2023	Topic Working Group (invited Mid Sussex DC, West Sussex CC, Mole Valley DC, Crawley BC, Surrey CC, East Sussex CC, Kent CC, Tandridge DC, Reigate and Banstead BC, National Highways) providing update on proposed construction methodology for the proposed highway works.
Network Rail	13 February 2019	Meeting held with Network Rail to discuss master plan scenarios and potential impacts on the station, South Terminal and inter-terminal shuttle. Network Rail agreed to release the Legion model used for business case modelling of the station project for use by GAL in relation to the DCO application.
	11 July 2019	Meeting to discuss and agree preliminary Legion modelling of the station.
	4 December 2019	Meeting to discuss use of rail to transport project-related construction materials and spoil.
	10 December 2019	Meeting to discuss further Legion modelling of the station and to discuss route capacity enhancements.
	8 November 2021	To provide an overview of the current status of strategic modelling and the assessment presented in the PEIR.
	29 July 2022	Highway design meeting with Network Rail covering scheme background and overview, review of existing Airport Way bridge over London to Brighton Railway, proposed design and construction considerations.
	9 November 2022	To provide an update on the strategic modelling for the DCO application, covering general context and the outcomes related to rail crowding.
	1 December 2022	Meeting to discuss Legion modelling undertaken for Gatwick Airport station, including outputs from core scenarios.
Transport for London	16 April 2019	Meeting held with Transport for London to discuss master plan scenarios and the approach to modelling and testing effects, including access to the London Highway Assignment Model (LoHAM) model network.
	4 November 2019	Meeting to discuss expectations for assessment, potential modelling approach and study area, assumptions regarding rail access and onward travel across London.
	14 April 2021	Update on progress towards DCO application, in particular the outline programme to consultation, progress and forthcoming outputs on surface transport modelling and transport assessment. Other subjects covered included the recently introduced Forecourt Charging at Gatwick and the Mayor's Financial Sustainability Plan with potential user charging concepts for London.
	22 October 2021	To provide an overview of the current status of strategic modelling and the assessment presented in the PEIR.
	20 October 2022	To provide an overview of the transport modelling for the DCO application including the approach to forecasting, selected model scenarios and modelling for the rail network.
	30 November 2022	To provide an update on the transport modelling for the DCO application including model outputs and addressing queries from previous meeting.
Environment Agency	22 March 2022	Meeting to discuss Water Quality and Water Environment Regulations in relation to highway proposals.
	5 July 2022	Meeting to discuss highway proposals and interface with watercourses, including culverting of main rivers, other culverting and ditch proposals, highway drainage proposals.
Sussex Police	16 November 2022	Design and operations meeting covering scheme background and overview, summary of proposals, impacts on Gatwick Police station, proposed operational regime and comments from Sussex Police.
Planning Inspectorate (PINS)	15 November 2019	Meeting held with PINS to respond to comments provided on the Environmental Impact Assessment Scoping Report, including in relation to cumulative development which impacts upon the strategic transport modelling.
	3 February 2021	Meeting held with PINS to restart engagement on the Project after a short pause related to Covid. Discussion on NSIPs, Heathrow Runway 3 and in relation to cumulative development which will impact upon the next stage of strategic transport modelling.

5.3 Modelling approach

5.3.1 For the purpose of the assessment, GAL has developed a bespoke suite of inter-related strategic modelling tools. The development and structure of these modelling tools has been shared with Department for Transport, National Highways, Network Rail, and the Local Authorities as statutory consultees prior to consultation. Detailed technical information is contained in the **Transport Assessment Annex B – Strategic Transport Modelling Report** (Doc Ref. 7.4) and summary information is provided in this section.

5.3.2 An overall model architecture has been developed. Diagram 5.3.1 shows the overall modelling structure for the Gatwick Strategic Model. This aligns with the approach in TAG (Unit M1.1) (Department for Transport, 2014). It comprises three core model components.

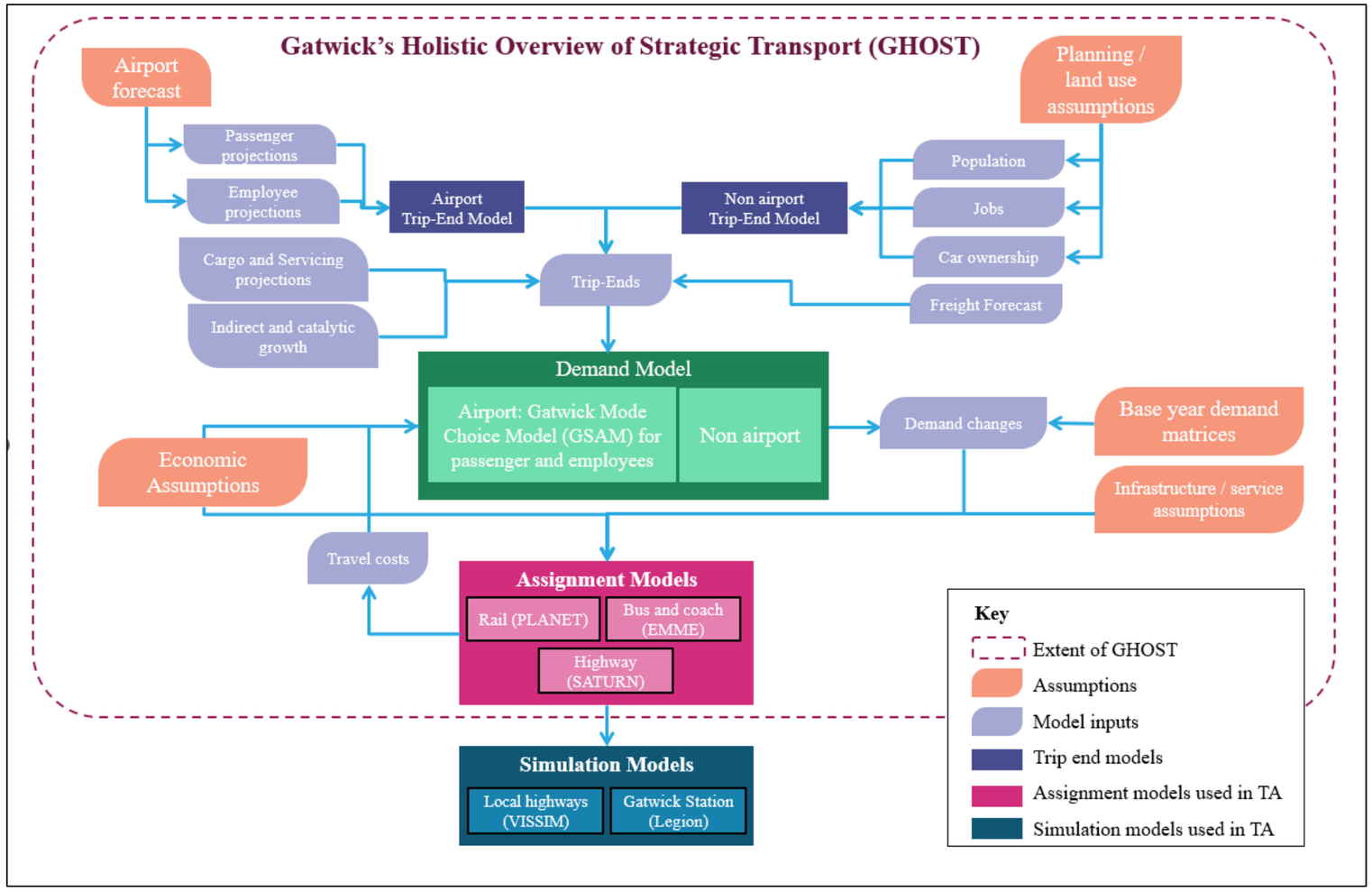
(1) The demand model – capable of reflecting changes in the distribution and mode of non-airport demand and the mode of travel for airport demand (employees and passengers).

(2) Assignment models – capable of establishing the likely routes taken by airport and non-airport demand and producing costs for the demand model.

(3) Simulation models – used for the detailed operational assessment of key pieces of infrastructure at and adjacent to the airport.

5.3.3 The modelling baseline year is 2016, based on a 2016 calibrated and validated transport model. The 2016 model provided base flows which have been extrapolated to describe relevant 2018 conditions, which informed the noise, air quality and carbon chapters in the Environmental Statement. Commentary is provided in Chapter 6 on differences between the modelled 2016 baseline and the current transport networks in 2023.

Diagram 5.3.1: Model architecture



Demand Model

5.3.4 A variable demand model (GSAM) has been developed to identify the background (non-Gatwick) trips. Alongside this sits a specific demand model for Gatwick trips for two main reasons:

- more model detail is required – more modes (eg taxi), different segmentation (eg UK/overseas) and additional time periods customised to the specific circumstances of Gatwick; and
- there are different choices and sensitivities – eg air passengers have no flexibility to change destination as they have to get to the airport. They also have different values with regard to journey time compared to general background trips.

5.3.5 Therefore, the development of the airport mode choice model has enabled the assessment of the relevant access/egress modes taken across the day for both passengers and employees. The mode choice model includes assumptions for the availability and performance of both the highway and public transport networks as the model is integrated with both the public transport (rail, bus, and coach) and highway (car (kiss and fly, park and fly), taxi, Light Goods Vehicles (LGV) and Heavy Goods Vehicles (HGVs)) models.

Rail assignment model

5.3.6 The public transport assignment model has used the PLANET South model as a basis for rail assignment and a new EMME model has been developed for bus/coach travel to create a bespoke Gatwick public transport model. The rail assessment is contained in Chapter 9 of this report, and Chapter 11 covers bus and coach.

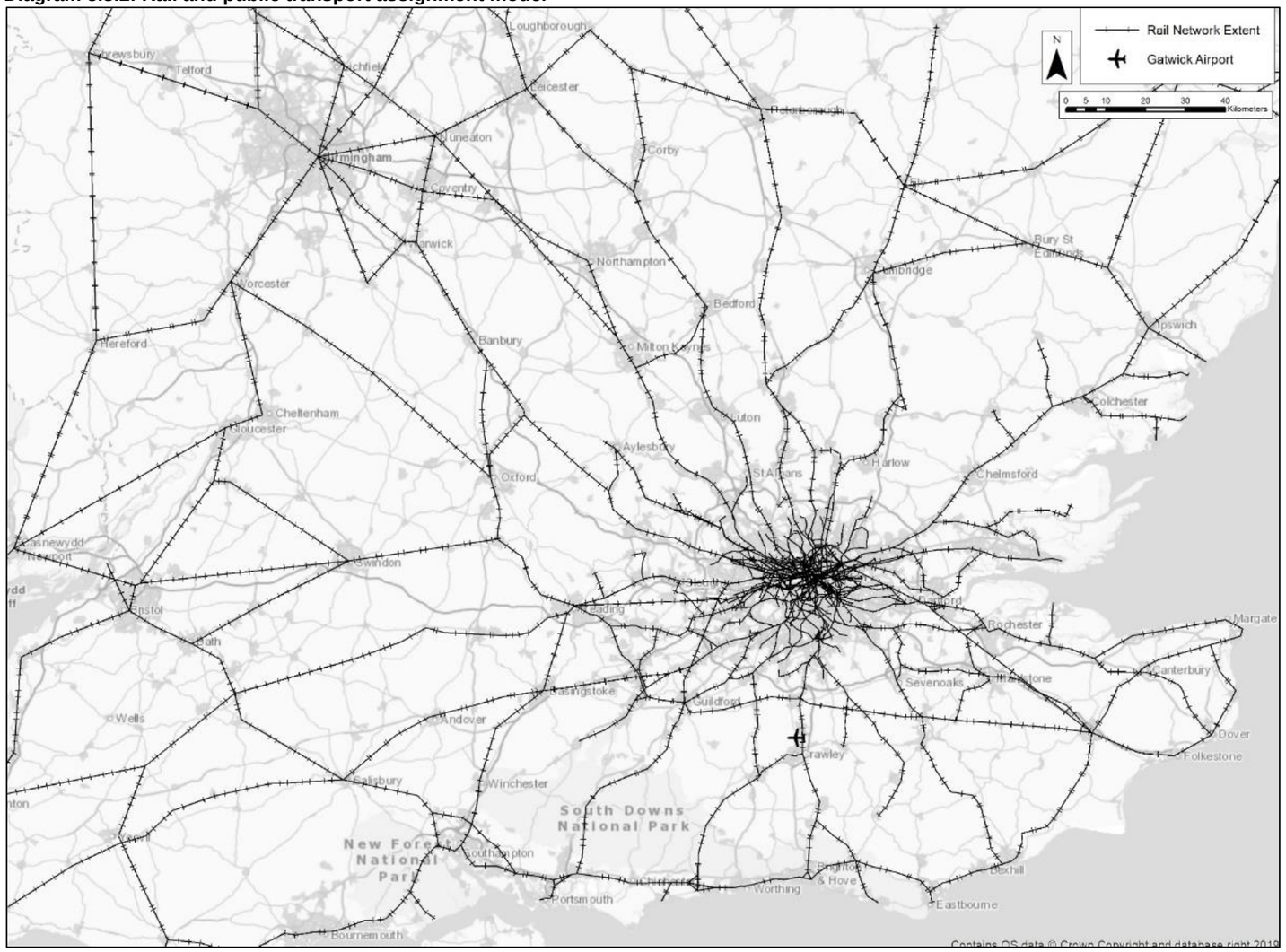
5.3.7 The Department for Transport's strategic rail model is called PLANET. PLANET is split into four geographic regions (North, Midlands, South and National) with the PLANET South Model covering London and the South East as well as the South West, East of England and the Midlands. It is an AM peak model that has been expanded for this study to six time periods covering 24 hours, covering the south of England. It is focussed on national rail services but London Underground, DLR and Croydon Tramlink services are also included to provide London access and cross London connectivity for rail trips. The Department for Transport supports the use of PLANET South as the base model for development of the Gatwick model.

5.3.8 PLANET South was used for determining the study area for public transport and the assessment of rail effects such as capacity and crowding with and without the Project. The affected rail network in PLANET South showed that the minimum extent of rail network coverage should be from the Sussex coast to central London plus the North Downs Line between Gatwick Airport and Reading (see Chapter 9). Moreover, given that travel to Gatwick for many passengers requires cross-London travel, full coverage of PLANET South to locations north of London such as Stevenage, Peterborough and Cambridge has also been included. A plan showing the PLANET South model area is shown in Diagram 5.3.2.

Bus and coach assignment model

5.3.9 The bus/coach model includes all bus services that operate to, from or within the Crawley, Horley and Gatwick area. Additionally, all coach services operated by Megabus and National Express nationwide are included, plus services from other coach operators which provide services at Gatwick. The bus/coach model has been developed as a standard public transport frequency-based assignment tool using the inbuilt modules of the EMME software and applying a standard generalised journey time function with weight on the components of time as recommended in TAG.

Diagram 5.3.2: Rail and public transport assignment model



Highway assignment model (strategic)

5.3.10 The Gatwick strategic highway assignment model uses SATURN, which is the software used for strategic highway modelling by all the source highway models. GAL's model has been developed using National Highway's South East Regional Transport Model (SERTM). SERTM is the basis for generating a sub-regional highway assignment model that can be used to test strategic network effects specifically related to Gatwick as well as providing input into any environmental analysis for noise and air quality. A summary of the strategic modelling work is provided in Chapter 12 and **Transport Assessment Annex B – Strategic Transport Modelling Report** (Doc Ref. 7.4).

5.3.11 SERTM was developed as one of five strategic models by National Highway's and focuses on London and the South East. In terms of its coverage, it includes the entire southeast of England, from The Wash and Oxford to Southampton. It includes detailed simulation of all motorways and 'A' roads, plus all 'B' roads and any 'C' roads that play a material role in allowing traffic to access the Strategic Road Network (SRN). The model includes in less detail the rest of the UK (southwest, Midlands, north, Wales and Scotland) and all motorways and 'A' roads, and all important 'B' roads that could affect the long-distance routing of traffic in the South East.

5.3.12 The Gatwick Highway Model has refined SERTM locally to add additional network detail and zoning. This update has made use of West Sussex's Crawley Local Transport Model (CLTM) and Transport for London's London Highway Assignment Model (LoHAM) for network coding in Crawley, Horley and the area of South London.

5.3.13 SERTM has been used for determining the study area for the highway network in addition to the extents being informed by previous experience and understanding of Gatwick's transport effects from modelling work to support various expansion proposals put forward by GAL since 2013. Model coverage has been shared with key stakeholders.

5.3.14 The coverage of the highway assignment model is shown in Diagram 5.3.3 in which the more detailed simulation area is shown in yellow, with the fully modelled simulation area defined by a black outline. The simulation area includes the A27 between Chichester and Hastings which has been included in the modelling following discussions with West Sussex County Council. It should be noted that, while the whole of London is shown as simulation area, other than for an area in South

London, the network is represented as fixed speeds which is the methodology adopted in SERTM. The area shown outside the fully modelled area is termed as "buffer network" which provides the key feeder links to the simulation area. Note this buffer area has been expanded when compared to SERTM to include links to Gatwick passenger origins and destinations.

5.3.15 The strategic highways model developed in SATURN is the primary highway assessment tool used, informing demand on links and through junctions as well as variation in speeds to be fed into more detailed junction modelling using VISSIM as well as into air quality and noise models. The model has been calibrated and validated and a summary is provided in Chapter 12, with detailed information provided in Chapter 5 of the **Transport Assessment Annex B – Strategic Transport Modelling Report** (Doc Ref. 7.4).

5.3.16 The screenline statistics and journey time information indicate that that the model meets the standard for calibration and validation which is required by TAG and provides a robust baseline on which to undertake the forecasting. Throughout the development of the transport models, technical aspects have been discussed with the relevant stakeholders, including the Department for Transport, National Highways, Surrey County Council, West Sussex County Council, Network Rail, and Transport for London. This has involved the sharing of model development technical notes and data collection/validation reports for the base year models. Stakeholders have had the opportunity to review this information and raise any concerns or requests for review, and concerns raised have been addressed through updates to the base model and through further dialogue.

5.3.17 The future baseline scenarios incorporate background traffic growth based on the latest growth factors from DfT's Trip End Presentation Program (TEMPro) with adjustments to consider cumulative development. TEMPro provides the National Trip End Model (NTEM) assumptions by setting out national travel demand growth for each local authority area based on a set of planning assumptions covering employment and housing projections.

5.3.18 In accordance with TAG Unit M4, an Uncertainty Log was developed for both demand (eg new developments) and supply (eg new transport infrastructure) that could impact the future performance of the transport system. The Uncertainty Log was developed with input from local planning and highway authorities which identified all planned development and transport infrastructure projects and their current status. The demand Uncertainty Log was used as the basis for reviewing the TEMPro/NTEM assumptions at a fine level of spatial detail in the AoDM. The NTEM assumptions were then updated accordingly, and the most current local plan assumptions were used as the basis for the growth trajectory in each local authority district. The Uncertainty Log is contained as part of the **Transport Assessment Annex B – Strategic Transport Modelling Report** (Doc Ref. 7.4).

5.3.19 The developments included in future baseline scenarios have Uncertainty Levels classed in the Uncertainty Log as 'Near Certain' or 'More than Likely'.

5.3.20 There are a number of other developments within the vicinity of Gatwick (at Horley Business Park, West of Ifield and Gatwick Green) which are less certain and have not been included in the future baseline. Local stakeholders have indicated that they wish to understand the potential cumulative traffic and transport impacts related to these developments. These have therefore been considered in the Uncertainty Log as 'Reasonably Foreseeable' and included in separate modelling runs and reported in detail in **Transport Assessment Annex B – Strategic Transport Modelling Report** (Doc Ref. 7.4).

5.3.21 This approach is in keeping with TAG Unit M4, which states '*local sources of uncertainty categorised as near certain should be included in the core scenario, whilst all sources categorised as hypothetical should be excluded. Between these two categories, an element of judgement may be required, but usually it would be expected that those inputs categorised as more than likely will be included in the core scenario, whilst those categorised as reasonably foreseeable will be excluded*'.

5.3.22 It should be noted that in developing the strategic model, every effort has been made to ensure the model networks reflect the expected future network state, with the coding of junctions being appropriate and traffic loading from zones being reasonable. However, where high levels of congestion are predicted within such models a localised effect known as 'model noise' can occur. This results in traffic demand switching between routes in successive iterations (of a model run), and when compared against a corresponding scenario, may indicate effects that do not appear logical in the context of the test. This can indicate lower levels of model convergence in specific localised areas, which can make the model results subject to higher levels of uncertainty.

5.3.23 Within the Gatwick model, some localised 'model noise' has been identified in two particular areas – Croydon and Steyning. These locations have been reviewed in detail and it is clear that airport-related traffic represents a very small proportion of traffic in these areas (less than 1%). The large changes in traffic flows between future baseline and with Project scenarios in these areas, and the associated impacts, are due to background traffic switching between routes with very similar journey times within the model, when in practice this is unlikely to happen, for instance because the alternative route is unsuitable or is not the signed route. These effects arising from model noise are not considered likely to occur in practice as a result of the Project.

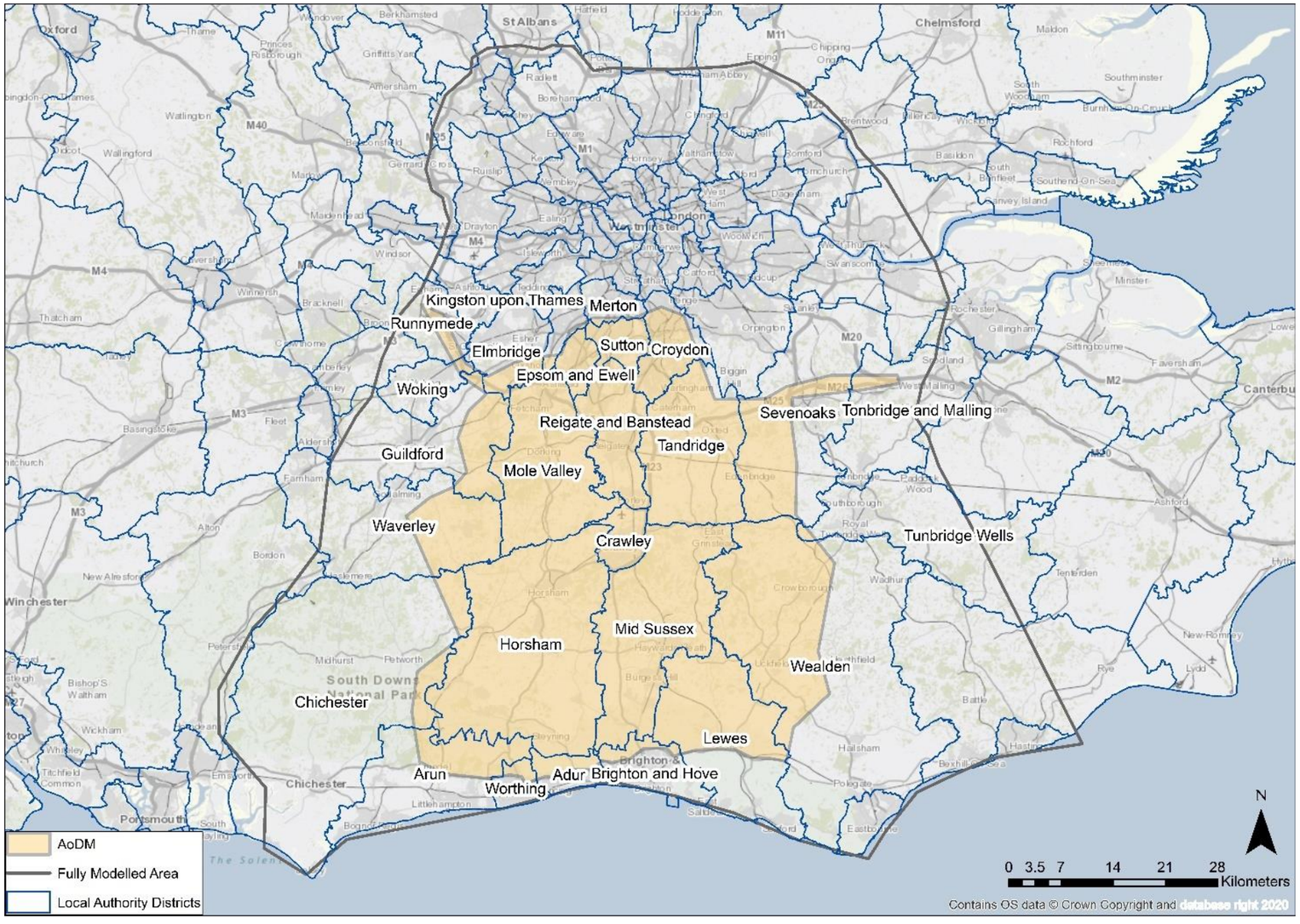
5.3.24 The transport modelling for the 2029, 2032 and 2047 assessment years is developed from a 2016 base year. Data was originally collected in 2016 during a period where the transport network was operating in a relatively stable condition. During the period of 2018 to 2019, the introduction of the Smart Motorways Scheme between Junctions 8 and 10 on the M23, and changes in railway timetabling through 2018 and 2019, led to a period of variability in access to the airport. 2016 was therefore considered the most stable pre-pandemic period on which to base the modelling.

5.3.25 Analysis of the changes in traffic flows at key locations adjacent to Gatwick Airport and on the Strategic Road Network has been undertaken to understand changes between 2016 and 2022. The analysis suggested that weekday daily traffic volumes in June 2022 were below the equivalent for 2016 indicating that traffic levels had not recovered to pre-pandemic levels. This ranged from -2% to -27% with less recovery noted on the local road network. More detailed analysis of the daily and hourly profile of traffic suggested this was consistent across the day for a typical weekday, with peak hour traffic volumes tending to be lower than 2016 equivalents. The modelling assumptions in producing the future baseline scenarios imply general traffic growth between the 2016 base year and 2022 of around +6%. This analysis indicates that the 2016 base for modelling is robust and appropriate for assessing the effects of the Project.

5.3.26 GAL notes the DfT published guidance in May 2023 which supplies advice regarding the treatment of the Covid-19

pandemic in transport modelling[5], including in relation to the proportionate accounting for the pandemic in prior-calibrated models. The advice acknowledges that in the near future the large majority of transport models will continue to use baselines established prior to the pandemic (as with the Project's transport model for the reasons discussed above) and accepts that the practical course of action in relation to any rebasing or adjustments to such models in respect of this guidance will be subject to professional judgment from the relevant expert analyst. Whilst the timing of the publication of this guidance was such that it was not possible or practicable to review the Project's transport model in its respect ahead of the submission of the Application, GAL confirms it will carefully review the guidance and consider the need for any necessary updates or adjustments to its transport model (and the implications for the assessments which depend on its outputs) in the post-application period, and in consultation with National Highways and the local Highway Authorities.

Diagram 5.3.3: Highway assignment model coverage



5 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1161977/tag-unit-m4-forecasting-and-uncertainty.pdf

Highways simulation model (local)

5.3.27 GAL has developed a VISSIM local traffic simulation model (known as the “Corridor Model”) which includes south Horley from the junction at Massetts Road and A23 Brighton Road, down through Longbridge Roundabout, east through North and South Terminal Roundabouts, along the M23 Spur to Junction 9 of the M23. The model also extends down the A23 London Road into North Crawley, including roads connecting to the Manor Royal estate.

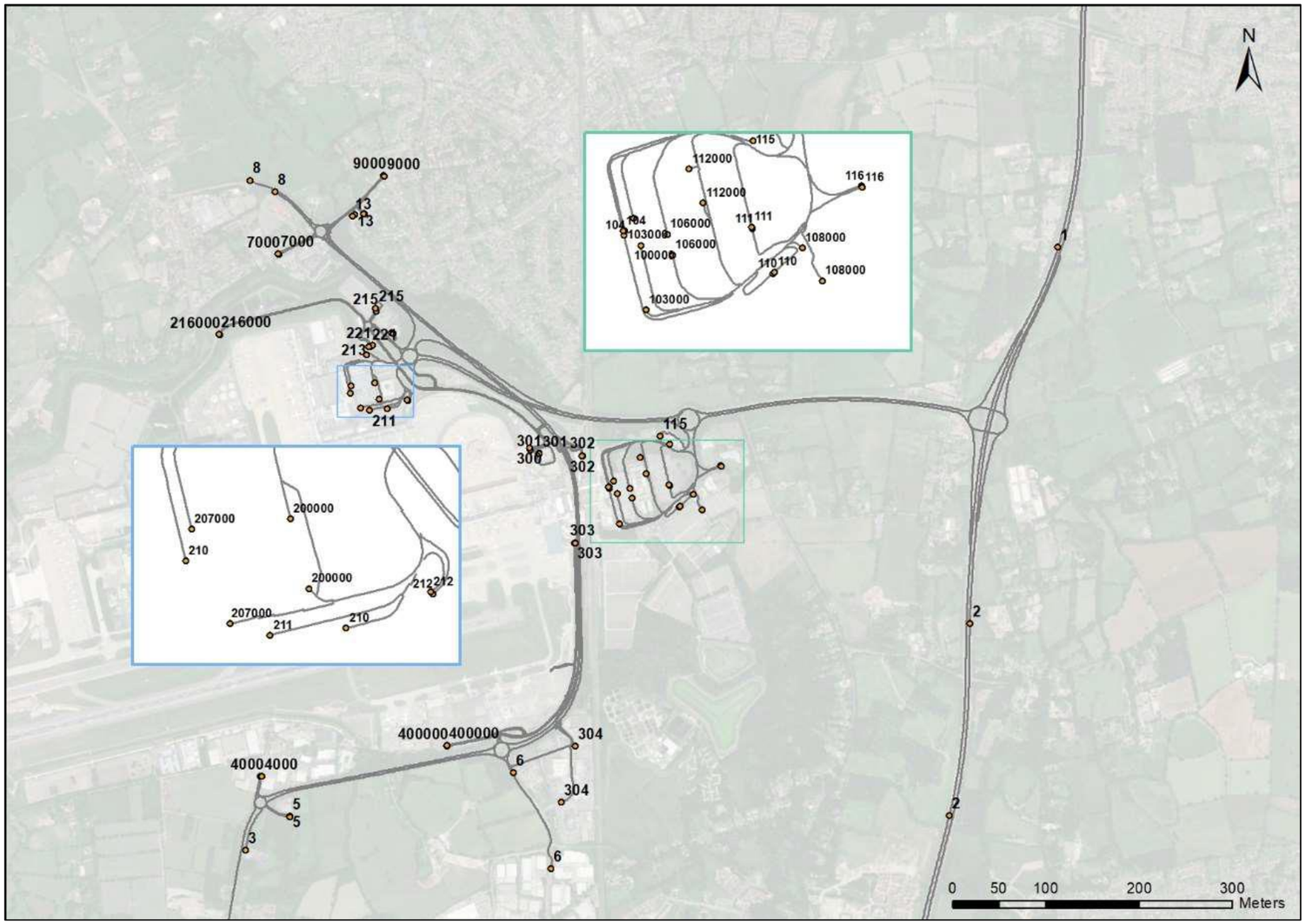
5.3.28 The extent of the VISSIM model used for the assessments in this report is shown in Diagram 5.3.4. The model is an appropriate tool for the assessment of traffic and congestion around the Airport as it includes the main east-west corridor, including the M23 Spur, A23 London Road and Airport Way, between and including M23 Junction 9 and Longbridge Roundabout.

5.3.29 In 2016, the Corridor Model was recalibrated based on an extensive data collection exercise. Calibration of the 2016 Corridor Model shows that the model satisfies TAG requirements, with minimum 85% calibration for each hour over the 24-hour simulation for turning counts and with 87% to 100% validation in terms of known journey times by route within one minute or a 15% variance.

5.3.30 An abbreviated version of this model has been used for assessment of the Project for the DCO application, covering the AM and PM peak periods. Over this shorter timeframe, the DCO Corridor base model achieves TAG consistency for at least of 94% of links and turning flows in each of the assessed hours. Overall, the abbreviated model performs well, with journey times also consistent with TAG guidance.

5.3.31 Given this high degree of calibration and validation, the rebased 2016 Corridor Model is considered a robust base to test highway junction performance effects of growth at the Airport both in the baseline and with Project. VISSIM is a more appropriate tool for this detailed assessment than a strategic highway model, though demand in the VISSIM models is informed by the strategic highway model. A summary of the VISSIM modelling work is provided in Chapter 13 and a VISSIM Modelling Report is provided in **Transport Assessment Annex C – VISSIM Forecasting Report** (Doc Ref. 7.4).

Diagram 5.3.4: Extent of VISSIM local traffic simulation model



Station simulation model and inter-terminal shuttle

5.3.32 To assess the impact of the Project on the railway station, South Terminal departures and the inter-terminal shuttle system, GAL has used the Legion simulation model developed, validated and calibrated by Network Rail for the committed Station Project. The model is used to test the effects of future growth on passenger densities and crowding. The assessment is contained in Chapter 10 and a Station Modelling Report is provided in **Transport Assessment Annex D – Station and Shuttle: Legion Modelling Report** (Doc Ref. 7.4).

5.4 Assessment scenarios

5.4.1 Modelling has used the following assessment years to test and analyse the peak construction phase and the operation of the Airport without and with the Project.

Baseline

5.4.2 The baseline year is 2016, which matches the base year of the modelling tools being used and reflects an extensive data collection exercise undertaken by GAL in that year, including mobile phone data capture, collected over a two-month period and comprising upwards of 2.5 million devices and 170 million events per day for the busiest days giving a wealth of information to inform transport modelling.

5.4.3 The 2016 dataset has been extrapolated to describe relevant 2018 conditions for the air quality and carbon assessments for the Environment Statement, where required. The 2016 data is considered to be robust and appropriate for assessing the effects of the Project, given industrial action by Southern Rail, rail disruption associated with works at London Bridge from late 2016 to 2018, construction of M23 Smart Motorways from 2018 to 2020 and the Covid-19 pandemic (see paragraphs 5.3.24 and 5.3.25). The base model has been discussed with NH and local highway authorities and comments have been addressed.

Operation

5.4.4 It should be noted that a with Project scenario for a given year is assessed against the future baseline scenario for the same year, rather than against the 2016 modelled baseline. The baseline scenario is used to describe existing transport infrastructure and the performance of the transport network prior to expansion.

5.4.5 2029 represents the assumed first full year of operation after the opening of the northern runway. Accordingly, this would be the first operational year and has been modelled and tested with and without the Project.

5.4.6 2032 represents an interim assessment year: The assessment assumes that by 2032, all arrival and departure slots on the northern runway are assumed to have been filled and the highway improvement works as part of the Project are assumed to be in place. Chapter 13 on the local highway modelling provides more information on the timing for the delivery of the highway works.

5.4.7 2047 represents the year 15 years after the highway improvement works are assumed to be completed: The Design Manual for Road and Bridges Vol. 5, Sec. 1 (TD37/93) (Highways England, 1995) requires the effects of a highway scheme to be assessed 15 years after it has been completed. Airport passenger and staff numbers are also expected to be higher in 2047 than in 2032 and background traffic will have increased on the network. This assessment year therefore provides a robust assessment and has been tested both without and with the Project.

Construction

5.4.8 Two construction phases have been tested which are airfield construction and highway construction.

5.4.9 An airfield construction scenario has been tested, with peak construction activity assumed in 2026/27. The construction trips have been added to 2029 future baseline traffic levels. This is conservative but reasonable as traffic flows in 2029 will be a few percent higher than in 2026/27, albeit within the daily variation in any given year.

5.4.10 A highway construction scenario has been tested to understand the impact of constructing the highway works on the network and the potential reassignment of traffic this may cause during that period. This has been tested for 2029 and assuming that the Project is operational. The test therefore includes increased operational airport traffic as a result of the northern runway.

6 Current transport network, operations and performance

6.1 Introduction

6.1.1 This chapter provides a summary of the current baseline (2022), using the latest information where available. The modelling baseline assessment year is 2016, based on a 2016 calibrated and validated transport model. Additional commentary is provided in this chapter on any baseline differences between 2016 and 2022.

6.1.2 It should be noted that for each assessment year, the Project is assessed against future baseline conditions in that year, which include any committed changes or improvements to the transport network. The current baseline is therefore used to provide an indication of the existing transport situation, from which the future baselines are developed. The committed changes or improvements for each mode of transport are covered separately in each of the assessment chapters (Chapters 9 to 14).

6.2 Existing Airport travel demand

6.2.1 The main sources of data for travel demand for Gatwick Airport are:

- The Civil Aviation Authority (CAA) – for passenger data; and
- GAL Employee surveys and travel to work surveys.

6.2.2 The CAA undertakes regular independent surveys of the air passengers using Gatwick and this is a primary source of information about the patterns of travel by air passengers. GAL carries out employee surveys and travel to work surveys for airport employees which provides mode share data.

6.2.3 The CAA released 2022 mode share data in April 2023 and this has been included in this chapter to provide the most recent available information and to allow comparison where appropriate with the 2016 data on which the transport modelling is based. During 2022, GAL staff numbers had not fully returned to pre-pandemic levels because of reduced operation. It should also be noted that 2022 data is not expected to be fully representative due to a variety of other domestic factors (such as public transport services not having fully recovered to pre-pandemic levels, rail strikes etc.), and global factors (such as flights to some destinations not being available due to ongoing restrictions). This chapter therefore presents passenger data and mode shares for 2022 as well as previous pre-pandemic years, and staff mode shares from the 2016 Gatwick Employee and Travel to Work Survey.

Passengers

6.2.4 The COVID-19 pandemic had a very severe impact on the global aviation industry in 2020. Gatwick, along with all other UK airports, experienced a significant reduction in passenger traffic levels as a result of both Government-imposed restrictions on air travel and reduced passenger demand driven by low consumer confidence. UK passenger volumes for the calendar year 2020 were 75% down on volumes for 2019, as illustrated in Diagram 6.2.1. Following the removal of the UK's travel restrictions in April 2022, however, airline capacity and passenger demand returned to Gatwick and other UK airports. During summer 2022 demand at Gatwick was over 80% of 2019's levels which was in line with the wider UK market. Capacity and demand would have been higher had it not been for ongoing travel restrictions in other markets as well as resourcing challenges faced across the aviation industry as it rapidly redeployed, meaning airports/airlines were unable to fulfil the underlying demand.

6.2.5 There is confidence that passenger and airline demand at Gatwick will return to previous levels over the course of the next few years and then continue to grow thereafter. Through 2022 airlines continued to re-establish their schedules and Gatwick returned to 85% of its passenger throughput in the peak summer months. This is notwithstanding the fact that some headwinds remain reflecting the weakening macro-economic environment alongside the ongoing conflict in Ukraine, as well as some markets in Asia continuing to be impacted by ongoing travel restrictions.

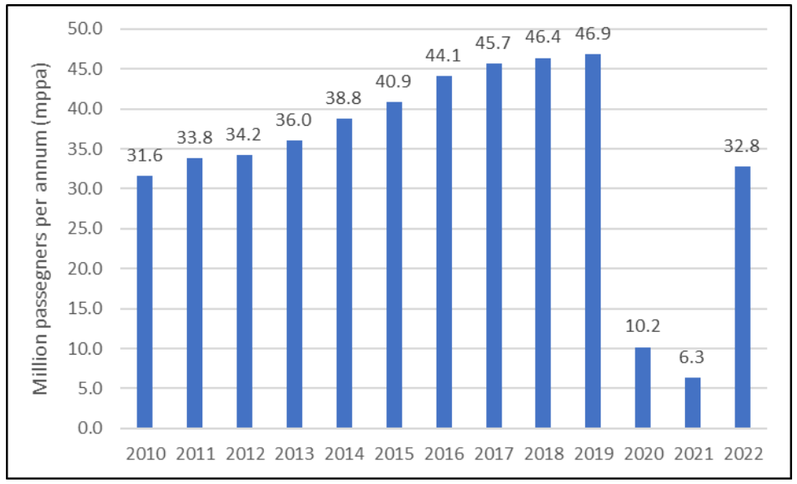
6.2.6 Forecasts for passengers and ATMs have been prepared jointly by GAL's in-house airline relations and marketing and research teams and ICF, one of the UK's foremost experts in air traffic forecasting (see **ES Appendix 4.3.1: Forecast Data Book** (Doc Ref. 5.3)). Overall, the updated forecasts provided by ICF predict that commercial traffic at Gatwick will return to 2019 pre-COVID levels in 2025, and that by the end of the 2020s, commercial levels at Gatwick will have returned broadly to where they would have been had the pandemic not occurred. This reflects the combination of ongoing capacity constraints already experienced before and during 2019 and underlying market growth across the London system. For example, Gatwick Airport has been operating very close to its full potential in the peak summer months for several years.

6.2.7 In FY2017/18, 92% of all Gatwick passengers used the airport for an international flight, with 73% of passengers travelling on short haul international flights to European business centres.

6.2.8 CAA passenger data has been analysed by mode for non-transfer passengers, which illustrates the distribution of passenger origins. Diagram 6.2.2 provides an illustration of the summary analysis, showing data for all surface access modes from the 2017 CAA passenger survey.

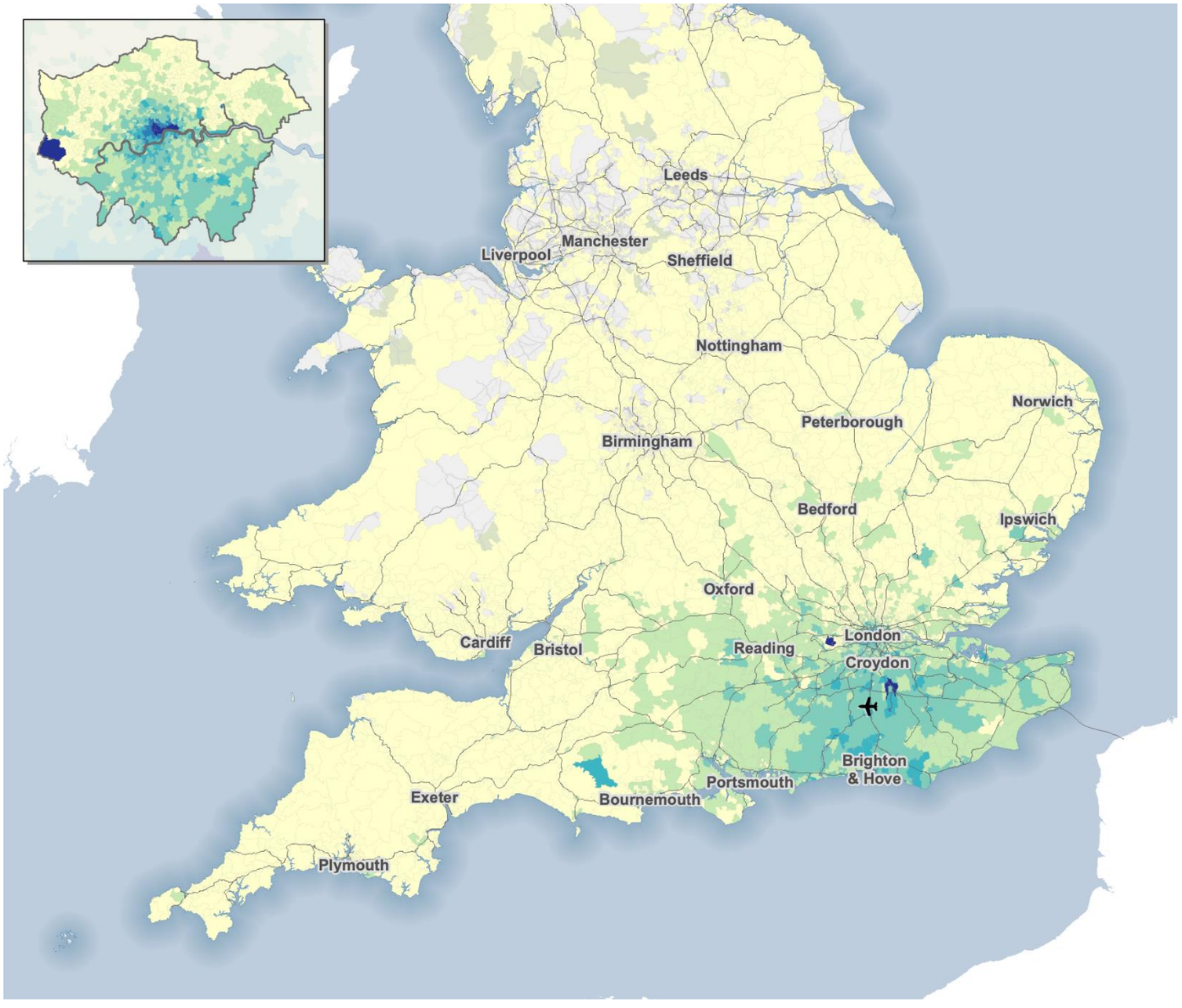
6.2.9 Gatwick's proximity to London and extensive surface access links to the wider South East (and beyond) give it a wide catchment area. CAA passenger survey data shows a total of 81% of Gatwick's originating and terminating passengers (ie excluding transfer passengers) travelling from or to destinations in London or the South East. Greater London is the largest source market (42%), but the nearby counties of Kent, Surrey and East and West Sussex account for a further 27%. Of the 19% of passengers travelling to or from destinations outside the South East, the majority travel to or from the East or the South of England.

Diagram 6.2.1: Gatwick passengers to 2022 (million passengers per annum, or mppa)



Note: From 2019 Gatwick moved from reporting annual passenger numbers from April-March to January-December.

Diagram 6.2.2: CAA Catchment Analysis for Gatwick Passengers (Average Day, June 2016)



Passenger mode share

6.2.10 In 2012, GAL set itself a target of achieving a 45% public transport mode share as the airport continued to grow beyond 40 mppa. As set out in the Master Plan (Gatwick Airport Ltd, 2019), GAL achieved this 45% public transport mode share target for passengers in 2017, with 39% of passengers coming to the Airport by rail and almost 6% by bus and coach. Around 55% of passengers accessed the Airport by car-based modes, with almost 40% of passengers coming by private car, either as pick-up and drop-off trips to terminal forecourts or to park their car at the Airport.

6.2.11 CAA passenger mode share data for 2017 and 2022 at the Airport is shown in Diagram 6.2.3. Diagram 6.2.4 shows the increase in public transport mode share over the last 15 years, which reflects the improvements in rail services and station works over time.

6.2.12 Prior to the pandemic, CAA surveys up to the first quarter of 2020 showed a continuing improvement in public transport mode share year-on-year, up to 47.4% in 2019 and 47.8% in the 12 months to March 2020.

6.2.13 Post-pandemic mode share data are emerging. As set out in Diagram 6.2.4, for 2022 the public transport mode share for Gatwick Airport was 43.7%, with 45.5% in Q1, 47.6% in Q2, 40.5% in Q3, and 45.7% in Q4. This highlights that the Airport is still in recovery, with public transport services not yet returning to pre-pandemic levels (see next sections in this chapter) and the effect of rail strikes and related disruption.

6.2.14 Diagram 6.2.5 shows that quarter-by-quarter passenger mode share data, as provided by the CAA, is an important consideration for the assessment. This shows that public transport mode share is highest in the autumn and winter, (October through to March), owing to the passenger mix in those months. However, the assessment of the future impact with Project has been undertaken to test a busy summer day at the Airport which is when public transport mode share is at its lowest owing to the higher proportion of UK outbound leisure passengers. Accordingly, when considering outputs of any mode share modelling, it is important to understand that the average annual mode share will be higher than the summer mode share, as discussed further in Chapter 8.

Diagram 6.2.3: Mode share data for Gatwick passengers (CAA data)

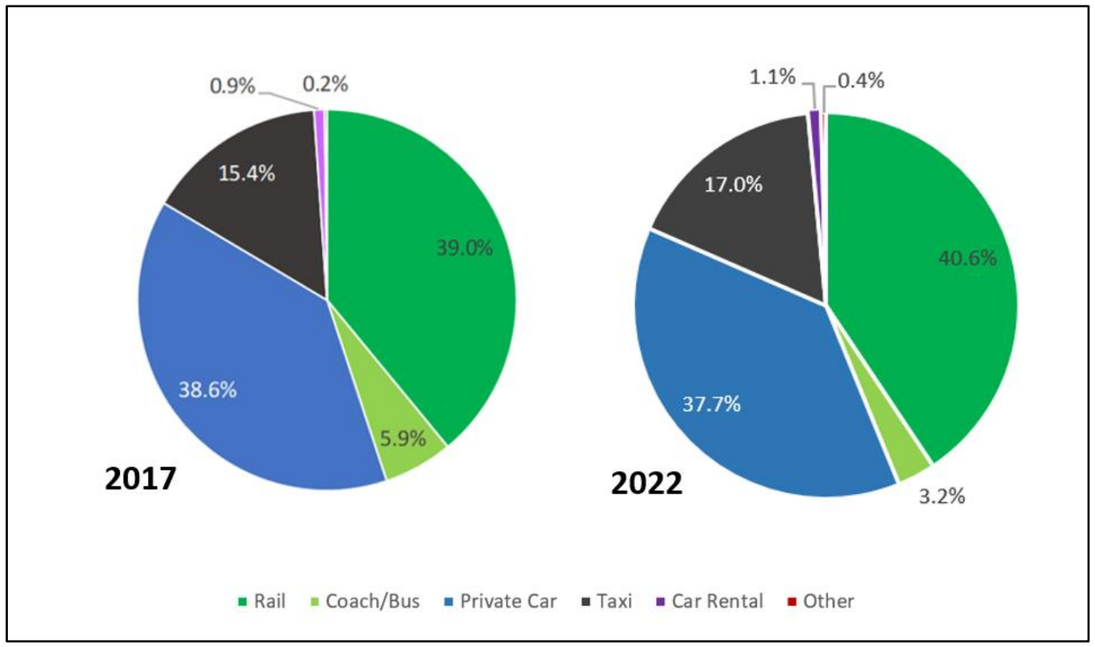


Diagram 6.2.5: Mode Share data for Gatwick passengers by quarter (CAA data)

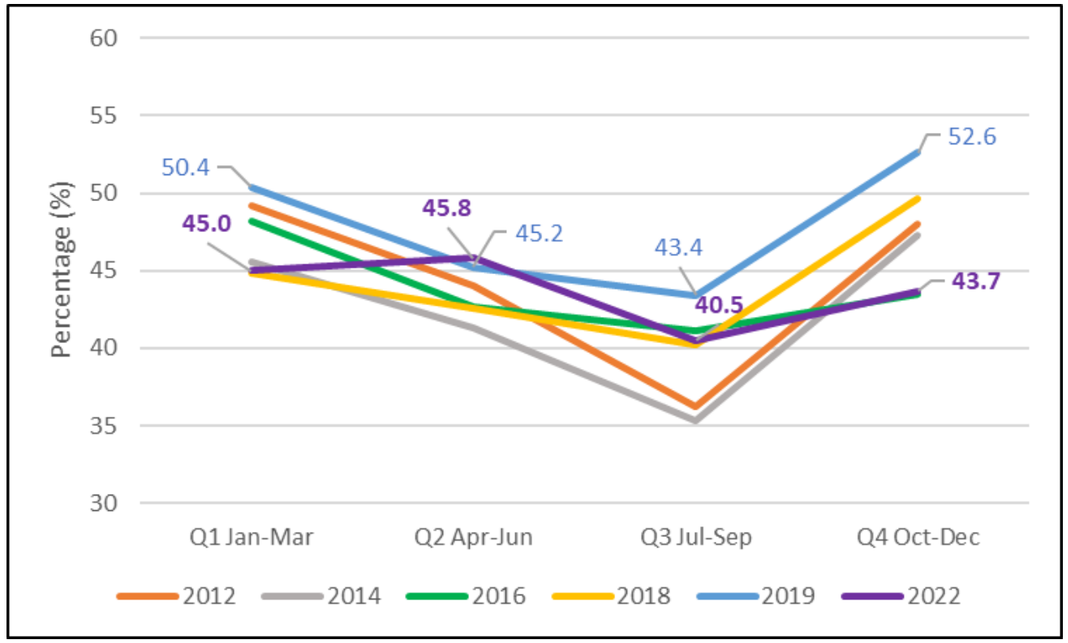


Diagram 6.2.4: Mode share data for Gatwick passengers (CAA data)

Staff

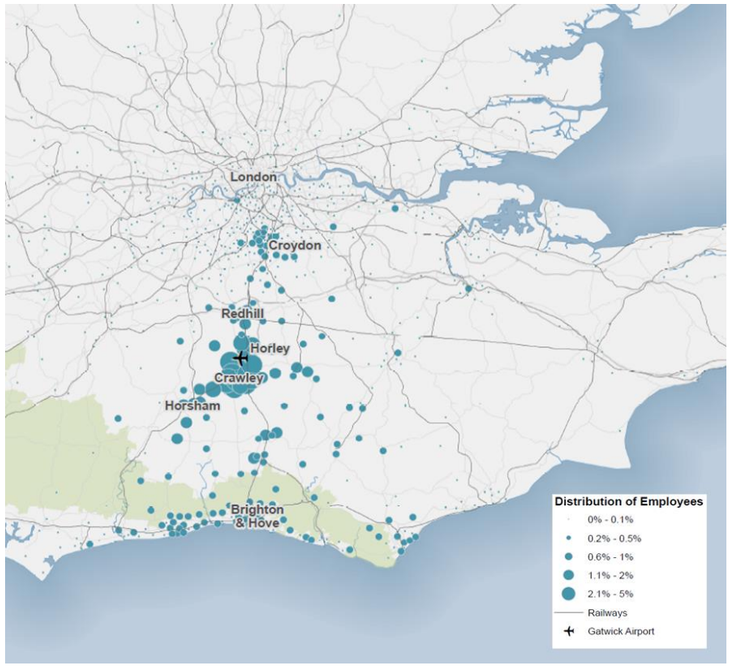
6.2.15 From the 2016 staff survey, nearly 24,000 people worked at Gatwick. The survey received upwards of 5,300 responses (Gatwick Airport Ltd, 2016), building on the 2008 and 2012 surveys and showing a trend towards more sustainable modes, despite significant rail disruption at that time. The 2016 data provided evidence of consistency and trends with previous data.

6.2.16 The survey showed that many of Gatwick's staff live within a short distance of the airport. Approximately 11% of staff travelled three miles or fewer to work and an additional 36% travelled between four and ten miles. Overall, half of staff began their journey within 15 miles of the Airport.

6.2.17 Analysis of survey data showed that 63% of staff lived in East and West Sussex, about half of whom lived in Crawley, with significant numbers in the Horsham area also. An additional 19% of employees lived in Surrey, largely concentrated in Horley and Redhill. Significant clusters of employees also lived along the Brighton Mainline in Croydon and Brighton and Hove. The distribution of Gatwick employee home locations is shown in Diagram 6.2.6.

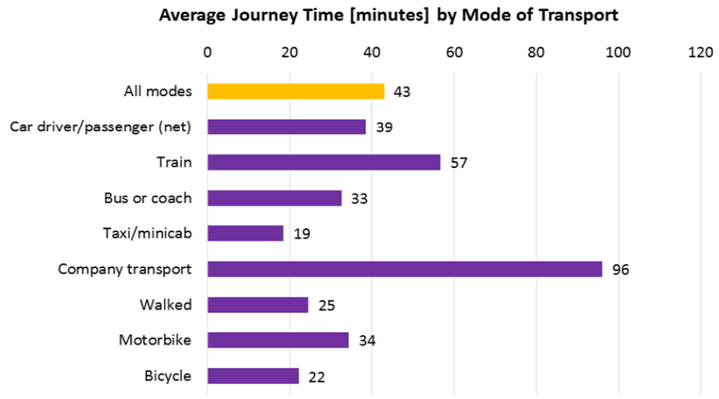
6.2.18 Staff journeys varied by mode of travel but the typical journey time was 43 minutes, as shown in Diagram 6.2.7. However, as noted above, many employees lived in close proximity to the airport and thus tended to have much shorter journey times. Half of all employees' journey to work was surveyed at 30 minutes or less; 24% had journey times between 11 and 20 minutes; and 9% had a journey of ten or fewer minutes.

Diagram 6.2.6: distribution of home location for Gatwick employees



Source: Arup analysis of 2016 Gatwick Employer and Travel to Work Survey data

Diagram 6.2.7: journey time to work for Gatwick employees



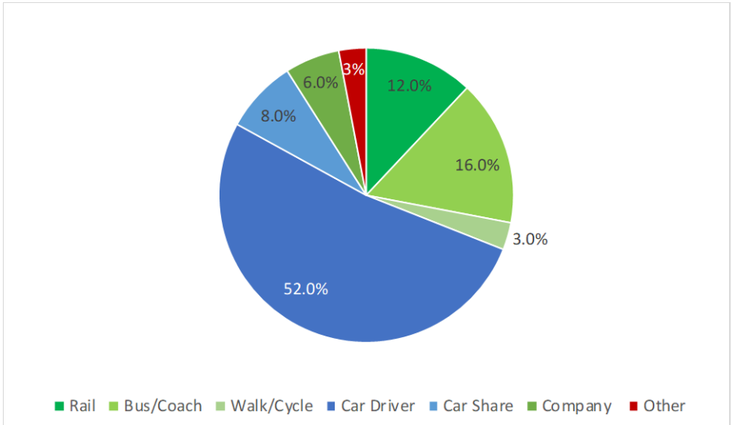
Source: 2016 Gatwick Employer and Travel to Work Survey

Staff mode share

6.2.19 The 2016 staff travel survey described in 6.2.15 showed that the sustainable mode share for employees was 31% excluding car share (39% including car share), as shown in Diagram 6.2.8. Although there have been some changes in staff numbers during the Covid pandemic, no further detail is available at the time of writing. As such, the 2016 survey is considered to be the best information available to date.

6.2.20 Owing to changes in shift patterns, corresponding to a busier early morning schedule of flights, and a higher proportion of aircrew that rotate between more than one London airport, there have been challenges around how staff get to work by public transport. GAL has worked with the local operator Metrobus to make more bus services available 24 hours a day, serving the Crawley and Horley areas where a significant proportion of staff live. Staff receive discounts on both bus and rail journeys with local operators. Recent rail timetable changes will also support a higher rail mode share by staff.

Diagram 6.2.8: mode share data for Gatwick employees



Source: 2016 Gatwick Employer and Travel to Work Survey

6.3 Rail

6.3.1 Gatwick Airport station has regular, direct daily services from over 120 stations. Over 1,000 stations are accessible with one interchange.

6.3.2 There are four service brands provided by two train operators serving Gatwick Airport:

- **Gatwick Express (Operator: Govia Thameslink Railway Limited)** provides a direct service to London Victoria, departing every 15 minutes in peak periods and taking around 30 minutes. Some trains extend to Brighton at peak times.
- **Southern (Operator: Govia Thameslink Railway Limited)** provides services across London and the South-East, including London Victoria, London Bridge, Clapham Junction, Brighton, Southampton, Eastbourne and Portsmouth, as well as many local stations.
- **Thameslink (Operator: Govia Thameslink Railway Limited)** connects Gatwick Airport to the south coast at Brighton, central London through London Bridge, St. Pancras International and Farringdon, and north to Bedford. Thameslink also provides a direct train to Luton Airport Parkway.
- **Great Western Railway (Operator: Great Western Railway Limited)** runs an hourly service between Gatwick Airport and Reading, via Redhill, Reigate and Guildford. This is known as the North Downs Line.

6.3.3 Peak rail frequencies are summarised in Table 6.3.1 for the modelling baseline (2016) and existing conditions (2022) for peak and off-peak hours. Off peak services are still considerably lower in some cases than pre-Covid period.

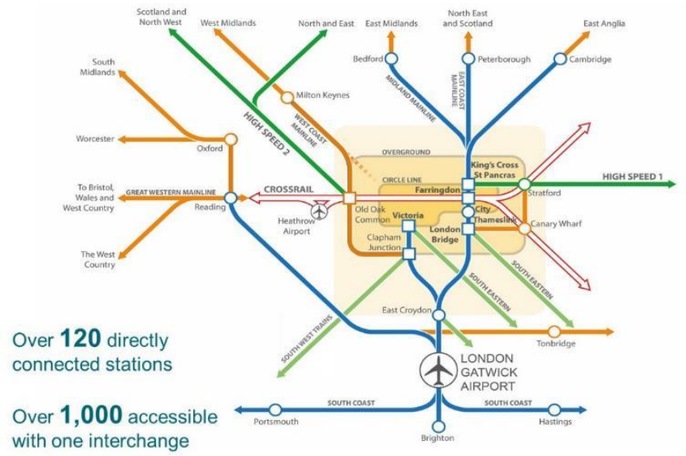
6.3.4 Gatwick Airport is part of London's Oyster and contactless fare payment network. From Gatwick Airport station, it is possible to travel directly to the City of London via the Thameslink route (with interchange to Docklands at London Bridge station on Thameslink and at Farringdon on the Elizabeth Line) and to the West End via London's Victoria station. These services also directly connect the airport to key interchanges at Croydon, Clapham Junction and Brighton.

6.3.5 Gatwick Airport therefore enjoys a very high level of rail connectivity, with 19 trains to and from central London in the morning peak hour (nine to London Bridge and ten to London Victoria, of which four are Gatwick Express services).

6.3.6 Train services can be busy in peak periods in the peak direction, into London in the morning and towards Brighton and the South Coast in the evening. However, with completion of the Thameslink Programme in 2019, train services between Gatwick Airport and London now provide nearly 14,000 seats per direction per hour, with room for nearly 30,000 passengers (including standing passengers) per direction per hour overall. Information on the other committed improvements which are included in the future baseline scenarios is provided in Chapter 9.

6.3.7 Opened in 1958, the current station is capacity constrained despite a number of upgrades, including a £53 million improvement programme in 2014, which provided an additional platform (Platform 7) and improved circulation for passengers. Accordingly, proposals were developed to increase the size of the station concourse, improve vertical circulation, and widen two of the seven platforms and were announced by the Department for Transport in July 2019. Construction of these elements of the new station (the Gatwick Station Project) is under way and due to be completed in 2023.

Diagram 6.3.1: Rail network to Gatwick



Source: Network Rail/GAL

Table 6.3.1: Rail frequencies at Gatwick Airport station (2016 and 2022)

Operator/Service	Route	Peak frequency per hour (average hourly over 7am to 9am)		Interpeak peak frequency per hour	
		Modelled 2016	Current 2022	Modelled 2016	Current 2022
Gatwick Express	Brighton and Gatwick Airport non-stop to London Victoria	4 trains per hour	2 trains per hour	4 trains per hour	2 trains per hour
Southern (Brighton Main Line) London Victoria	South coast (Main Line) to Victoria via Gatwick, East Croydon and Clapham Junction	4-5 trains per hour	7 trains per hour	3 trains per hour	3 trains per hour
Southern (Arun Valley) London Victoria	South coast (Arun Valley) to London Victoria via Gatwick, East Croydon and Clapham Junction	Up to 1 train per hour	No trains	2 trains per hour	No trains
Southern London Bridge	South coast (Main Line) to London Bridge via Gatwick and East Croydon	1-2 trains per hour	No trains	No trains	No trains
Thameslink (Brighton Main Line) London Bridge	Littlehampton and Brighton to London Bridge via Gatwick and East Croydon	3 trains per hour**	4-5 trains per hour	6 trains per hour	4 trains per hour
Thameslink (Arun Valley) London Bridge	Horsham to London Bridge via Gatwick and East Croydon	No trains	4 trains per hour	2 trains per hour	2 trains per hour
Great Western (North Downs Line)	Reading to Gatwick Airport via Redhill	1 train per hour	1 train per hour	1 train per hour	1 train per hour
Total		14 **to 15** trains per hour	**18-19 trains per hour**	**18 trains per hour**	**12 trains per hour**

**some trains terminated at Elephant and Castle whilst the Thameslink through platforms at London Bridge were closed for reconstruction*

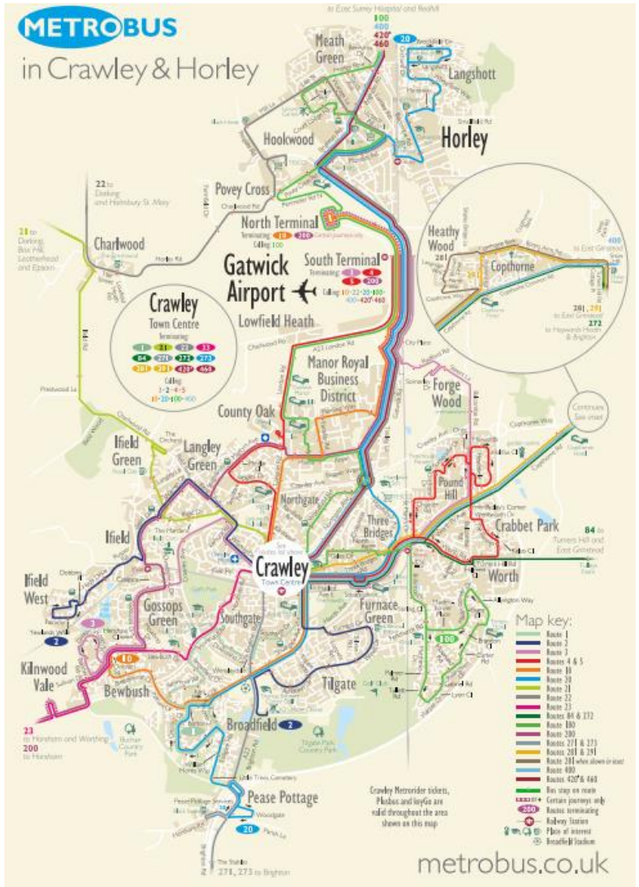
6.4 Bus and coach

6.4.1 Gatwick is served by frequent bus and coach services at both North and South Terminals. The operators include Metrobus, National Express, Megabus and Oxford Bus Company.

6.4.2 Bus and coach mode share for passengers was around 6% in 2017/18, whereas these modes account for 16% of staff travel.

6.4.3 The majority of local bus services are provided by Metrobus and are used by airport staff and air passengers, as well as rail passengers accessing Gatwick Airport station. The Metrobus map is shown in Diagram 6.4.1 and more information on bus services is provided in Chapter 11.

Diagram 6.4.1: Metrobus Local Service in Crawley and Horley (August 2022)



6.4.4 The airport is served by a range of coach services, and the most popular National Express direct services to and from Gatwick are shown in Table 6.4.1 for the modelling (2016) and current (2022) baselines. Coach services have yet to fully return to pre-pandemic frequencies but are expected to do so as demand returns to the airport.

Table 6.4.1: Popular National Express coach services to Gatwick

Routes	Modelling Baseline (2016)		Existing Baseline (2022)		Fastest Journey Time
	Service	Daily Services	Service	Daily Services	
London (Victoria) to Gatwick	A3	37	025	22	1hr 50 mins
Brighton to Gatwick	025, 026, 028, 029, 201, 206, 747	23	025	19	40 mins
Heathrow to Gatwick	200, 201, 210, 230, 707, 727, 747	81	025, 201, 210	43	50 mins
Bristol to Gatwick	200, 201	19	201	8	3hrs 35 mins
Birmingham to Gatwick	210	23	210	10	3hrs 50 mins
Cardiff to Gatwick	201	22	201	8	4hrs 30 mins
Swansea to Gatwick	201	15	201	8	5hrs 40 mins

6.4.5 Bus frequencies are summarised by time period for the modelling baseline 2016 and existing baseline 2022 in Table 6.4.2. The table shows that bus services have also not returned to pre-pandemic levels.

Table 6.4.2: Bus frequencies (average hourly)

Period	Average number of buses per hour in each direction	
	Modelling baseline 2016	Current baseline 2022
AM peak (07:00-09:00)	27	21
Interpeak (09:00-16:00)	29	22
PM peak (16:00-18:00)	30	22
Off peak 1 (18:00-00:00)	16	15
Off peak 2 (00:00-04:00)	7	4
Off peak 3 (04:00-07:00)	17	14

6.5 Active travel

6.5.1 There are very few passengers who walk or cycle to Gatwick Airport and around 4% of staff travel to Gatwick by walking or cycling.

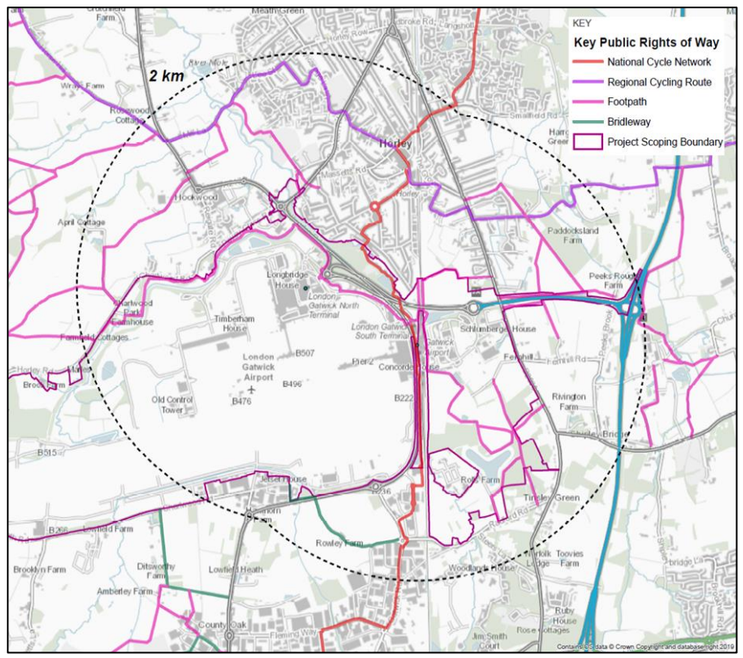
6.5.2 Diagram 6.5.1 shows the key active travel routes in the area. National Cycle Network Route 21 (NCN21) provides a continuous route between Crawley, Gatwick, Horley, Reigate and London, splitting towards Greenwich on Route 21 and Wandsworth on Route 20. To the south of Crawley, Route 20 continues south towards Brighton and Route 21 continues east towards Royal Tunbridge Well before heading south towards Eastbourne.

6.5.3 Within the vicinity of Gatwick, NCN21 crosses the A23 in the form of a subway, located to the north of the South Terminal. It crosses the railway lines along a ramped subway to the north of Horley station and along St Mary's Drive to the north of Three Bridges station.

6.5.4 On the wider highway network, there is a cycle track and shared pedestrian/cycle space on the A23 between the North Terminal and the Longbridge Roundabout. Signal controlled pedestrian crossings are located on all four arms of the Longbridge Roundabout. There are no other pedestrian or cycle facilities along the A23 or M23 to the east.

GAL provides pathways along internal access and forecourt roads, where pedestrian movements are considered to be appropriate. Zebra crossings are provided at appropriate locations and signage is also provided to direct passengers to the terminals. indicates the key designated pedestrian and cycle routes. Further details are included in Chapter 14.

Diagram 6.5.1: Key Active Travel Routes



Source: Analysis of West Sussex and Surrey online maps and OpenStreetMap Data

6.6 Highways

6.6.1 Gatwick can be directly accessed from the national Strategic Road Network via the M23 motorway, which runs north-south adjacent to the airport. Junction 9 of the M23 is the main access point with an onward link of motorway to Junction 9a at the airport's South Terminal roundabout.

6.6.2 The typical journey time from Gatwick to the M25 via the M23 is less than ten minutes. From the M25, there is access to the wider Strategic Road Network.

6.6.3 The A23, which runs parallel to the M23, continues north beyond the M25 into London via Croydon and Brixton to the heart of the West End and the City. It connects south London and Croydon, through Redhill then Horley and Gatwick, through Crawley and providing a connection to the south through Pease Pottage to Brighton.

6.6.4 South of Gatwick, the M23/A23 continues as a strategic highway corridor from London to Brighton on the South Coast. Brighton is approximately 30 to 45 minutes from the airport by road in the off-peak and peak periods respectively. The A23 connects with the A272 and A27 east-west routes, placing the whole of the South Coast between Southampton and Folkestone within approximately 1 hour 20 minutes of the airport.

6.6.5 National Highways' M23 Smart Motorway project opened in 2020 and added additional running lane capacity to the strategic network serving Gatwick at peak times. The construction of the Smart Motorway project led to highway disruption between 2018 and 2020, which meant that representative traffic data for the M23 and surrounding roads could not be collected during this period. The design of the highway improvement works for the Project takes into account the changes from the Smart Motorway project. In addition, GAL has allocated funding in its Capital Investment Programme to improve South and North Terminal roundabouts to cater for predicted growth over the next decade and beyond.

6.6.6 The M25 is busy and can be slow-moving and congested at peak times. National Highways is committed to improving conditions on the M25, through a variety of enhancements as well as the M25 South West Quadrant study, which is looking at ways to enhance capacity from Junctions 7 (for the M23) to 16 (for the M40) of M25.

6.7 Forecourts and Car Parks

6.7.1 Surface transport facilities within the airport boundary are made up of on-airport roads, forecourts and car parks, including facilities for coaches, taxis and car rental companies.

North Terminal forecourt

6.7.2 The North Terminal forecourt is accessed off the Airport Way/London Road roundabout. The extent of the forecourt includes two multi-storey car parks (MSCP5 and MSCP6), three hotels and an area for car rental. There is a bus station on Furlong Way to the south and there are additional bus stops by the terminal entrance. Drop-off activity currently takes place on Northway, located between the car parks and hotels. Northway is also used by the hotels.

6.7.3 In March 2021, GAL introduced forecourt charging at North Terminal and this is enforced by Automatic Number Plate Recognition along Northway. Car rental vehicles have been whitelisted and can use Northway without being charged. Free drop-off is provided in North Terminal long-stay for those who do not wish to pay.

6.7.4 The forecourt charges are:

- £5 for 10 minutes, and £1 for each additional minute, up to 20 minutes.
- The maximum charge is £25 and the maximum length of stay is 30 minutes.

6.7.5 People picking up passengers are signed to do so from the short stay car parks as it often takes more time to collect passengers.

6.7.6 Prior to Covid-19, Northway was heavily used, and it was observed that vehicles sometimes do not pull up parallel to the kerb or double park, which holds up traffic or creates unsafe overtaking movements. Vehicles tend to use the southern end more than the northern end of the Forecourt, potentially owing to visibility issues and uncertainty of getting a parking space beyond the shuttle bridge structure.

6.7.7 The upper Forecourt has restricted access for VIP drop off only.

South Terminal forecourt

6.7.8 The South Terminal forecourt is accessed off the M23/Airport Way roundabout. The extent of the forecourt includes three multi-storey car parks MSCP1-3), Hilton hotel and an area for car rental. There is a separate coach park on the approach to the forecourt. Bus stops are located by the terminal entrance, drop-off activity takes place on Coach Road. Access to the multi-storey car parks is from Westway.

6.7.9 Forecourt charging was introduced at South Terminal in April 2021, with the same charges as at North Terminal. Prior to the Covid-19 pandemic, it was observed that queuing occurs at the primary drop-off kerb during busier times, with vehicles prioritising spaces near to the forecourt entry point. The secondary drop-off area is often underutilised, which is a feature of drivers having to make a decision about which lane to be in before being able to see the kerbside occupancy. Steps have been taken to improve signage as part of the forecourt charging works. Free drop-off is provided in South Terminal long-stay for those who do not wish to pay.

6.7.10 The upper Forecourt has restricted access for long stay car park buses, approved taxis, premium valet, and electric car rental only.

Car parking

6.7.11 There are currently approximately 46,700 car parking spaces ‘on-airport’, including staff parking (around 6,100 spaces), and a further 21,200 authorised spaces ‘off-airport’.

6.8 Freight and cargo

6.8.1 In 2019 Gatwick handled 150,000 tonnes of cargo, an increase on the previous year, driven by additional long-haul services.

6.8.2 The Gatwick Cargo Centre comprises 12 self-contained units with landside and airside access, located west of North Terminal and accessed via Perimeter Road North and Cargo Road.

6.8.3 In the mid-2000s, Gatwick handled over 300,000 tonnes of cargo from the same facility. As such, there is spare capacity within the current facility for future growth.

6.9 Road safety

6.9.1 Department for Transport STATS19 road safety data has been examined for the study area for the latest available five years (2017 to 2021) and a summary is shown in Table 6.9.1. The extent of the accident data reviewed is the study area identified as part of the Environmental Impact Assessment[6]. Accidents which occur within 30m of the study area links are shown in Diagram 6.9.1, and a more detailed plan around the airport is shown in Diagram 6.9.2.

Table 6.9.1: Summary of accidents from 2017 to 2021

Year	2017	2018	2019	2020	2021
Fatal	1	1	4	0	0
Serious	27	26	39	34	27
Slight	241	222	208	155	171
Total	**269**	**249**	**251**	**189**	**198**

6.9.2 A summary of the average annual number of accidents by casualty severity is shown in Table 6.9.2. The accidents have also been considered in terms of local authorities.

[6] EIA study area based on Rules 1 and 2 defined in the IEMA (1993) guidance and additional screening thresholds to focus on the “main” or “significant” environmental effects and exclude any minor flow variations in the region-wide strategic modelling outputs (in keeping with Infrastructure Planning (Environmental Impact Assessment) Regulations 2017):

- Rule 1 – Highway links where traffic flows will increase by more than 30% (or the number of Heavy Goods Vehicles (HGVs) will increase by more than 30%). Links are included where the absolute difference is greater than two vehicles per minute and on links where the model is showing at least one vehicle in the future baseline (ie excluding routes with zero traffic). Where the change in HGVs is more than 30%, include links where the absolute difference is greater than one HGV every five minutes.
- Rule 2 – include any other specifically sensitive areas where traffic flows have increased by 10% or more. Links are included where the absolute difference is greater than two vehicles per minute and where the model shows at least one vehicle in future baseline (ie excluding routes with zero traffic).

Table 6.9.2: Accident data

Location	Average Annual Number of Accidents, 2017 to 2021 (Highest Recorded Injury Severity)			
	Fatal	Serious	Slight	Total
Total accidents within 30m of a study area link	0.8	30.6	199.4	230.8
Crawley	0	6.6	49.2	55.8
Croydon	0.2	10.2	83.8	94.2
Horsham	0.2	1.6	6.2	8
Mid Sussex	0	0	0.8	0.8
Mole Valley	0	2.2	6.4	8.6
Reigate and Banstead	0.4	6.2	32	38.6
Sutton	0	3.4	17.2	20.6
Tandridge	0	0.4	3.8	4.2

6.9.3 The above shows that on average, 231 accidents per year occurred within the study area over the five-year period. Of these, 199 accidents resulted in slight injuries (86%), 31 resulted in serious injuries (13%) and one accident, when averaged over five years, resulted in a fatality.

6.9.4 The location of the accidents suggest that junctions tend to have a higher risk of accidents because of potential conflicts and sensitivity to human error.

Diagram 6.9.1: 5-year accident data within 30m of a EIA study area link

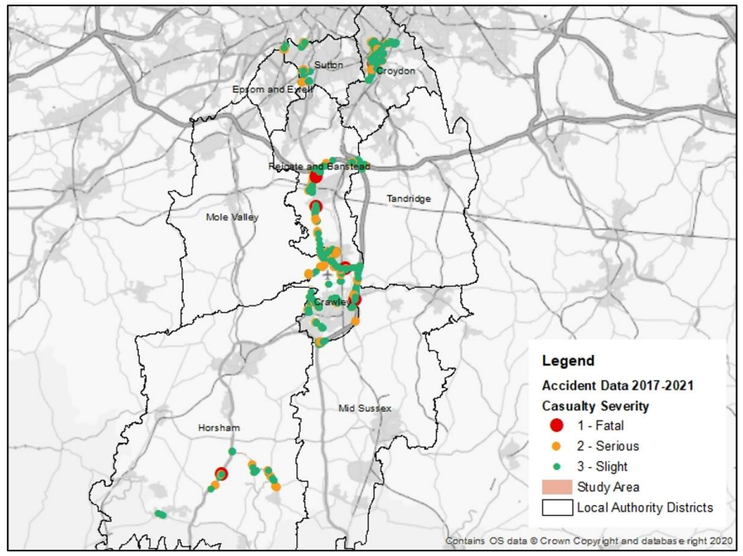
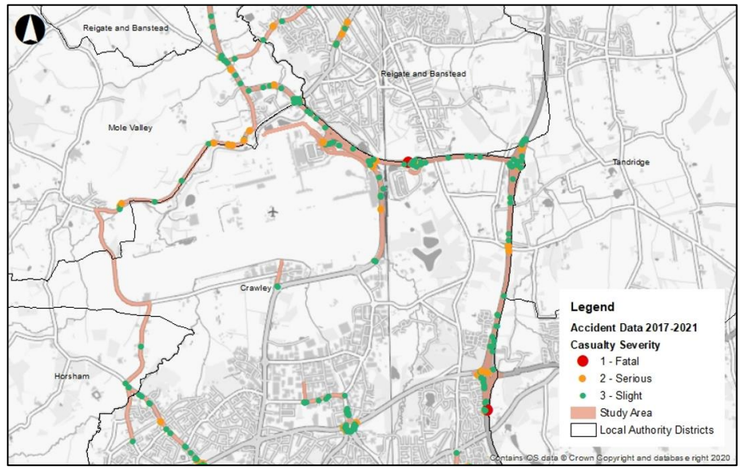


Diagram 6.9.2: 5-year accident data within proximity of the airport



6.10 Current Airport Surface Access Strategy (ASAS)

6.10.1 GAL is committed to low-carbon growth and its Decade of Change strategy (GAL, 2021) sets ambitious carbon reduction targets. These inform headline mode share targets established for the future baseline, together with surface access measures and interventions to help achieve those targets, all of which are outlined in the latest Airport Surface Access Strategy 2022-2030 (GAL, October 2022).

6.10.2 The current ASAS outlines the four objectives which have been developed with the Transport Forum Steering Group:

- **Objective 1**: Continue to innovate as the best connected and most accessible UK airport, delivering integrated surface transport and sustainable growth by meeting the needs of customers and airport colleagues.
- **Objective 2:** Manage and monitor behaviour change as a result of major road and rail infrastructure projects, securing safe, efficient and reliable journeys for all users of the transport network, with effective communication.
- **Objective 3**: Collaborate with key stakeholders and communities in the region to maximise the economic potential from efficient road and rail access to Gatwick.
- **Objective 4:** Deliver a new standard in sustainable surface access in support of Gatwick's Decade of Change, using technology, management, information and infrastructure measures to achieve greater choice and efficiency.

6.10.3 The ASAS sets out the Action Plan for achieving the targets set out in the ASAS and in GAL's Decade of Change document. The Action Plan will be developed and refined each year of the strategy to reflect any changes and to take account of new, relevant data. As the airport recovers GAL will also adapt the Action Plan to respond to changes in passenger characteristics and behaviours.

6.10.4 There are 24 actions set out in the ASAS and some of the key themes are:

- Data collection – undertake a new Staff Travel Survey by early 2023, commit to an annual update on progress against the ASAS action plan and targets, define and fund a data collection and monitoring programme with stakeholders and service providers.
- Public transport – support a return to the full rail schedule, develop a proposition for early morning/late evening train

services, and trial new and enhanced bus and coach services, funded through the Sustainable Transport Fund

- Active travel – review the condition, network extent and use of Active Travel routes around Gatwick to develop an evidence base for investment, and undertake feasibility studies for a Cycle Hub alongside NCR21 and for other facilities on-airport to support cycling.
- Zero emission – identify a set of priority facilities to support the use of zero emission vehicles by staff and passengers, agree programmes for car rental and Airport Cars taxi providers to transition to ZEV, transition all Gatwick vehicles (operational and car park shuttles) to ZEV by 2030, review feasible options for providing differential pricing structures for forecourt and parking charges to indicate priority for ULEV/ZEVs, and review feasible options for a shared e-cycle and/or EV scheme for staff as a precursor to EV purchase.
- Service providers – complete a strategy for staff travel by public transport in consultation with operators (to cover discounts, ticketing, information provision, marketing and offers), and engage with DfT and rail partners on ways to simplify ticket pricing for airport trips and reduce rail fares relative to car.

6.10.5 Measures contained within the current ASAS are included in the future baseline modelling for this assessment and a summary of these are provided below.

6.10.6 Bus and coach assumptions used in the strategic modelling for 2029 and beyond in the future baseline include:

- The following bus and coach improvements as part of the 2022-2030 ASAS:
  - Frequency enhancements on local bus routes 4/5, 10, 20, 22 and 100, as shown in Table 6.10.1;
  - New coach route (hourly in peaks, otherwise two-hourly) Uckfield – East Grinstead – Gatwick;
  - New coach route (two-hourly) Chatham – Maidstone – Sevenoaks – Gatwick;
  - New coach route (hourly) Romford – Upminster – Dartford – Gatwick.
- Increased coach frequencies in proportion to growth in air passengers over time, representing market reaction to increasing demand.

Table 6.10.1: Proposed routes and frequencies for enhanced local bus services

Route	Indicative Frequency with Project
4/5	6 bph daytime; 4 bph early/late
10	10 bph daytime; 6 bph early/late
20	6 bph daytime; 4 bph early/late
22	2 bph in peaks, 1 bph other times
100	6 bph daytime; 4 bph early/late

bph: buses per hour

6.10.7 Car parking assumptions in the future baseline are:

- The addition of 6,570 spaces to the existing provision and therefore provide a total of approximately 53,270 spaces without the Project.
- Staff car parking capacity at approximately 6,100 spaces throughout the period 2029 to 2047; and
- Off-airport parking capacity held constant and occupancy capped at 87.5% of capacity, after which any off-airport parking demand is assumed to divert to on-airport car parks.

6.10.8 Charges for air passenger parking and forecourt use in the future baseline modelling are assumed to be:

- Car parking for air passengers charged at between £67 and £84 per typical length of stay by 2032 (in 2021 prices), with charges increasing at the retail price index (RPI) + 1% annually thereafter to 2047;
- Forecourt access charge at £11.50 by 2032 (in 2021 prices); and
- No charge for staff car parking.

6.10.9 There are some rail improvements included in the modelling of the future baseline scenarios, based on works being implemented by third parties. These are set out in Chapter 9.

7 Surface Access Commitments for the Project

7.1 Introduction

7.1.1 GAL has developed Surface Access Commitments (SACs) which represent the outcomes which GAL commits to achieving in relation to surface access at the Airport. These form part of the Project. The SACs are set out in full in **ES Appendix 5.4.1: Surface Access Commitments** (Doc Ref. 5.3).

7.1.2 The SACs set out GAL's commitments to achieving certain mode shares for passenger and staff journeys as part of the Project; the measures which GAL will put in place to achieve those mode shares; and the approach to monitoring and reporting surface access information to identify progress towards achieving the mode share commitments.

7.1.3 In due course, in accord with the expected cycle of ASAS updates, GAL will produce a new ASAS as the airport develops to refresh its strategy and to reflect the commitments it is making about surface access outcomes and measures as part of the Project. The future ASAS will be informed by these SACs, providing the wider policy and evidential context within which those commitments are delivered. However, it is not proposed that the future ASAS will 'replace' the SACs in **ES Appendix 5.4.1: Surface Access Commitments** (Doc Ref. 5.3) as the 'control' document, through which GAL's commitments in the SACs (and on which this assessment relies) are secured. The SACs will remain in effect, and sit alongside the future ASAS, which will necessarily have a wider remit than simply delivering the SACs.

7.1.4 Surface access measures have been tested through the strategic modelling process to understand the impact of 'pull' and 'push' measures and the mode shares that could be achieved as a result, informing the mode share targets for the SACs. 'Pull' measures include committed improvements such as additional bus and coach services. 'Push' measures include increasing forecourt and parking charges.

7.2 Mode share commitments

7.2.1 Through the SACs, GAL commits to achieving the following annualised mode shares by the summer period after the third anniversary of the opening of the northern runway:

- A minimum of 55% of air passenger journeys to and from the Airport to be made by public transport (rail, local bus, regional/express bus or coach or another commercially-operated shared transport service for public use);
- A minimum of 55% of staff journeys to and from the Airport to be made by public transport, shared travel (a journey made by private car containing more than one person) and active modes (walking and cycling);
- A reduction of air passenger drop-off and pick-up car journeys at the Airport to a mode share of no more than 12% of surface access journeys; and
- A least 15% of airport staff journeys to work originating within 8km of the Airport to be made by active modes.

7.3 Measures and Interventions

7.3.1 GAL has developed a series of surface access interventions which form part of the SACs for the Project. These additional interventions respond to the increase in total passenger throughput that is expected with the Project and the mode share commitments which are set out in Section 7.2.

7.3.2 The measures to which GAL is committing are set out in more detail in **ES Appendix 5.4.1: Surface Access Commitments** (Doc Ref. 5.3) and in summary comprise:

- Financial support for enhanced regional express bus or coach services;
- Financial support for local bus services;
- Delivery of active travel infrastructure improvements as part of the highway works which form part of the Project;
- Enhanced on-site facilities for active travel users;
- Provision of no more than 1,100 net additional car parking spaces for air passengers, to cater for expected increases in parking demand resulting from growth in passenger numbers once the new runway is open;
- Funding to support local authorities in implementing additional parking controls in surrounding streets, or in enforcement action against unauthorised off-airport passenger parking sites;
- Using air passenger car parking charges and forecourt access charges to influence passenger travel choices;
- Maintaining the number of staff car parking spaces at or below current levels of provision;
- Introducing measures to discourage single-occupancy private vehicle use by staff for journeys to and from work, incentivise active travel use and increase public transport discounts for staff;
- Continued use of the Sustainable Transport Fund to provide a funding stream for sustainable transport initiatives; and
- Provision of a Transport Mitigation Fund to support additional measures should these be needed as a result of growth related to the Airport.

7.3.3 GAL also has the opportunity to supplement these committed measures with other initiative and interventions if and when appropriate, although the modelling for this assessment indicates that the committed measures alone are sufficient to achieve the committed mode shares,

7.3.4 Because they form part of the Project, the measures contained in the SACs are used as the basis of the strategic modelling for the with Project scenarios.

7.3.5 The strategic modelling for the with Project scenarios therefore includes:

- The highway works proposed as part of the Project, between Longbridge Roundabout and M23 Junction 9. This includes Active Travel proposals (more information is provided in Chapter 14);
- Increased frequency (half-hourly daytime, hourly early/late) on the coach route which GAL is already proposing as part of the current ASAS, between Chatham, Maidstone, Sevenoaks and Gatwick;
- New coach route (hourly) Bexley – Footscray – Gatwick;
- New coach route (half-hourly) Tunbridge Wells – East Grinstead – Gatwick;
- New coach route (hourly) Worthing – Horsham – Gatwick;
- On-airport air passenger car parking capacity of 47,200 spaces in 2029, increasing to 48,300 spaces in 2047;
- Car parking for air passengers charged at between £84 and £102 per typical length of stay by 2032 (in 2021 prices), with charges increasing at the retail price index (RPI) + 1% annually thereafter to 2047;
- Forecourt access charge at £15.75 by 2032 (in 2021 prices), with charges increasing at RPI + 1% annually thereafter to 2047; and
- A modelled charge of £5 for access to staff parking by single occupancy vehicle in 2029 (in 2021 prices), with no charge for multiple occupancy, as explained in paragraph 7.3.9.

7.3.6 The proposed and enhanced coach services are shown in Table 7.3.1.

Table 7.3.1: Proposed routes and frequencies for new regional bus or coach services

Route	Frequency in future baseline	Indicative Frequency with Project
Uckfield – East Grinstead – Gatwick (continue support)	Two-hourly; hourly in peaks	Two-hourly; hourly in peaks
Romford – Upminster – Dartford – Gatwick (continue support)	Hourly	Hourly
Chatham – Maidstone – Sevenoaks – Gatwick	Two-hourly	Half-hourly daytime, hourly early/late
Bexley – Footscray – Gatwick	-	Hourly
Tunbridge Wells – East Grinstead – Gatwick	-	Half-hourly
Worthing – Horsham – Gatwick	-	Hourly

7.3.7 The on-airport air passenger car parking included in the modelling for the with Project scenarios by 2047 comprises a net gain of 1,100 spaces required to accommodate growth resulting from the Project. The proposals also include some 8,900 new parking spaces which would replace the same number that would be lost as part of the construction of the Project.

7.3.8 The charges for car parking and forecourts have been set for the purposes of the transport modelling. For air passenger parking and forecourts, they reflect an expectation of the degree to which charges might have to increase to achieve the desired mode share outcomes. The exact level of charge used in operation will depend on progress towards achieving the mode share commitments and circumstances at the time. Free drop-off and pick-up space will be provided in long-stay car parks to ensure equitable access from locations not well-served by public transport.

7.3.9 For staff parking, the charge for single occupancy vehicles used in the modelling is used as a proxy for the range of restraint measures that GAL could employ to reduce single occupancy vehicle use by staff. GAL may choose other ways to implement such a restraint, in which case parking charges may not be necessary provided that the staff mode share commitments are being met.

7.4 Modelled mode shares

7.4.1 The modelling work shows that through the interventions tested to reflect the SACs, it is possible to achieve at least the committed mode shares by the summer period after the third anniversary of the opening of the new northern runway. GAL aspires to a high sustainable, low emission mode share so will continue to work to exceed the mode share commitments where possible.

7.4.2 The identified measures and interventions are included in the strategic modelling used to inform the assessments of the Project reported in this TA. The measures lead to an increase in annual average air passenger mode share from around 45% by public transport prior to the Covid-19 pandemic up to 52% by public transport in the future baseline and 54% to 56% by public transport between 2029 and 2047 in the with Project scenario. This increase in public transport mode share for air passengers is significant and notable given the growth in passenger numbers with the Project.

7.4.3 In terms of employees, the strategic model shows that a sustainable transport mode share of up to 50% is expected in the future baseline, increasing to between 55% and 56% in the with Project scenarios.

7.4.4 More information on the trip generation for the Project is included in Chapter 8.

7.4.5 GAL recognises that it is necessary to monitor the actual outcomes that result from deploying the measures listed above and to provide periodic review of whether, and assurance that, the committed mode shares are being achieved. The SAC document sets out the commitments GAL is making to a comprehensive monitoring exercise. This includes the collation of data from a range of available sources on a regular basis, including additional primary data collection where necessary, and the preparation of Annual Monitoring Reports to set out progress made towards achieving the mode share commitments.

8 Demand forecasts: future baseline and Project scenarios

8.1 Context

8.1.1 As Section 6.2 explains, passenger numbers at Gatwick fell significantly during the Covid-19 pandemic. Passenger numbers started to recover in 2021 and in 2022 almost 33 mppa used the airport, or around 70% of 2019 pre pandemic levels.

8.1.2 In the medium-term, through to the mid-2020s, it is expected that overall demand for air travel will recover to previous levels as consumer behaviours return, driven by factors such as global and UK economic growth, disposable income, consumer confidence and the relative cost of air travel. There is therefore confidence that passenger and airline demand will return to previous levels over the course of the next few years and then continue to grow thereafter.

8.1.3 In addition to recovery from Covid-19, another important factor that will affect the level of air traffic at Gatwick in the future is whether a third runway (R3) is brought forward at Heathrow.

8.1.4 Given the continuing uncertainty surrounding the third runway at Heathrow, it is considered that the most robust assumption to adopt for the assessment of the Project is to assume that a third runway does not come forward at Heathrow.

8.1.5 Consequently, the forecasts prepared by GAL for the baseline and with Project scenarios for this TAR adopt a 'No Heathrow R3' assumption. This approach provides a conservative assessment from a traffic and transport perspective. If Heathrow R3 was to come forward, traffic levels at Gatwick would be likely to decline in the period immediately following the opening of R3, meaning that the impacts of the Project, such as traffic and therefore associated noise and emissions would be lower in the 2032 assessment year. By not including Heathrow R3, the 2032 assessment is therefore more conservative. However, by 2047, there would be little difference between demand at Gatwick with or without Heathrow R3 and accordingly this scenario would be unchanged irrespective of developments at Heathrow.

8.1.6 The central assessment cases for the Project are therefore as follows.

- Gatwick future baseline with no Heathrow R3.
- Gatwick Northern Runway or "with Project", which assumes the northern runway opens in 2029 and Heathrow R3 does not come forward.

Assessment years

8.1.7 In respect of each of these two cases, forecasts have been prepared for three primary assessment years – 2029, 2032 and 2047 (as set out in Section 5.4):

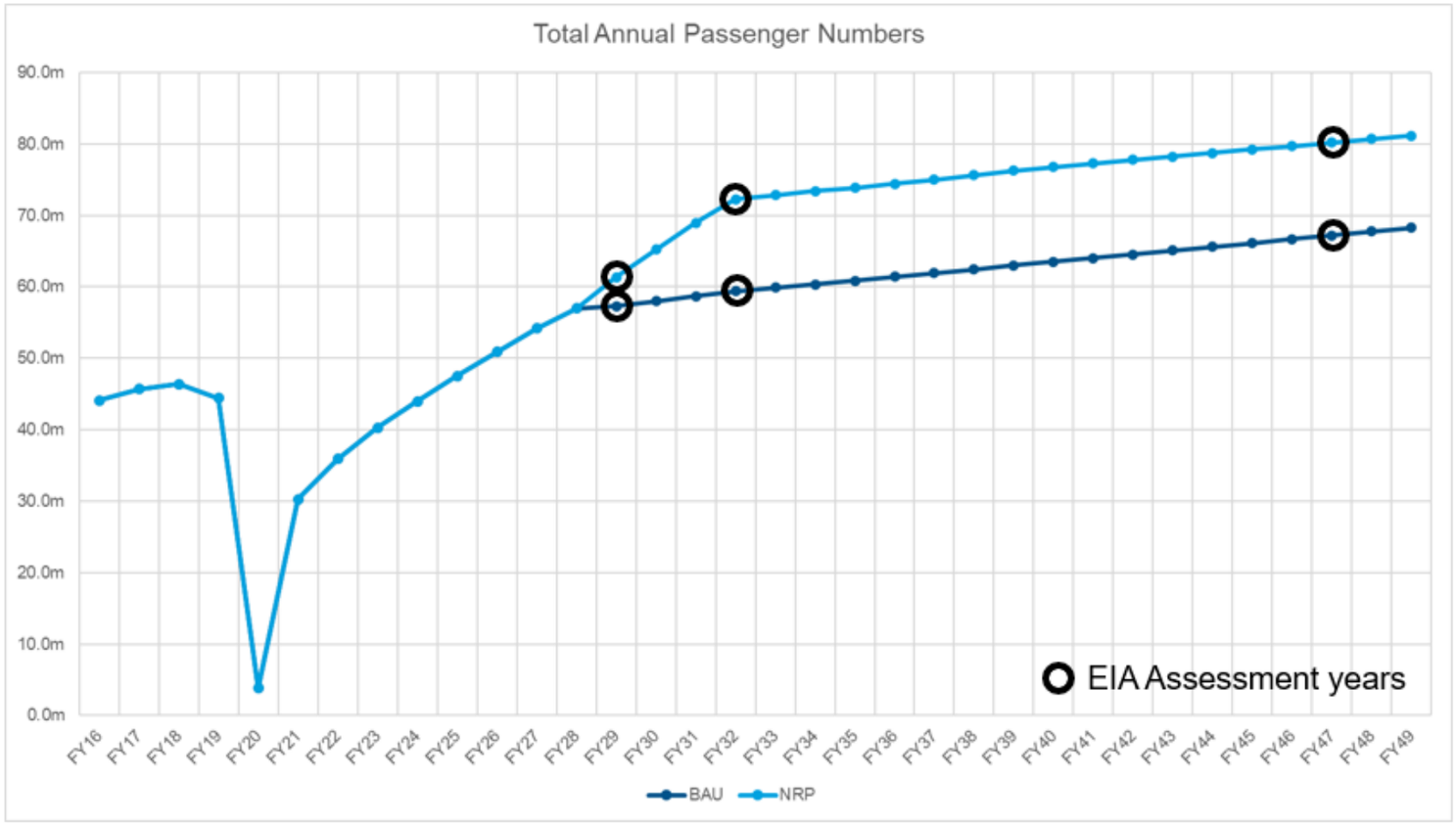
- 2029: represents the assumed first full year of opening of the Project (and therefore the first year when effects arising from its operation would occur).
- 2032: an interim assessment year, by which time the highway works are expected to have been completed and all peak slots on both runways would be full; this therefore represents a year in which environmental effects are likely to be higher than 2029.
- 2047: reflects a requirement under the Design Manual for Road and Bridges Vol. 5, Sec. 1 (TD37/93) (Highways England, 1995) to assess the effects of a highway project 15 years after it has been completed. Airport passenger and staff numbers are also expected to be higher in 2047 than in 2032 and background traffic on the network will have continued to grow. This assessment year therefore provides a robust assessment and has been tested both without and with the Project.

Annual demand

8.1.8 Annual demand for these assessment years is shown in Diagram 8.1.1 and described more fully in the Forecast Databook in **ES Appendix 4.3.1: Forecast Data Book** (Doc Ref. 5.3)**.**

8.1.9 The updated forecasts predict that commercial traffic at Gatwick will return to 2019 pre-COVID levels in 2025, and that by the end of the 2020s, commercial levels at Gatwick will have returned broadly to where they would have been had the pandemic not occurred. By 2029, annual demand is estimated to be 57.3 mppa in the future baseline. Opening of the Northern Runway generates additional traffic, with airlines taking advantage of the released slots, such that 2029 demand with the Project is 4 mppa higher than the future baseline at 61.3 mppa at the end of 2029. With the Project, there then follows a three-year period of more significant growth to 2032, by which time demand at the Airport has grown to 72.3 mppa with the Northern Runway compared to 59.4 mppa in the future baseline. Demand then levels off (in both the future baseline and with Project scenarios) and grows incrementally with all peak slots filled and with any growth coming from higher load factors or larger aircraft. It is assumed that by 2047, the Project could increase airport capacity up to 80.2 mppa, compared to a maximum potential capacity based on existing facilities of 67.2 mppa within the same timescale. This represents an increase of approximately 13 mppa.

Diagram 8.1.1: Annual demand for future baseline and with Project scenarios (No Heathrow R3)



Daily demand

8.1.10 Daily demand is described below and discussed more fully in **Transport Assessment Annex B – Strategic Transport Modelling Report** (Doc Ref. 7.4).

8.1.11 The interaction of airport and non-airport travel demand is complex, driven in part by the seasonal variations in travel demand. The airport peak season occurs during the August period, and this corresponds to lower levels of commuting demand particularly on the rail and local road networks (where demand is between 2% and 6% lower than in June).

8.1.12 For the assessments supporting the PEIR, the modelling used June weekday non-airport demand and overlayed this with airport demand for a busy August day. Although this was considered a robust case, it also produced an unrealistically onerous scenario, as high levels of commuting and peak season airport conditions do not tend to occur at the same time of year.

8.1.13 So that the assessments contained in this report reflect a more reasonable and likely scenario, June average weekday conditions for non-airport demand have been overlayed with airport demand for a peak weekday in June. This represents the conditions anticipated during non-school holiday periods of the year. Daily airport demand on a peak June weekday is greater than that expected on 93% of weekdays in a year. The busiest June weekday is 3.5% lower than the August busy day used in the PEIR modelling. As the air traffic forecasts assume there will be more 'busy' days in the future, the difference between the June peak day and August peak day can be expected to reduce in future years to between 1% and 2%. The use of a June weekday is also in keeping with DfT guidance (TAG Unit M1.2) on using neutral periods as the basis for model development and assessment. The revised approach is considered to be more appropriate and a reasonable robust case for the assessment, as it provides a more consistent combination of demand data.

8.1.14 The daily profile of airside demand in terms of two-way passengers (arrivals and departures) for this peak June weekday is shown in Diagram 8.1.2. Daily numbers of passengers exclude transferring passengers (who do not leave the airport when changing flights).

8.1.15 The future baseline growth scenario to 2032 is around 30% higher across the day when compared to 2016. By 2047 demand is around 40% higher than in 2016. Demand in the Project scenario is 70% higher across the day when compared to 2016.

8.1.16 To generate landside demand, modelling assumes a 'lead' time before departure. This is referenced to surveyed arrival at check-in profiles, with passengers arriving closer to departure time for short-haul flights and over a longer period for long-haul flights. It also assumes a 'lag' time after flight arrival, referenced to survey data of passengers exiting through terminal processes before taking landside modes.

8.1.17 When considering the landside profiles in Diagram 8.1.3, both scenarios create overlaps with background traffic peaks so the potential effect on congestion is greater at these times of the day, specifically 07:00 to 09:00 and 16:00 to 18:00. High inter-peak demand may also affect resilience and network recovery.

8.1.18 Accordingly, GAL has developed a bespoke suite of inter-related strategic modelling tools to test the impact and the effects of this growth on the transport network as well as to inform environmental workstreams, as described in Section 5.3.

Diagram 8.1.2: Airside demand High June weekday, Baseline and with Project

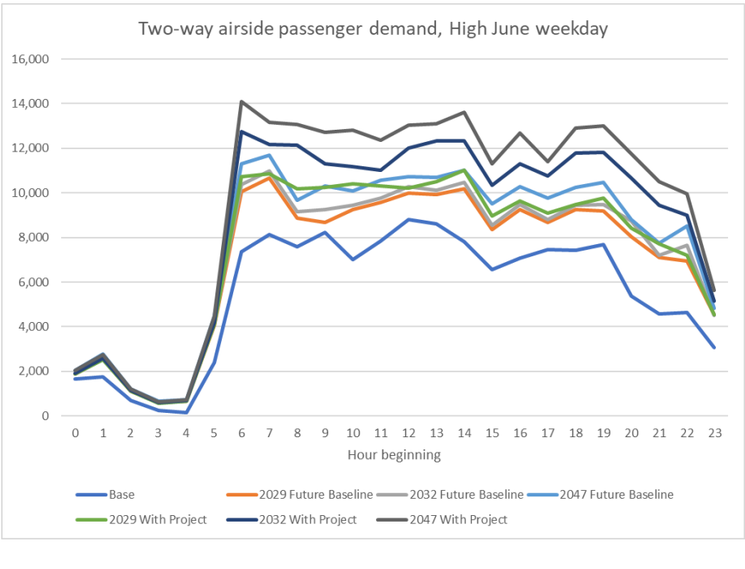
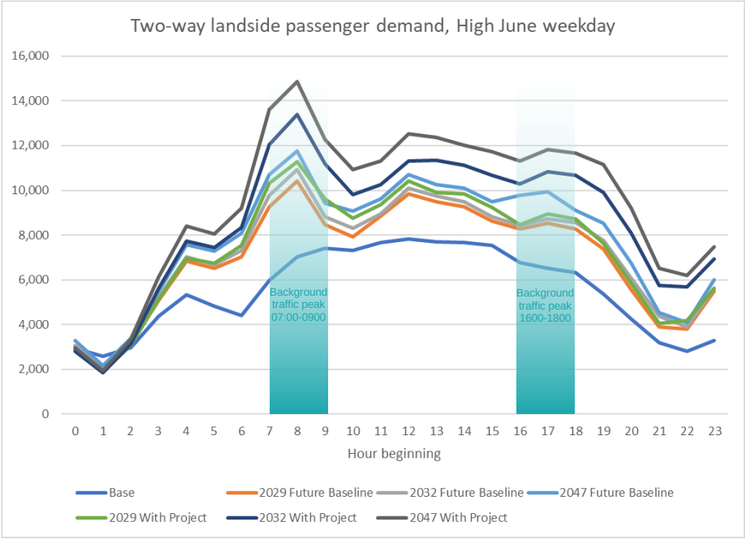


Diagram 8.1.3: Landside demand High June weekday, Future Baseline and Project scenarios



8.2 Employee forecasts

8.2.1 Travel for staff working at the airport is an important consideration for the assessment. The performance of transport networks needs to take account of forecast changes in the number of employees, their distribution, and their working hours.

8.2.2 The Gatwick Airport Employment Survey in 2016 (Gatwick Airport Ltd, 2016) showed that approximately 23,800 people were employed on-airport.

8.2.3 The total number of on-airport employees is forecast to rise both in the future baseline and with the Project, as shown in Table 8.2.1.

Table 8.2.1: Gatwick employee forecasts (on-airport employee only)

	Future baseline	With Project
2016	23,807	-
2029	27,609	28,596
2032	28,077	31,199
2047	29,721	32,822

8.2.4 The forecasts indicate that the number of on-airport employees will increase progressively and will reach approximately 29,700 by 2047 for the future baseline scenario and approximately 32,800 by 2047 for the with Project scenario, a difference of 3,100 employees.

8.2.5 The majority of airport staff work in four-day shift patterns, with a range of start times from before 05:00 to after 10:00. As an employment site, this spreads the impact of the journey to work beyond the traditional commuter peak more commonly associated with office, retail and some service sector employment. Therefore, only a proportion of trips for additional employment at Gatwick will have an impact on peak traffic flows.

8.2.6 GAL commissioned a study into employment growth and housing supply. This indicates that there will be sufficient housing in the local area into the future to accommodate Gatwick's growth as well as growth generated by other employers.

8.2.7 Bearing in mind the speed of recovery from the Covid-19 pandemic seen in the last two years, there is confidence that passenger activity at Gatwick will regain previous levels shortly and will continue to grow in future years. As a result, staff numbers and working patterns are also likely to return to pre-pandemic conditions.

8.2.8 Following the pandemic, there generally appears to be an increase in hybrid working at many employers, with staff dividing their working time between working from home and working at their employer's place of work. However, at Gatwick, a significant proportion of airport workers are not practically able to work from home because the nature of their job means that it can only be performed in person. The modelling work therefore assumes that employee attendance levels on site will be similar to those experienced pre-pandemic. This is a robust assumption as it leads to the assessment testing higher trip generation to the Airport and is likely to reflect a typical mid-week day. The transport modelling also assumes that the distribution of new employment will be comparable to existing employment.

8.3 Cargo and goods traffic

8.3.1 In 2019, Gatwick handled 150,000 tonnes of cargo. Gatwick's cargo volumes are forecast to grow to just over 290,000 tonnes by 2047 in the future baseline and just under 350,000 tonnes in the Project scenario.

8.3.2 Forecast growth in cargo volumes is driven by an increasing proportion and volume of flights to long haul markets where cargo volumes are typically strong. To serve these markets the forecasts anticipate a greater proportion of wide-body aircraft with cargo capacities in line with or greater than today's fleet.

8.3.3 It should be noted that Gatwick handled more than 300,000 tonnes of cargo in the mid-2000s and accordingly appropriate levels of handling capacity are already available at the Gatwick Cargo Centre.

8.3.4 Cargo and logistics movements are described further in Chapter 16. Cargo and logistics movements are included in the strategic transport model.

8.4 Background demand

8.4.1 The amount of growth in non-airport travel demand in the modelling has been estimated using TEMPro, the Trip End Model Presentation Program, developed by the Department for Transport. TEMPro v7.2 has been used to provide demand forecasts through to 2051 and is based on published Local Plan data where it exists and then extrapolated.

8.4.2 These forecasts are appropriate at district level but require adjustment to deal with local uncertainty or specific projects. This is covered further in **Transport Assessment Annex B – Strategic Transport Modelling Report** (Doc Ref. 7.4).

8.5 Cumulative development

8.5.1 The estimates of rail and station crowding as reported in this TAR (Chapters 9 and 10) include for background traffic growth in line with Network Rail projections.

8.5.2 Highway modelling reported in Chapter 12 includes background traffic growth from TEMPro through to 2047 and a comprehensive set of cumulative development assumptions related to specific developments that have been identified as of relevance to the Project. This information is set out in the Uncertainty Log contained in **Transport Assessment Annex B – Strategic Transport Modelling Report** (Doc Ref. 7.4) and summarised in paragraph 5.3.17.

8.5.3 As detailed above, the modelling assumes growth at Heathrow with two runways, based on the future baseline described in Heathrow's DCO consultation on its third runway in 2018. The last Heathrow Consultation was in July 2019 on their preferred proposal.

8.6 Trip generation

Passengers

8.6.1 Airside passenger demand includes passengers transferring between flights, who do not leave the airport between flights. These passengers do not affect surface access demand and are therefore removed from the figures before calculating the 'non-transfer' airside demand, from which landside demand is also generated.

8.6.2 Table 8.6.1 shows airside non-transfer passenger demand for the future baseline and with Project scenarios as compared to 2016 (the modelled baseline year) for a busy weekday in June. In the future baseline, passenger growth to 2032 is 30% higher across the day when compared to 2016. By 2047 passenger demand is around 40% higher than in 2016. Passenger demand in the Project scenario is 70% higher across the day when compared to 2016.

8.6.3 To generate landside demand, modelling assumes a 'lead' time before departure and a 'lag' time after flight arrival, as described in paragraph 8.1.16.

8.6.4 These demands have been input into the modelling suite and have been assigned to different modes by the model, based on the measures forming part of the SACs, described in Chapter 7 above, as well as origin, destination, time and cost parameters which influence the modes which are available to passengers and which modes passengers will choose to take.

8.6.5 By 2047, rail mode share on the busy summer day in the future baseline is shown by the model to increase to around 42% and bus and coach at 7%, as shown in Table 8.6.2 and Table 8.6.3 respectively. There is variation across the day with rail mode share up to 52% on average in the PM peak period on the busy summer day. As one would expect rail mode share is lower – 17% to 19% – late at night and early in the morning when there are limited services and connections are more difficult. Bus and coach mode share varies between 6% and 10% across the day.

Table 8.6.1: Airside non-transfer passenger two-way demand

Time Period	Total Passengers - Future Baseline				Total Passengers - with Project			
	2016	2029	2032	2047	2016	2029	2032	2047
AM (0700-09:00)	15,687	19,236	19,912	21,266	15,687	20,637	24,045	26,000
IP (09:00-16:00)	54,882	65,038	67,166	72,512	54,882	70,192	79,611	88,119
PM (16:00-18:00)	14,519	17,663	18,076	19,929	14,519	18,348	21,828	23,872
OP1 (18:00-00:00)	32,772	44,436	46,473	50,355	32,772	46,160	57,178	63,194
OP2 (00:00-04:00)	4,374	6,015	6,166	6,635	4,374	5,959	6,159	6,602
OP3 (04:00-07:00)	9,877	14,575	15,054	16,402	9,877	15,136	17,388	19,132
24hr	**132,111**	**166,963**	**172,845**	**187,098**	**132,111**	**176,433**	**206,210**	**226,920**

Table 8.6.2: Landside passenger two-way rail demand and mode share

Time Period	Rail Passengers - Future Baseline				Rail Passengers - with Project			
	2016	2029	2032	2047	2016	2029	2032	2047
AM (07:00-09:00)	4,088	7,802	8,371	9,211	4,088	8,866	10,450	12,134
IP (09:00-16:00)	21,253	29,800	30,901	32,877	21,253	33,096	37,610	41,720
PM (16:00-18:00)	5,886	8,635	8,911	10,162	5,886	9,171	11,179	12,364
OP1 (18:00-00:00)	10,785	17,373	18,513	19,796	10,785	18,614	24,515	27,414
OP2 (00:00-04:00)	2,111	2,564	2,653	2,786	2,111	2,630	2,735	2,964
OP3 (04:00-07:00)	1,530	3,447	3,615	3,837	1,530	3,823	4,211	4,629
24hr	**45,653**	**69,621**	**72,965**	**78,669**	**45,653**	**76,201**	**90,699**	**101,223**
Time Period	**Rail Mode Share - Future Baseline**				**Rail Mode Share - with Project**			
	2016	2029	2032	2047	2016	2029	2032	2047
AM (07:00-09:00)	31%	40%	40%	41%	31%	41%	41%	43%
IP (09:00-16:00)	40%	48%	48%	48%	40%	49%	50%	50%
PM (16:00-18:00)	44%	51%	52%	52%	44%	53%	53%	53%
OP1 (18:00-00:00)	43%	50%	51%	51%	43%	52%	52%	53%
OP2 (00:00-04:00)	16%	19%	20%	19%	16%	20%	20%	21%
OP3 (04:00-07:00)	11%	17%	17%	17%	11%	18%	18%	18%
24hr	**35%**	**42%**	**42%**	**42%**	**35%**	**43%**	**44%**	**45%**

8.6.6 In the with Project scenarios, rail and bus mode shares on the busy summer day are shown by the model to be around 45% and 8% respectively by 2047. Rail mode share would be highest in the PM peak period and early evening, at around 53%, while bus mode share would range between 7% and 11%, with an uplift from 8% in the future baseline to 10% with the Project in the AM peak period.

8.6.7 When taking data for the busy summer day, it is estimated from the modelling that the annual average will have a higher public transport mode share of around 52% between 2029 and 2047 in the future baseline and 56% with the Project, owing to the seasonal variation described in Section 8.1.

8.6.8 Table 8.6.4 shows that by 2047, highway mode share (taxis, kiss and fly, car parking) on the busy summer day is expected to reduce to around 51% of demand in the future baseline, or 47% with the Project, with higher mode share at times of the day when public transport options are more limited.

Table 8.6.3: Landside passenger two-way bus/coach demand and mode share

Time Period	Bus/Coach Passengers - Future Baseline				Bus/Coach Passengers - with Project			
	2016	2029	2032	2047	2016	2029	2032	2047
AM (07:00-09:00)	757	1,564	1,688	1,856	757	2,030	2,451	2,826
IP (09:00-16:00)	2,848	4,155	4,340	4,634	2,848	5,234	6,145	6,817
PM (16:00-18:00)	680	1,069	1,107	1,269	680	1,253	1,573	1,728
OP1 (18:00-00:00)	1,199	1,948	2,080	2,222	1,199	2,327	3,161	3,538
OP2 (00:00-04:00)	726	1,268	1,314	1,405	726	1,430	1,503	1,647
OP3 (04:00-07:00)	808	1,548	1,636	1,764	808	1,920	2,210	2,452
24hr	**7,018**	**11,551**	**12,165**	**13,149**	**7,018**	**14,194**	**17,043**	**19,008**
Time Period	**Bus/Coach Mode Share - Future Baseline**				**Bus/Coach Mode Share - with Project**			
	2016	2029	2032	2047	2016	2029	2032	2047
AM (07:00-09:00)	6%	8%	8%	8%	6%	9%	10%	10%
IP (09:00-16:00)	5%	7%	7%	7%	5%	8%	8%	8%
PM (16:00-18:00)	5%	6%	6%	6%	5%	7%	7%	7%
OP1 (18:00-00:00)	5%	6%	6%	6%	5%	6%	7%	7%
OP2 (00:00-04:00)	6%	10%	10%	10%	6%	11%	11%	11%
OP3 (04:00-07:00)	6%	8%	8%	8%	6%	9%	9%	10%
24hr	**5%**	**7%**	**7%**	**7%**	**5%**	**8%**	**8%**	**8%**

Table 8.6.4: Landside passenger two-way highway demand and mode share

Time Period	Highway Passengers - Future Baseline				Highway Passengers - with Project			
	2016	2029	2032	2047	2016	202	2032	2047
AM (07:00-09:00)	8,183	10,312	10,646	11,378	8,183	10,692	12,538	13,512
IP (09:00-16:00)	29,031	28,525	28,920	31,115	29,031	28,805	31,925	34,559
PM (16:00-18:00)	6,726	7,101	7,163	8,280	6,726	7,005	8,381	9,041
OP1 (18:00-00:00)	13,235	15,101	15,701	16,990	13,235	15,092	19,339	21,206
OP2 (00:00-04:00)	10,048	9,365	9,505	10,144	10,048	8,921	9,172	9,782
OP3 (04:00-07:00)	12,219	15,373	15,766	17,349	12,219	15,508	17,096	18,562
24hr	**79,442**	**85,777**	**87,701**	**95,256**	**79,442**	**86,024**	**98,451**	**106,662**
Time Period	**Highway Mode Share - Future Baseline**				**Highway Mode Share - with Project**			
	2016	2029	2032	2047	2016	2029	2032	2047
AM (07:00-09:00)	63%	52%	51%	51%	63%	50%	49%	47%
IP (09:00-16:00)	55%	46%	45%	45%	55%	43%	42%	42%
PM (16:00-18:00)	51%	42%	42%	42%	51%	40%	40%	39%
OP1 (18:00-00:00)	52%	44%	43%	44%	52%	42%	41%	41%
OP2 (00:00-04:00)	78%	71%	71%	71%	78%	69%	68%	68%
OP3 (04:00-07:00)	84%	75%	75%	76%	84%	73%	73%	72%
24hr	**60%**	**51%**	**51%**	**51%**	**60%**	**49%**	**48%**	**47%**

Employees

8.6.9 Total employee trip generation is shown in Table 8.6.5. These are two-way trips associated with those employees who are travelling to and from the Airport on any given day, not the total number of people employed at the Airport.

8.6.10 In the future baseline, modelling shows an employee mode share by 2047of 16% by rail (Table 8.6.6), 19% by bus/coach (Table 8.6.7) and 4% by active travel. Adding journeys made by company transport or car sharing brings the total sustainable transport mode share to 50%.

8.6.11 In the with Project scenario, sustainable mode share for employees is expected to increase to 55%, comprising 17% by rail, 21% by bus/coach, 4% by active travel and 13% by car share or company transport.

8.6.12 As Table 8.6.8 shows, modelling shows an employee mode share by highway modes of 62% by 2047 in the future baseline, comprising 7% sharing a car, 5% using company transport and 50% being solo car drivers. In the with Project scenario, the overall share by highway modes reduces to 58% in 2047, comprising 8% sharing a car, 5% using company transport and 45% being solo car drivers.

Table 8.6.5: Landside employee two-way demand

Time Period	Total Employees - Future Baseline				Total Employees - with Project			
	2016	2029	2032	2047	2016	2029	2032	2047
AM (07:00-09:00)	3,845	4,454	4,530	4,798	3,845	4,606	5,016	5,276
IP (09:00-16:00)	7,967	9,258	9,415	9,967	7,967	9,585	10,489	11,013
PM (16:00-18:00)	3,356	3,813	3,868	4,067	3,356	3,931	4,245	4,436
OP1 (18:00-00:00)	5,554	6,504	6,621	7,035	5,554	6,745	7,400	7,801
OP2 (00:00-04:00)	1,539	1,827	1,860	1,982	1,539	1,897	2,091	2,210
OP3 (04:00-07:00)	5,100	5,836	5,925	6,237	5,100	6,037	6,572	6,864
24hr	**27,360**	**31,693**	**32,219**	**34,087**	**27,360**	**32,801**	**35,812**	**37,601**

Table 8.6.6: Landside employee two-way rail demand and mode share

Time Period	Rail Employees - Future Baseline				Rail Employees - with Project			
	2016	2029	2032	2047	2016	2029	2032	2047
AM (07:00-09:00)	550	731	759	879	550	846	904	1,008
IP (09:00-16:00)	991	1,281	1,318	1,486	991	1,506	1,634	1,775
PM (16:00-18:00)	508	659	680	779	508	757	814	893
OP1 (18:00-00:00)	659	864	891	1,004	659	1,017	1,101	1,200
OP2 (00:00-04:00)	179	212	218	246	179	249	272	296
OP3 (04:00-07:00)	614	832	854	952	614	980	1,057	1,136
24hr	**3,501**	**4,579**	**4,721**	**5,347**	**3,501**	**5,354**	**5,782**	**6,309**
Time Period	**Rail Employee Mode Share - Future Baseline**				**Rail Employees Mode Share - with Project**			
	2016	**2029**	**2032**	**2047**	**2016**	**2029**	**2032**	**2047**
AM (07:00-09:00)	14%	16%	17%	18%	14%	18%	18%	19%
IP (09:00-16:00)	12%	14%	14%	15%	12%	16%	16%	16%
PM (16:00-18:00)	15%	17%	18%	19%	15%	19%	19%	20%
OP1 (18:00-00:00)	12%	13%	13%	14%	12%	15%	15%	15%
OP2 (00:00-04:00)	12%	12%	12%	12%	12%	13%	13%	13%
OP3 (04:00-07:00)	12%	14%	14%	15%	12%	16%	16%	17%
24hr	**13%**	**14%**	**15%**	**16%**	**13%**	**16%**	**16%**	**17%**

Table 8.6.7: Landside employee two-way bus/coach demand and mode share

Time Period	Bus/Coach Employees - Future Baseline				Bus/Coach Employees – with Project			
	2016	2029	2032	2047	2016	2029	2032	2047
AM (07:00-09:00)	571	763	787	873	571	922	981	1,043
IP (09:00-16:00)	1,264	1,662	1,701	1,858	1,264	2,017	2,203	2,317
PM (16:00-18:00)	483	613	627	693	483	735	795	835
OP1 (18:00-00:00)	898	1,177	1,208	1,321	898	1,436	1,560	1,644
OP2 (00:00-04:00)	251	400	410	450	251	478	522	553
OP3 (04:00-07:00)	820	1,044	1,067	1,158	820	1,270	1,376	1,437
24hr	**4,286**	**5,660**	**5,801**	**6,352**	**4,286**	**6,858**	**7,437**	**7,828**
Time Period	**Bus/Coach Employee Mode Share - Future Baseline**				**Bus/Coach Employees Mode Share - with Project**			
	2016	**2029**	**2032**	**2047**	**2016**	**2029**	**2032**	**2047**
AM (07:00-09:00)	15%	17%	17%	18%	15%	20%	20%	20%
IP (09:00-16:00)	16%	18%	18%	19%	16%	21%	21%	21%
PM (16:00-18:00)	14%	16%	16%	17%	14%	19%	19%	19%
OP1 (18:00-00:00)	16%	18%	18%	19%	16%	21%	21%	21%
OP2 (00:00-04:00)	16%	22%	22%	23%	16%	25%	25%	25%
OP3 (04:00-07:00)	16%	18%	18%	19%	16%	21%	21%	21%
24hr	**16%**	**18%**	**18%**	**19%**	**16%**	**21%**	**21%**	**21%**

Table 8.6.8: Landside employee two-way highway demand and mode share

Time Period	Highway Employees - Future Baseline				Highway Employees - with Project			
	2016	2029	2032	2047	2016	2029	2032	2047
AM (07:00-09:00)	2,520	2,722	2,741	2,785	2,520	2,561	2,841	2,927
IP (09:00-16:00)	5,401	5,971	6,048	6,259	5,401	5,654	6,214	6,481
PM (16:00-18:00)	2,166	2,316	2,332	2,350	2,166	2,179	2,361	2,426
OP1 (18:00-00:00)	3,803	4,244	4,300	4,478	3,803	4,030	4,458	4,675
OP2 (00:00-04:00)	1,058	1,163	1,179	1,231	1,058	1,107	1,230	1,294
OP3 (04:00-07:00)	3,482	3,758	3,800	3,915	3,482	3,545	3,881	4,034
24hr	**18,430**	**20,173**	**20,399**	**21,019**	**18,430**	**19,075**	**20,986**	**21,837**
Time Period	**Highway Employee Mode Share - Future Baseline**				**Highway Employees Mode Share - with Project**			
	2016	**2029**	**2032**	**2047**	**2016**	**2029**	**2032**	**2047**
AM (07:00-09:00)	66%	61%	61%	58%	66%	56%	57%	55%
IP (09:00-16:00)	68%	64%	64%	63%	68%	59%	59%	59%
PM (16:00-18:00)	65%	61%	60%	58%	65%	55%	56%	55%
OP1 (18:00-00:00)	68%	65%	65%	64%	68%	60%	60%	60%
OP2 (00:00-04:00)	69%	64%	63%	62%	69%	58%	59%	59%
OP3 (04:00-07:00)	68%	64%	64%	63%	68%	59%	59%	59%
24hr	**67%**	**64%**	**63%**	**62%**	**67%**	**58%**	**59%**	**58%**

Mode shares

8.6.13 The measures described in Chapter 7 and included in the strategic modelling lead to an increase in annual average air passenger public transport mode share from around 45% (prior to the Covid-19 pandemic) up to 52% in the future baseline and between 54% and 56% in the period between 2029 and 2047 in the with Project scenario. This increase in public transport mode share for air passengers is significant and notable given the growth in passenger numbers with the Project. These mode share outcomes have informed the mode share commitments in the **ES Appendix 5.4.1: Surface Access Commitments** (Doc Ref. 5.3).

8.6.14 The annual average position represents a public transport mode share of 49% on the busy June day in the future baseline, increasing to up to 53% in the with Project scenario, owing to the seasonal variation described in Section 8.1. This comprises 43% to 45% by rail and 8% by bus and coach.

8.6.15 In terms of employees, the strategic model shows that a sustainable transport mode share of up to 50% is expected in the future baseline, increasing to up to 56% in the with Project scenario.

8.6.16 The model outputs also indicate that around 9% to 10% of staff journeys made to and from locations within 8km of the airport, compared to the target of 15% for such journeys. It is worth noting that the models do not include specific walking and cycling improvements (whether infrastructure, facilities, or incentives). Chapter 2 sets out the proposed highway improvement works include new or improved pedestrian and cyclist routes. Chapter 7 summarises the SACs which include additional measures to encourage active travel. It is therefore reasonable to expect that these will contribute to higher active travel mode shares than those shown in the model results. GAL will continue to explore additional measures to encourage active travel by staff.

9 Public transport: rail

9.1 Introduction

9.1.1 This chapter provides an assessment of the rail network in terms of crowding in the future baseline and with Project scenarios.

9.2 Rail services at Gatwick Airport station

9.2.1 Chapter 5 sets out the baseline rail conditions for both the 2016 modelled baseline and the 2022 current baseline, and a summary is provided in this section.

9.2.2 Gatwick is the UK's best-connected airport by rail and is served by Gatwick Express, Southern, Thameslink and Great Western Railway services. Peak rail frequencies are summarised in Table 9.2.1 for the modelling baseline (2016) and existing conditions (2022).

9.2.3 Gatwick's rail connections are shown in Diagram 9.2.1. It has regular, direct daily services from over 120 stations, across the South Coast from Southampton to Hastings, west to Reading and as far north as Bedford, Cambridge, and Peterborough, as shown by the blue lines.

9.2.4 A network of over 1,000 UK stations is accessible with just one interchange (as shown by the orange lines). Gatwick is connected to High Speed 1 trains to Europe from St Pancras International and to the Elizabeth Line at Farringdon. In addition to these stopping services, the Airport has a dedicated four trains per hour Gatwick Express service to London Victoria.

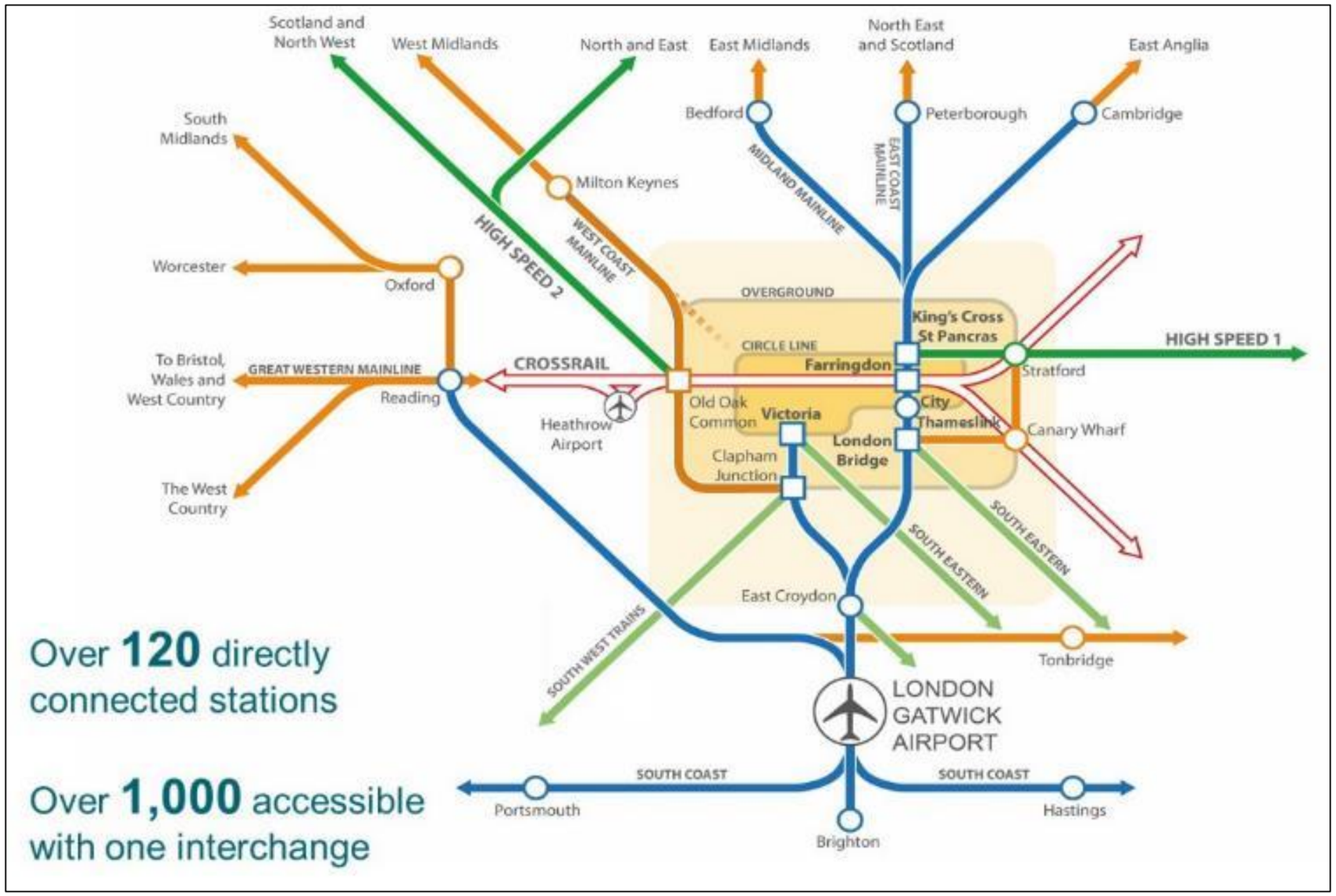
9.2.5 Being situated on the Brighton-London main line, with a dedicated station integrated with the South Terminal, is an important asset which helps GAL to achieve a high rail mode share for air passengers. Rail attracts approximately 39% of all air passengers (2017 CAA passenger data) and approximately 12% of all airport employees (2016 staff travel survey).

Table 9.2.1: Modelled rail frequencies calling at Gatwick

Operator/Service	Route	Peak frequency per hour*			Off peak frequency per hour		
		Modelled 2016	Current 2022	Modelled 2029, 2032, 2047	Modelled 2016	Current 2022	Modelled 2029, 2032, 2047
Gatwick Express	Brighton and Gatwick Airport non-stop to London Victoria	4 trains per hour	2 trains per hour	4 trains per hour	4 trains per hour	2 trains per hour	4 trains per hour
Southern (Brighton Main Line) London Victoria	South coast (Main Line) to Victoria via Gatwick, East Croydon and Clapham Junction	4-5 trains per hour	7 trains per hour	7 trains per hour	3 trains per hour	3 trains per hour	4 trains per hour
Southern (Arun Valley) London Victoria	South coast (Arun Valley) to London Victoria via Gatwick, East Croydon and Clapham Junction	Up to 1 train per hour	No trains	No trains	2 trains per hour	No trains	2 trains per hour
Southern London Bridge	South coast (Main Line) to London Bridge via Gatwick and East Croydon	1-2 trains per hour	No trains	1 train per hour	No trains	No trains	No trains
Thameslink (Brighton Main Line) London Bridge	Littlehampton and Brighton to London Bridge via Gatwick and East Croydon	3 trains per hour**	4-5 trains per hour	4 trains per hour	6 trains per hour	4 trains per hour	6 trains per hour
Thameslink (Arun Valley) London Bridge	Horsham to London Bridge via Gatwick and East Croydon	No trains	4 trains per hour	4 trains per hour	2 trains per hour	2 trains per hour	4 trains per hour
Great Western (North Downs Line)	Reading to Gatwick Airport via Redhill	1 train per hour	1 train per hour	2 trains per hour	1 train per hour	1 train per hour	2 trains per hour
Total (average hourly over 7am to 9am)		**14-15 trains per hour**	**18-19 trains per hour**	**22 trains per hour**	**18 trains per hour**	**12 trains per hour**	**22 trains per hour**

**AM peak northbound used to indicate peak frequency (average hourly between 07:00-09:00).*
*** Most peak trains routed via Elephant and Castle whilst the Thameslink through platforms at London Bridge were closed for reconstruction.*

Diagram 9.2.1: Rail network to Gatwick



Source: GAL

9.3 Approach and methodology

Modelling methodology

9.3.1 The EMME software platform has been used for the public transport modelling for the Project. EMME is a well-established and reliable software package for public transport assignment, including modelling impacts of in-vehicle crowding on passenger route choice. Both DfT and TfL have their primary rail models in EMME software (Railplan and PLANET South respectively) and its strengths and limitations are well understood.

9.3.2 PLANET South has been used for the assessment of rail effects. The model extents include rail lines from the Sussex coast to central London, plus the North Downs Line between Gatwick Airport and Reading. Given that travel to Gatwick Airport for many passengers requires cross-London travel, full coverage of PLANET South to locations north of London such as Stevenage, Peterborough and Cambridge have also been included. DfT supports the use of PLANET South for this assessment.

Assessment criteria

9.3.3 Crowding is an important measure of rail effects and the following have been assessed, as illustrated in Diagram 9.3.1:

- The line loading (number of passengers on trains) on departure from each station, which indicates total demand on these services;
- The Seated Load Factor, which shows how many seats on trains are occupied; and
- The percentage of standing capacity occupied, which illustrates crowding when standing passengers are expected.

9.3.4 If all passengers have a seat, this is assumed to be a more comfortable journey which is perceived to be less crowded than if passengers are standing. Once passengers are standing, there is a reduction in available space in the train, leading to less comfortable journeys.

9.3.5 The assessments are based on hourly forecasts and individual trains may have higher or lower levels of crowding depending on variations in supply and demand within the hour - these variations are not modelled.

9.3.6 In addition, it is assumed that no one will stand unless 100% of seats are taken. In practice some people will stand even when seats are available.

Seated load factor

9.3.7 The assessments contained in this chapter (line loading, Seated Load Factor and standing capacity occupied) are undertaken for the one-hour Network peak and one-hour Project peak.

9.3.8 The Seated Load Factor is calculated by dividing the number of passengers on trains by the total number of seats on those trains, in the relevant hour.

9.3.9 If the Seated Load Factor is less than 1.0, this means there are unoccupied seats on the trains in that hour. A value of 1.00 means that all seats are taken but there are no standing passengers.

9.3.10 A value greater than 1.0 means all seats are taken and there are standing passengers. For example, if a train has 600 seats and is carrying 900 passengers, the Seated Load Factor would be 1.50.

Percentage of standing capacity occupied

9.3.11 Many trains can accommodate more passengers standing than there are sitting. The Seated Load Factor does not provide an indication of whether the number of standing passengers is within the available standing capacity and so when the Seated Load Factor exceeds 1.00, the assessment examines the percentage of standing capacity occupied.

9.3.12 For example, if a train has 600 seats and can also accommodate 1,000 passengers standing, and is carrying 900 passengers, the Seated Load Factor is 1.50. The percentage of standing capacity occupied is 30% – ie 300 standing passengers out of capacity for 1,000.

9.3.13 Where there are standing passengers, the assessment also presents the number of people standing per train carriage on the busiest journey segments to help visualise the degree of crowding.

9.3.14 Where the demand generated on the rail network by the Project can be accommodated within the available number of seats, or creates only small change in the amount of standing capacity occupied, the impacts of the Project are considered acceptable. Where the number of standing passengers would increase, the assessment also considers the length of time that passengers would be standing for. DfT guidance previously used in considering train service franchising typically suggested that in peak periods, passengers should not have to stand for more than 20 minutes.

Diagram 9.3.1: Rail crowding assessment criteria

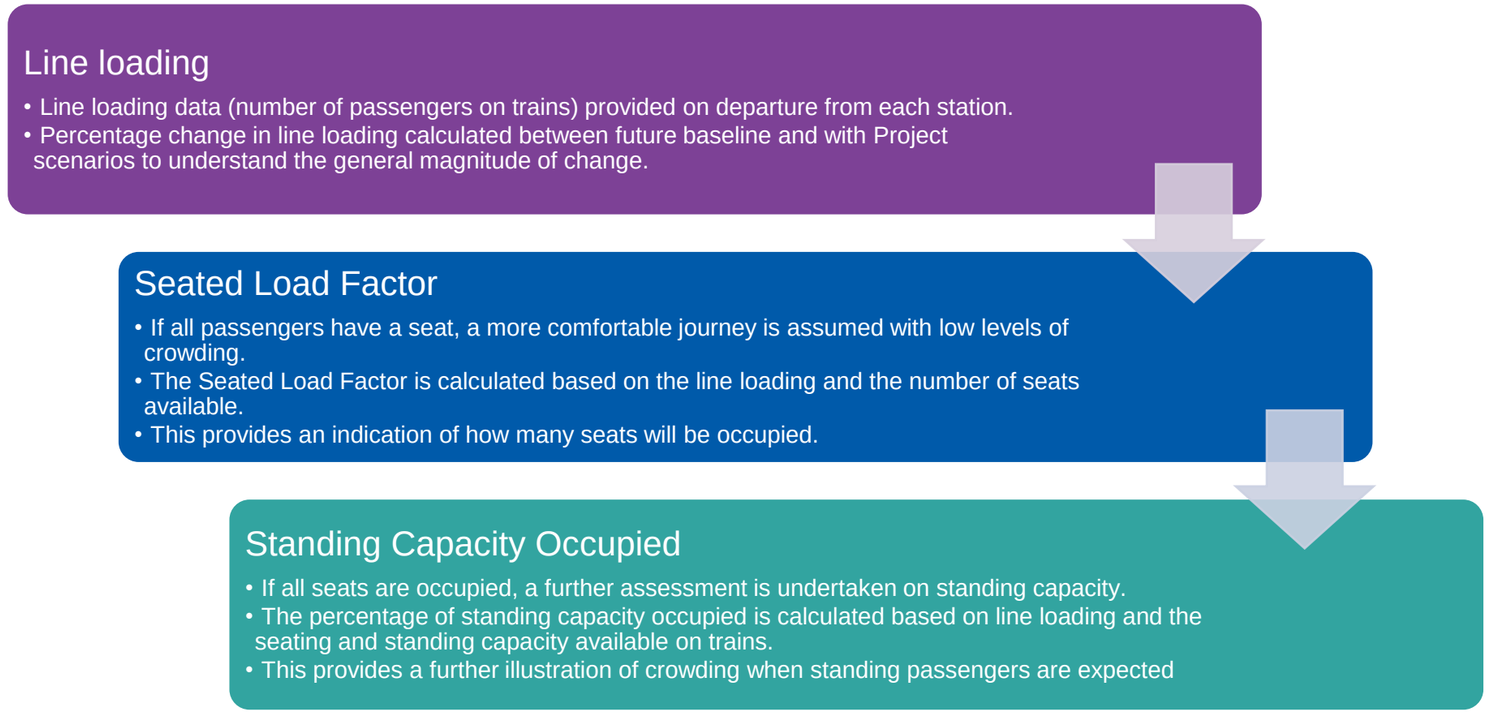


Illustration of Seated Load Factor

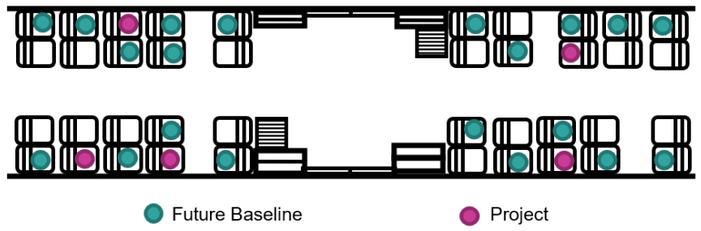
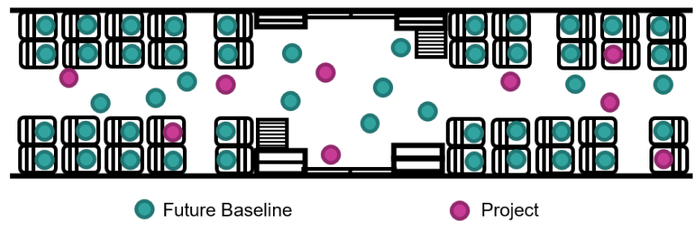


Illustration of Standing Capacity Occupied



Study area

9.3.15 Gatwick's primary effect on the rail network is on services which pass through Gatwick Airport railway station.

9.3.16 Diagram 9.3.2 shows the number of two-way rail trips by area. The principal areas where rail is the air passenger surface access mode to Gatwick are central and south London, Brighton, and the south coast. There are also significant numbers from rail-served corridors across the home counties generally.

9.3.17 A similar distribution is also shown for employees in Diagram 9.3.3 though specific catchments stand out as having higher concentrations of Gatwick employees, including south London, Redhill and Reigate, Crawley, Horsham, Guildford, Haywards Heath, Brighton and towns along the South Coast.

9.3.18 The model contains all rail services in the modelled area. However, based on the volume and distribution of Gatwick rail passengers, the rail services which have been assessed for crowding are:

- North Downs Line
- Arun Valley Line
- Brighton Main Line comprising fast and stopping services to and from London Victoria and fast and stopping services to and from London Bridge.

9.3.19 These three lines provide direct connections to Gatwick Airport and therefore carry all airport-related rail passengers at some stage of their journey. The volume of airport-related passengers is significantly lower on other lines which provide connecting services to the three lines above. Consequently, the effect of the Project on crowding on other rail lines is not expected to be significant.

Diagram 9.3.2: Gatwick Airport passenger catchments for rail

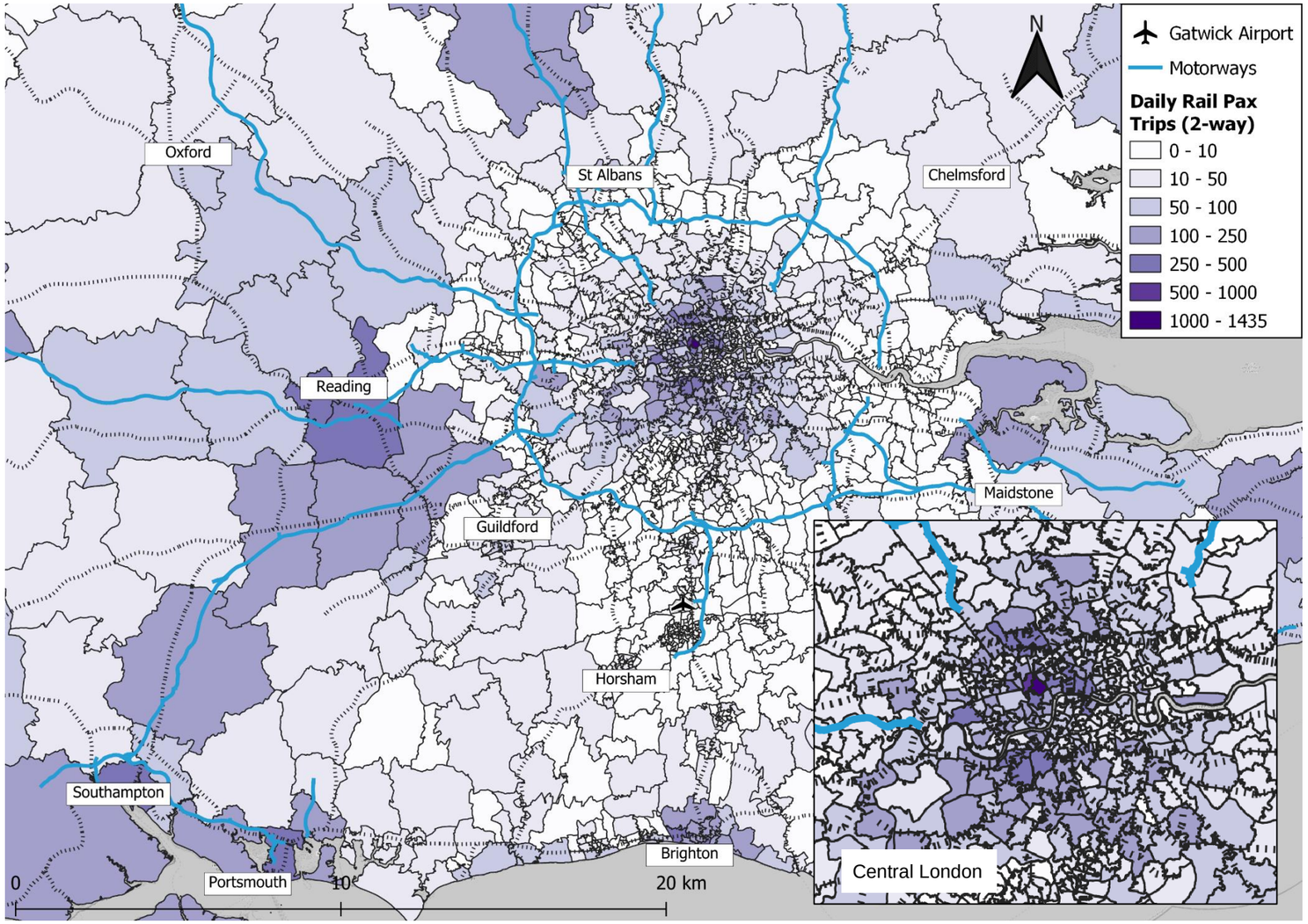
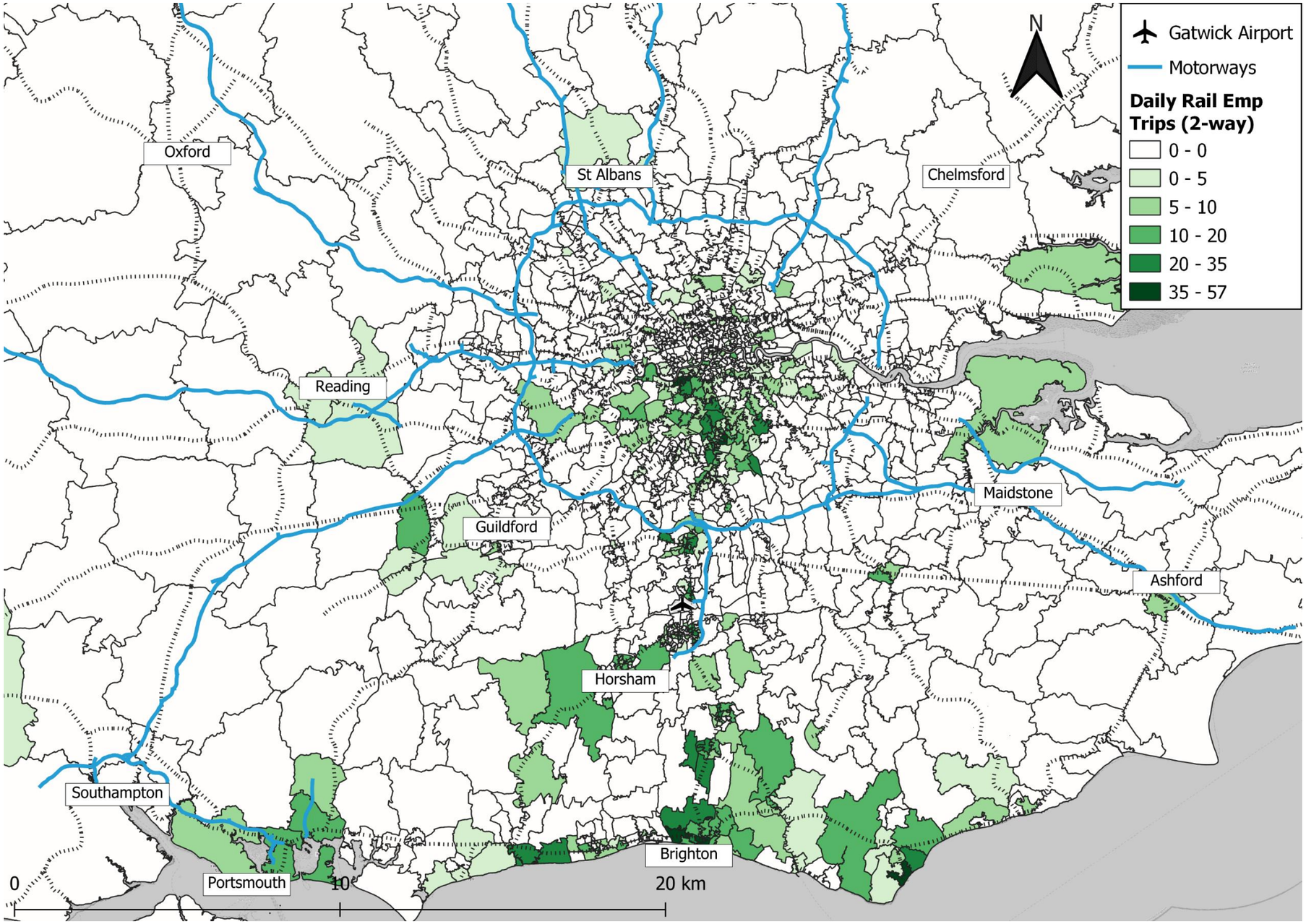


Diagram 9.3.3: Gatwick Airport employee catchments for rail



Time periods

Network and Project peak hours

9.3.20 Modelling on the rail network has been undertaken for 24 hours. Full details of loadings on rail services for all 24 hours of the day in each scenario are provided in the **Transport Assessment Annex B – Strategic Transport Modelling Report** (Doc Ref. 7.4), with rail data is in its Appendix G.

9.3.21 Crowding impacts have been assessed based on line loadings for both the Network and Project peak periods. These are defined as follows and are based on the station after which the highest line loading occurs:

- **Network peak hour** – The hour with highest aggregate line loading, meaning that rail passengers are most sensitive to an increase in passengers and the effects of crowding.
- **Project peak hour** – The hour with the highest increase in rail passengers as the result of the Project.

9.3.22 Diagram 9.3.4 shows the Network and Project peak hours for the northbound and southbound services on the Brighton Main Line for each assessment year.

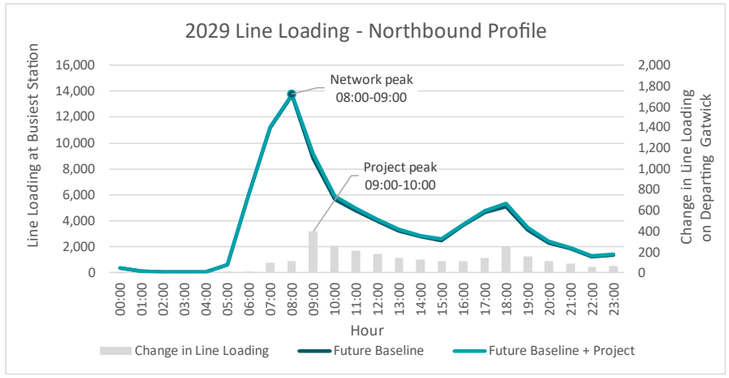
9.3.23 The Network and Project peak hours are the periods when the Project is likely to have the greatest impact on crowding, either because trains are at their busiest or because the additional patronage caused by the Project is at its greatest. No other off-peak period is forecast to have higher line loadings than those reported in this chapter. Nevertheless, the rail modelling has been undertaken for 24 hours, and the information showing the changes due to the Project in each hour and direction (line loading, seated load factor and percentage of standing capacity occupied) are contained in **ES Appendix 12.9.2: Rail Passenger Flows** (Doc Ref. 5.3).

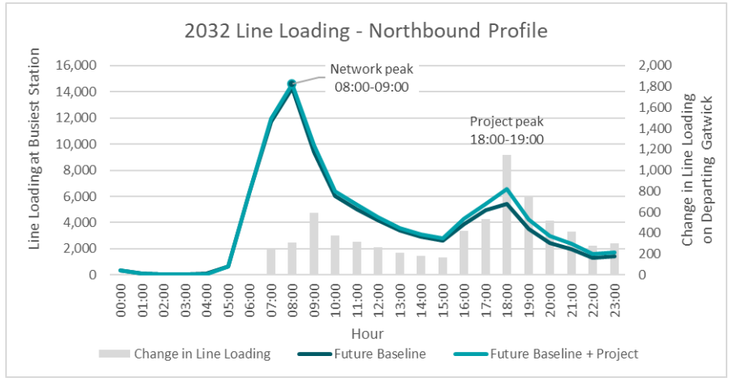
9.3.24 For northbound services, the highest network line loadings are on services departing Purley station. The highest increase in rail passengers as a result of the Project defines the Project peak, based on services departing Gatwick Airport station, and these increases are shown by the grey bars.

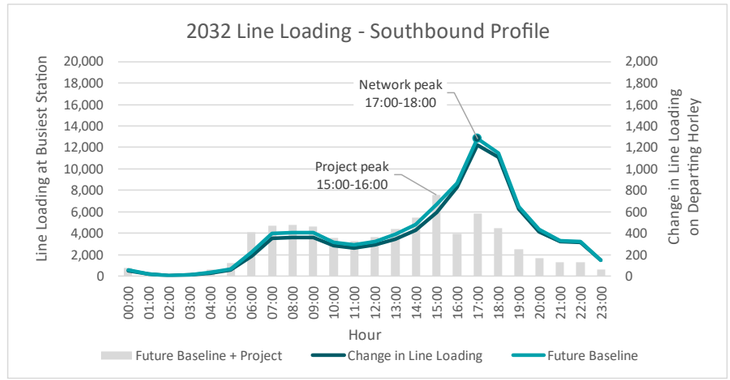
9.3.25 For southbound services, the highest network line loadings are on services departing East Croydon station. The highest increase in rail passengers as a result of the Project defines the Project peak, based on services departing Horley station, and these increases are shown by the grey bars.

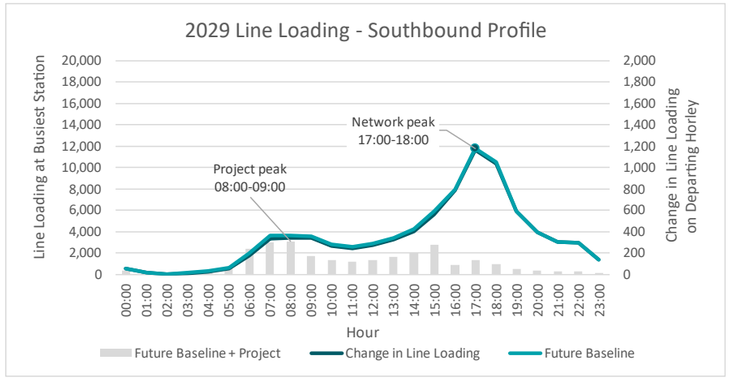
9.3.26 Peak periods have also been considered for the Arun Valley Line and North Downs Line services, which are covered in Section 9.6.

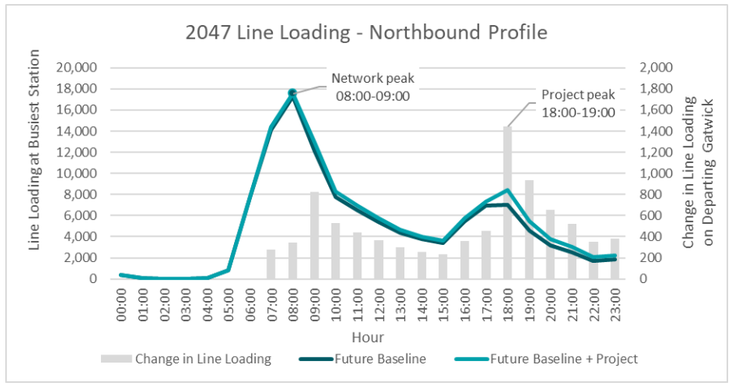
Diagram 9.3.4: Network and Project peak periods for assessment

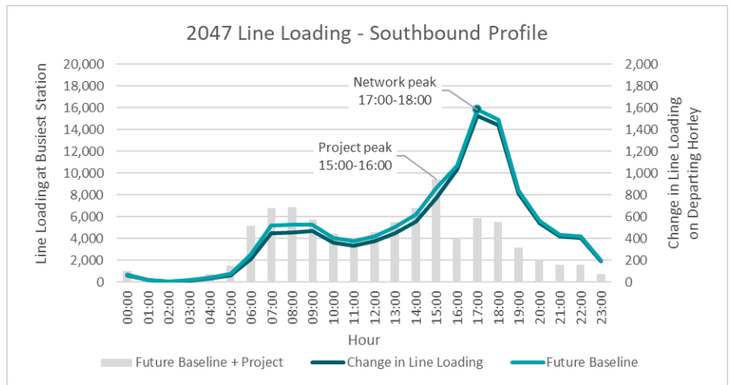












9.4 Future baseline

9.4.1 For each assessment year, the Project is assessed against future baseline conditions in that year, which include any committed changes or improvements to the transport network in accordance with TAG methodology.

Modelled rail improvements

9.4.2 Committed third-party improvements have been included in the model. Modelled rail improvements in the future baseline and with Project scenarios include:

- Elizabeth Line (Crossrail) services
- Thameslink service frequency increase (from 20 tph in the modelled baseline to 24 tph in the future baseline scenarios[7])
- North Downs Line service frequency increase from 2 tph in the modelled baseline to 3 tph in the future baseline scenarios (increase from 1 tph to 2 tph at Gatwick Airport)
- LUL services on the Northern Line Extension to Battersea Power Station/Nine Elms
- LUL/DLR frequency and capacity improvements

9.4.3 These frequency improvements, together with timetable changes which have already occurred since the modelled baseline, increase the total service frequency assumed at Gatwick Airport station from 15 tph in the peak periods in the modelled baseline to 22 tph in the future baseline and with Project scenarios.

9.4.4 The modelling of these committed improvements show that it can lead to an improvement in annual rail mode share to between 42% and 43% for air passengers and between 14% and 15% for employees in future years 2029, 2032 and 2047.

9.4.5 Further information on some of the modelled improvements is provided below.

Elizabeth Line (Crossrail) services

9.4.6 The first service on the Elizabeth Line commenced in May 2022. The line operates between Reading/Heathrow Airport and Shenfield/Abbey Wood, via Farringdon where interchange with Thameslink services can provide access to Gatwick Airport.

Thameslink programme

9.4.7 The Thameslink Programme has delivered additional rail capacity in Sussex and Kent, as well as improved cross London connectivity, particularly through direct rail services to Cambridge and Peterborough, as shown in Diagram 9.4.1.

9.4.8 Most Thameslink services on the Brighton-London main line are operated using 12-car trains, which have provided additional capacity for people accessing the Airport since their introduction in the last few years. In addition, customers to Gatwick Airport have enjoyed an increased frequency of connections with recent timetable changes. The future baseline scenarios for 2029 and beyond include these changes.

North Downs Line and Redhill

9.4.9 The planned work to bring into use a new platform at Redhill (completed in 2018) provides additional capacity to turn trains from the North Downs Line and run through to Gatwick Airport. Great Western Railway (GWR) is planning to operate a second direct train per hour to Gatwick Airport as a result. GAL provided a funding contribution of £200,000 to Great Western to support an additional hourly service to Reading, which will be operational once the Gatwick Airport Station Project is completed and rail demand has recovered to pre-Covid levels. This will enable a connection to East West Rail in the future. GWR introduced a 2tph service between Reading and Redhill in September 2020, in anticipation of extending the additional services to Gatwick Airport in the next phase. As such, service improvements on the North Downs Line have been included in the future baseline.

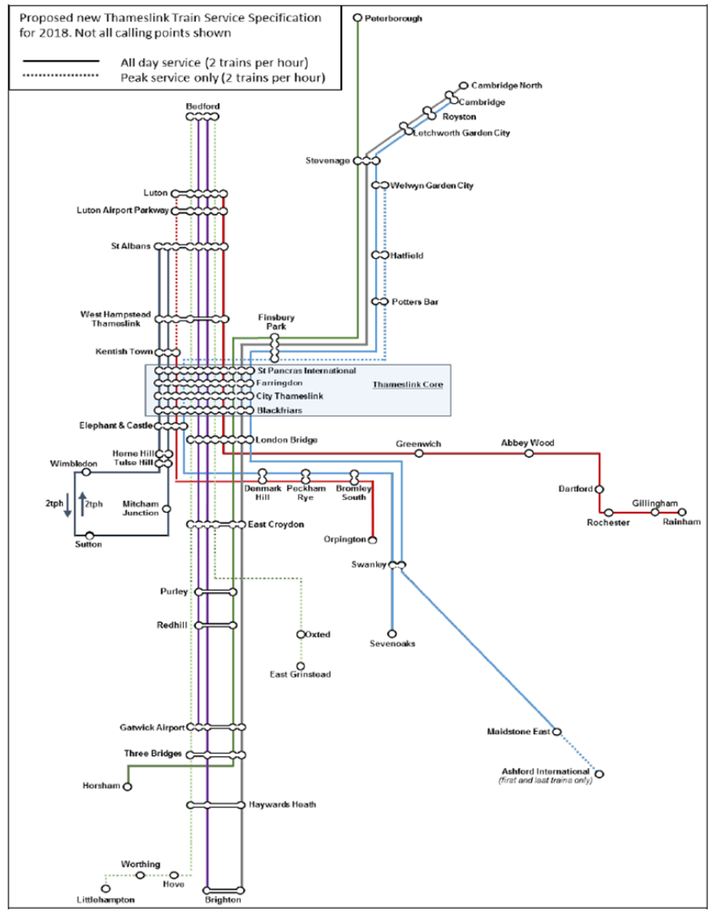
LUL services

9.4.10 The Northern Line Extension between Kennington and Nine Elms and Battersea Power Station opened in September 2021 and has been included in the future baseline.

LUL/DLR frequency and capacity improvements

9.4.11 The future baseline includes LUL/DLR frequency and capacity improvements, which are associated with the rolling stock replacement on the Bakerloo, Central and Piccadilly lines and small frequency increases on most lines including DLR.

Diagram 9.4.1: Thameslink service patterns expected from 2029



Source: GTR 2018 Timetable Consultation, 15 September 2016

[7] Trains per hour (tph)

Other improvements under way

9.4.12 Other rail-related improvements under way are set out below. These are not included in the strategic public transport modelling for the future baseline, because they do not directly influence the demands on the different rail services.

Gatwick Airport station upgrade

9.4.13 Gatwick Airport station currently acts as an interchange, primarily for passengers connecting to air services via the terminals but also for staff, commuters and local residents. The railway station, located adjacent to South Terminal, handled around 20 million airport passengers per annum.

9.4.14 The current station is congested at peak times and accordingly the Department for Transport announced £150 million investment in the Station Project in July 2019, which will include doubling the size of the station concourse, adding five new lifts and eight escalators to improve passenger flow, and widening two platforms to reduce crowding. GAL and the Coast to Capital Local Enterprise Partnership are also co-funding the project. Construction for this project commenced in 2019 and is due to be completed in 2023.

9.4.15 These enhancements will make travelling to Gatwick by rail more attractive into the future and should help grow the Airport's strong rail mode share. The performance of the station is assessed in Chapter 10.

Digital railway programme

9.4.16 Network Rail's Digital Railway programme is delivering technological improvements to traffic management on the Brighton-London main line. A new Traffic Management System installed as part of the Thameslink Programme is able to:

- take full control of train regulation through the core cross London route via Blackfriars, Farringdon and St Pancras International (as described below);
- assist train regulation on the most intensively used parts of the Brighton-London main line, where the system can highlight issues of late train running and advise the signaller of a solution (which they can accept or reject); and
- assist regulation on other parts of the network, again suggesting solutions to the signaller but not being fully integrated with their control panel.

9.4.17 The system automates some traffic regulation and provides improved real-time information to signallers so they have time to have more oversight and take strategic decisions across the network. It is understood that train drivers can also receive real-time advice to drive to a modified train service plan.

9.4.18 The cross London Thameslink route via Farringdon has been fitted with an automatic train operation system whereby Traffic Management algorithms automatically update the signalling to regulate the service optimally. These Digital Railway improvements enable the maintenance and improvement of punctuality under the more intensive train service delivered by the Thameslink Programme.

Future planned improvements

9.4.19 There are improvements which are at various stages of planning but are not considered sufficiently advanced to be considered as committed at this stage. These have not been included in the future baseline or with Project modelling but are summarised below to indicate the potential for further increases in capacity. GAL will continue to work closely with Network Rail to support improvements.

Brighton-London Main Line upgrade (Croydon/Windmill Bridge)

9.4.20 The Brighton-London main line is one of the busiest commuter lines in the country with peak crowding on a range of services. The planned investments in capacity described above are intended to address the current gap and provide for growth. Network Rail is further developing a programme of measures to enhance the Brighton-London main line for implementation in Control Period 6 (CP6) and CP7[8]. These include the Croydon Area Remodelling Scheme (CARS), as shown in Diagram 9.4.2 and Diagram 9.4.3.

9.4.21 There is currently no complete funding commitment to deliver CARS at this stage and therefore it has not been included in the strategic modelling. CARS would be the most significant scheme to transform Brighton-London main line capacity and the largest part of Network Rail's long-term route upgrade proposals. It would remove the most operationally challenging bottleneck at East Croydon station and the layout of the important Windmill Bridge Junction where the routes to London Bridge and London Victoria stations diverge.

9.4.22 Network Rail's analysis shows that removing this constraint could deliver four additional trains per hour in the peak direction via Gatwick Airport as well as improving punctuality.

9.4.23 This additional capacity could remove the need to split and join trains from the South Coast, reducing journey times, and enable more trains to operate to Reigate; both are current connectivity gaps for the Airport. If this was supported by changes to the railway track layout at Gatwick Airport station, this could enable more trains to call at the Airport also. The programme of work for the Gatwick Station Project has included some of these improvements to reduce future cost and disruption in relation to the Brighton Main Line upgrade.

9.4.24 CARS comprises major works at Norwood Junction, Selhurst triangle, two additional platforms at East Croydon station and between these locations and would include new grade-separation of track (fly-overs and dive-unders), more tracks and better signalling, resulting in improved reliability and enhanced capacity.

9.4.25 Network Rail is continuing design work and has carried out two consultations, the latest on its proposals in summer 2020, in line the Transport and Works Act process. The South East Route Control Period 6 Delivery Plan (Network Rail, 2019) identifies that the scheme will *"remove known bottlenecks in the Croydon area in CP7 and increase capacity on the main line routes between London and Brighton".*

[8] Control Periods are 5 year periods used by Network Rail to specify planning and investment in railway infrastructure. Control Period 6 from 2019 to 2024, Control Period 7 from 2024 to 2029 and so on.

Diagram 9.4.2: Brighton Mainline upgrade proposals

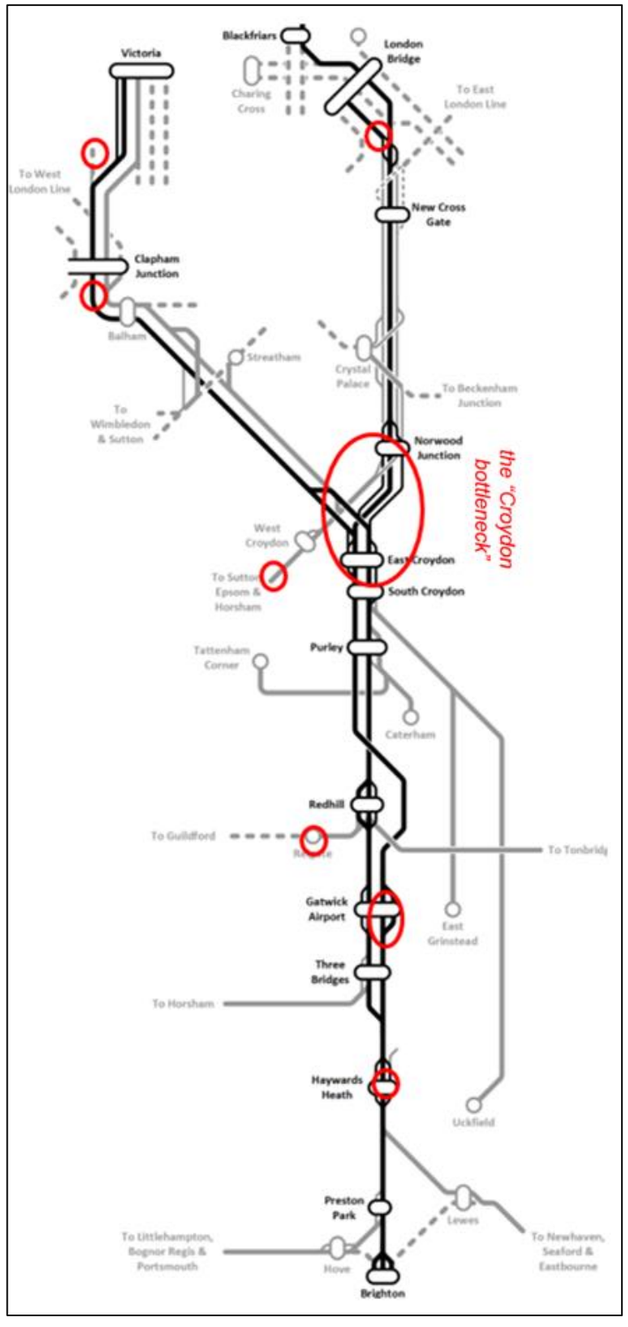
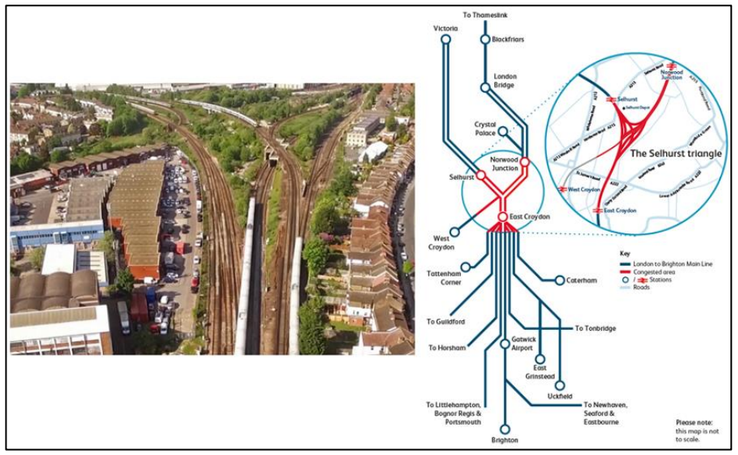


Diagram 9.4.3: Location of Croydon Area Remodelling Scheme (CARS)



Future network connectivity

9.4.26 In terms of wider connectivity, it is possible to travel directly between the Airport and the City of London via the Thameslink route with interchange for services to and from Docklands at London Bridge station and at Farringdon. These services also directly connect the Airport to Croydon. The connection to the East Coast Main Line provides direct services between the Airport and Hertfordshire, Cambridge, and Peterborough. Cross-platform connections onto trains to Yorkshire, the North East, and Scotland on the LNER are possible at both Stevenage and Peterborough.

9.4.27 Possible future improvements to the connection from Gatwick Airport to Reading (particularly the provision of more and faster direct trains) via Redhill, Reigate and Guildford would be important for unlocking additional potential in this corridor. The North Downs Line upgrade would also enable Gatwick Airport to link, with one or two interchanges, to Oxford, the Midlands and, potentially in the future, the East West Rail connection to Milton Keynes and Bedford.

9.4.28 Should Crossrail 2 come forward, additional connectivity benefits may be possible between Surrey and Hertfordshire through central London, in particular through Clapham Junction which provides connectivity to Gatwick Airport. In addition, there is an opportunity for Gatwick Airport to be connected to HS2 Phase 1 services at Old Oak Common from the West London Line via interchange at Clapham Junction. However, given the uncertainty on the timescales and delivery of these schemes, they have not been included in the modelling. This approach represents a robust assessment of the current committed future network.

Earlier train services

9.4.29 Earlier morning trains on all routes to Gatwick Airport station would help match services to staff shift patterns at Gatwick. This intervention has been discussed with Network Rail though no specific service has been confirmed at this time and so this is not included in the modelling.

9.4.30 This intervention does not require additional capital expenditure but would require additional operational expenditure for scheduling of traincrew. Subject to a detailed diagramming exercise, existing units could start operation earlier, with little or no impact on other activities such as overnight maintenance and freight movements.

9.4.31 These earlier services would provide better connectivity both for employees on early shifts as well as air passengers catching the first departing flights of the day. If service changes were accompanied by track signalling upgrades, this could allow services to continue to run in parallel with overnight maintenance, which might otherwise restrict the ability to operate earlier services.

9.5 Project demand

9.5.1 This section provides an overview of the additional number of rail passengers generated as the result of the Project. This is based on the number of passengers accessing Gatwick Airport station.

9.5.2 The **ES Appendix 5.4.1: Surface Access Commitments** (Doc Ref. 5.3) includes a range of commitments to surface access interventions in order to achieve the mode share commitments which GAL is making. These are set within the general context of increasing the use of sustainable transport modes, including rail services, by passengers and staff.

9.5.3 The number of trips made by different modes is discussed in Section 8.6. The assessment estimates that there would be around 84,000 rail passengers per day associated with the Airport on a June weekday in 2047. The effect of the Project and the SACs would be to increase this by around 23,500 passengers in 2047. This represents a substantial additional level of rail patronage, although it would be spread across a 24-hour period. The remainder of this chapter discusses the implications of this increase in relation to rail service crowding.

9.5.4 Table 9.5.1 shows the net increase in the number of entry and exit rail passengers in the AM and PM peak hours, from future baseline to with Project scenarios. Further information on these number are provided in Table 10.5.2 as part of the station modelling work.

9.5.5 By 2047, which has the highest increases in rail passengers as a result of the Project, there would be over 1,900 more passengers (entry and exit) in the AM peak hour and over 1,400 more passengers (entry and exit) in the PM peak hour.

Table 9.5.1: Rail passenger demand (entry and exit numbers at Gatwick Airport station)

	Project demand (net increase in rail passengers)		
	2029	2032	2047
	AM peak net (08:00-09:00)		
Entry	210	649	808
Exit	506	782	1,120
Total	**716**	**1,431**	**1,928**
	PM peak net (17:00-18:00)		
Entry	235	691	591
Exit	182	719	821
Total	**417**	**1,410**	**1,412**

9.6 Assessment for network peak

9.6.1 The plots in Diagram 9.6.1 show a comparison between flows in the 2047 AM and PM peak periods (07:00-09:00 and 16:00-18:00) in the future baseline and with the Project, with the change in bandwidth indicating the growth with Project. These plots show that the largest potential change in demand will be on the Brighton Main Line, in particular north of Gatwick, and then on into London Victoria and London Bridge, which is intuitive and confirmed by the catchment analysis of CAA data for passengers and staff travel survey data for employees.

Arun Valley line

9.6.2 Line loading and crowding analysis undertaken for the Arun Valley Line (between Billingshurst and Gatwick Airport) shows that the impact of the Project on this line is expected to be very small. Table 9.6.1 provides a summary of the 2047 peak Seated Load Factors for services on the Arun Valley Line. The other (earlier) modelled years have lower Seated Load Factors. Full details of loadings are provided in the **Transport Assessment Annex B – Strategic Transport Modelling Report** (Doc Ref. 7.4), with rail data in its Appendix G.

Table 9.6.1: Peak Seated Load Factors for Arun Valley Line, with Project 2047

Service	Peak Seated Load Factor, with Project (Future baseline in brackets)	Hour
Arun Valley NB Fast	1.00 (1.00)	08:00-09:00
Arun Valley SB Fast	0.82 (0.79)	18:00-19:00
Arun Valley NB Stopping	0.65 (0.64)	08:00-09:00
Arun Valley SB Stopping	0.77 (0.75)	18:00-19:00

9.6.3 The table shows that the Seated Load Factors are slightly higher with Project. However, the highest Seated Load Factor of 1.00 is unchanged from the future baseline. In summary, there is sufficient capacity in all years on the Arun Valley Line services with the Project.

North Downs line

9.6.4 Line loading and crowding analysis undertaken for the North Downs Line (between Guildford and Gatwick Airport) shows that the impact of the Project on this line is very small. Table 9.6.2 provides a summary of the 2047 peak Seated Load Factors for North Downs Line services. The other (earlier) modelled years have lower Seated Load Factors. Full details of loadings are provided in the **Transport Assessment Annex B – Strategic Transport Modelling Report** (Doc Ref. 7.4), with rail data in its Appendix G.

Table 9.6.2: Peak Seated Load Factors for North Downs Line, with Project 2047

Service	Peak Seated Load Factor, with Project (Future baseline in brackets)	Hour
North Downs Line EB	1.10 (1.10)	07:00-08:00
North Downs Line WB	0.94 (0.87)	18:00-19:00

9.6.5 The table shows that the Seated Load Factors are slightly higher with Project. However, the highest Seated Load Factor of 1.10 is unchanged from the future baseline. In summary:

- There is sufficient seated capacity in all years on the North Downs Line in the with Project scenario, except where the

Seated Load Factor rises to just above 1.0 (07:00-08:00) between Reigate and Redhill.

- This also occurs in the future baseline, and is not worsened in the with Project scenario. It indicates low density standing associated with the short journey between Redhill and Reigate made by Reigate commuters who interchange to and from mainline services at Redhill. The Seated Load Factor exceeds 1.0 only on this section and only for one hour.
- There is therefore spare standing capacity available on these services at this time and the Project does not worsen conditions.

Brighton Main Line (BML)

9.6.6 The remainder of this section focuses on the Brighton Main Line, covering the fast services and stopping services to and from London Bridge and London Victoria.

9.6.7 The additional demand on Brighton Main Line services south of Gatwick Airport is considerably smaller than that to the north and these services are not considered further in the assessment.

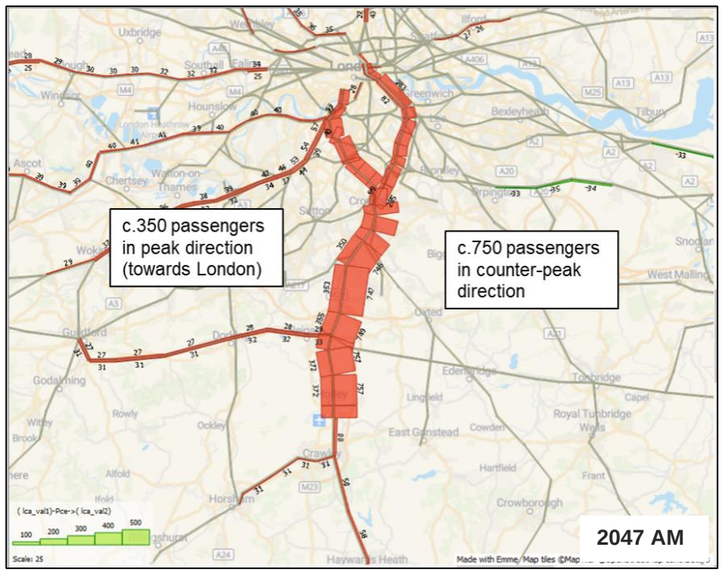
Line loading assessment (Network peak)

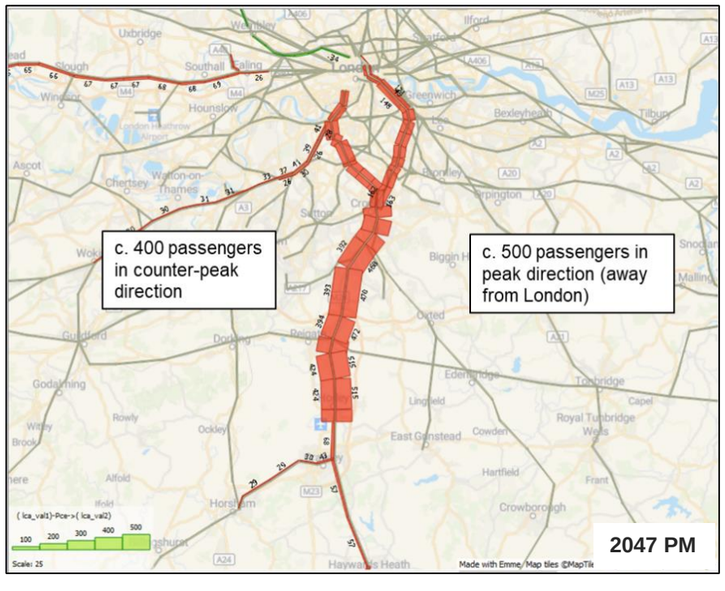
9.6.8 Line loading information from the modelling work has been taken to inform the Seated Load Factor and standing capacity assessments. Line loading is the number of passengers on trains on departure of each station.

9.6.9 The Network peak periods are 08:00-09:00 for northbound services and 17:00-18:00 for southbound services. The line loadings are assessed between central London and Gatwick Airport, ie northbound services from Gatwick Airport and southbound services to Gatwick Airport, as the line north of Gatwick Airport is more heavily loaded than the section between Gatwick Airport and Brighton.

9.6.10 Table 9.6.3 and Table 9.6.4 show the line loading for the northbound and southbound services, respectively, for the Network peak. The tables provide the future baseline line loadings, and the with Project line loadings. The net increase in line loading is provided, which illustrates the number of additional passengers as the result of the Project, compared against the future baseline.

Diagram 9.6.1: 2047 net flow change between future baseline and with Project





2029 Network peak

9.6.11 In the northbound direction, the Project adds up to 110 passengers onto the future baseline line loadings between 08:00 and 09:00, which represents an increase of around 1%.

9.6.12 In the southbound direction, the Project adds up to 129 passengers onto the future baseline line loadings between 17:00 and 18:00. This represents an increase of around 1.5%.

2032 Network peak

9.6.13 In the northbound direction, the Project adds up to 295 passengers onto the future baseline line loadings between 08:00 and 09:00, which represents an increase of around 2.5%.

9.6.14 In the southbound direction, the Project adds 558 passengers. onto the future baseline line loadings between 17:00 and 18:00. This represents an increase of around 5.5%.

2047 Network peak

9.6.15 in the northbound direction, the Project adds around 331 passengers onto the future baseline line loadings between 08:00 and 09:00, which represents a maximum overall increase of around 2.5%.

9.6.16 In the southbound direction, the Project adds up to 570 passengers onto the future baseline line loadings between 17:00 and 18:00. This represents an increase of around 4.5%.

Table 9.6.3: Line loading – Network peak northbound

Scenario	Service	Line loading (number of passengers on departure) - network peak northbound													
		Three Bridges	Gatwick Airport	Horley	Salfords	Earlswood	Redhill	Merstham	Coulsdon South	Purley	South Croydon	East Croydon (VIC Branch)	Clapham Junction (VIC Branch)	East Croydon (LBG Branch)	Norwood Junction (LBG Branch)
Future baseline 2029	Fast (LBG)	4,149	4,642	-	-	-	-	-	-	-	-			7,490	-
	Fast (VIC)	3,670	5,032	5,072	-	-	-	-	-	-	-	5,985	5,488		
	Stopping	640	333	369	395	822	1,622	1,886	2,844	3,929	3,904	1,505	1,336	3,366	3,675
	Total	**8,459**	**10,007**	**10,083**	**10,109**	**10,536**	**11,336**	**11,600**	**12,559**	**13,643**	**13,619**	**7,490**	**6,824**	**10,857**	**11,166**
With Project 2029	Fast (LBG)	4,178	4,693	-	-	-	-	-	-	-	-			7,522	-
	Fast (VIC)	3,695	5,081	5,121	-	-	-	-	-	-	-	6,025	5,509		
	Stopping	650	340	376	402	829	1,630	1,894	2,853	3,938	3,914	1,508	1,337	3,374	3,683
	Total	**8,523**	**10,114**	**10,190**	**10,216**	**10,643**	**11,444**	**11,708**	**12,667**	**13,753**	**13,728**	**7,533**	**6,846**	**10,896**	**11,204**
Change (%) 2029	Fast (LBG)	29 (0.7%)	51 (1.1%)	-	-	-	-	-	-	-	-			32 (0.4%)	-
	Fast (VIC)	25 (0.7%)	49 (1.0%)	49 (1.0%)	-	-	-	-	-	-	-	40 (0.7%)	21 (0.4%)		
	Stopping	10 (1.5%)	7 (2.1%)	7 (1.9%)	7 (1.8%)	7 (0.9%)	8 (0.5%)	8 (0.4%)	9 (0.3%)	10 (0.2%)	10 (0.2%)	3 (0.2%)	1 (0.1%)	8 (0.2%)	7 (0.2%)
	Total	**64 (0.8%)**	**107 (1.1%)**	**107 (1.1%)**	**107 (1.1%)**	**107 (1.0%)**	**108 (1.0%)**	**108 (0.9%)**	**109 (0.9%)**	**110 (0.8%)**	**110 (0.8%)**	**43 (0.6%)**	**22 (0.3%)**	**39 (0.4%)**	**39 (0.3%)**
Future baseline 2032	Fast (LBG)	4,377	4,929	-	-	-	-	-	-	-	-			7,748	-
	Fast (VIC)	3,816	5,250	5,292	-	-	-	-	-	-	-	6,192	5,641		
	Stopping	682	367	405	432	867	1,701	1,972	2,958	4,089	4,056	1,545	1,362	3,471	3,781
	Total	**8,875**	**10,546**	**10,626**	**10,653**	**11,088**	**11,922**	**12,193**	**13,179**	**14,310**	**14,277**	**7,737**	**7,003**	**11,219**	**11,529**
With Project 2032	Fast (LBG)	4,426	5,073	-	-	-	-	-	-	-	-			7,817	-
	Fast (VIC)	3,822	5,382	5,422	-	-	-	-	-	-	-	6,285	5,699		
	Stopping	678	384	424	451	886	1,722	1,992	2,977	4,106	4,073	1,552	1,366	3,483	3,793
	Total	**8,926**	**10,838**	**10,919**	**10,946**	**11,381**	**12,217**	**12,487**	**13,472**	**14,601**	**14,568**	**7,838**	**7,065**	**11,301**	**11,610**
Change (%) 2032	Fast (LBG)	48 (1.1%)	144 (2.9%)	-	-	-	-	-	-	-	-			70 (0.9%)	-
	Fast (VIC)	6 (0.2%)	131 (2.5%)	131 (2.5%)	-	-	-	-	-	-	-	94 (1.5%)	58 (1.0%)		
	Stopping	-4 (-0.6%)	17 (4.7%)	19 (4.6%)	19 (4.3%)	19 (2.2%)	21 (1.2%)	20 (1.0%)	19 (0.6%)	17 (0.4%)	17 (0.4%)	7 (0.5%)	4 (0.3%)	12 (0.4%)	12 (0.3%)
	Total	**51 (0.6%)**	**293 (2.8%)**	**293 (2.8%)**	**293 (2.8%)**	**293 (2.6%)**	**295 (2.5%)**	**295 (2.4%)**	**293 (2.2%)**	**291 (2.0%)**	**291 (2.0%)**	**101 (1.3%)**	**62 (0.9%)**	**82 (0.7%)**	**82 (0.7%)**
Future baseline 2047	Fast (LBG)	5,589	6,260	-	-	-	-	-	-	-	-			9,040	-
	Fast (VIC)	4,695	6,231	6,276	-	-	-	-	-	-	-	7,064	6,352		
	Stopping	1,031	623	676	708	1,178	2,104	2,413	3,479	4,721	4,681	1,724	1,480	4,052	4,388
	Total	**11,315**	**13,114**	**13,212**	**13,244**	**13,714**	**14,640**	**14,949**	**16,015**	**17,257**	**17,217**	**8,788**	**7,832**	**13,092**	**13,428**
With Project 2047	Fast (LBG)	5,615	6,400	-	-	-	-	-	-	-	-			9,103	-
	Fast (VIC)	4,671	6,360	6,404	-	-	-	-	-	-	-	7,169	6,409		
	Stopping	1,044	678	731	763	1,241	2,164	2,471	3,534	4,771	4,729	1,732	1,480	4,077	4,409
	Total	**11,330**	**13,438**	**13,535**	**13,567**	**14,045**	**14,968**	**15,275**	**16,338**	**17,574**	**17,532**	**8,901**	**7,889**	**13,180**	**13,513**
Change (%) 2047	Fast (LBG)	26 (0.5%)	140 (2.2%)	-	-	-	-	-	-	-	-			63 (0.7%)	-
	Fast (VIC)	-24 (-0.5%)	129 (2.1%)	128 (2.0%)	-	-	-	-	-	-	-	105 (1.5%)	57 (0.9%)		
	Stopping	13 (1.2%)	54 (8.7%)	55 (8.1%)	55 (7.7%)	63 (5.3%)	59 (2.8%)	57 (2.4%)	54 (1.6%)	49 (1.0%)	47 (1.0%)	8 (0.5%)	0 (0.0%)	25 (0.6%)	22 (0.5%)
	Total	**15 (0.1%)**	**323 (2.5%)**	**323 (2.4%)**	**323 (2.4%)**	**331 (2.4%)**	**327 (2.2%)**	**325 (2.2%)**	**322 (2.0%)**	**317 (1.8%)**	**315 (1.8%)**	**113 (1.3%)**	**57 (0.7%)**	**88 (0.7%)**	**85 (0.6%)**

Table 9.6.4: Line loading – Network peak southbound

Scenario	Services	Line loading (number of passengers on departure) - southbound network peak													
		London Victoria (VIC Branch)	Clapham Junction (VIC Branch)	London Bridge (LBG Branch)	Norwood Junction (LBG Branch)	East Croydon	South Croydon	Purley	Coulsdon South	Merstham	Redhill	Earlswood	Salfords	Horley	Gatwick Airport
Future Baseline 2029	Fast (LBG)			6,379	6,676	3,934	-	-	-	-	-	-	-	-	3,290
	Fast (VIC)	5,769	6,656			5,086	-	-	-	-	-	-	-	5,091	5,853
	Stopping			3,456	3,307	2,609	-	1,902	1,367	1,239	752	582	551	554	417
	Total	**5,769**	**6,656**	**9,834**	**9,983**	**11,630**	**-**	**10,922**	**10,388**	**10,259**	**9,772**	**9,602**	**9,572**	**9,579**	**9,560**
With Project 2029	Fast (LBG)			6,400	6,700	3,977	-	-	-	-	-	-	-	-	3,307
	Fast (VIC)	5,810	6,710			5,166	-	-	-	-	-	-	-	5,171	5,889
	Stopping			3,464	3,316	2,613	-	1,905	1,370	1,242	759	589	558	561	423
	Total	**5,810**	**6,710**	**9,865**	**10,016**	**11,756**	**-**	**11,048**	**10,513**	**10,384**	**9,902**	**9,731**	**9,701**	**9,709**	**9,619**
Change (%) 2029	Fast (LBG)			22(0.3%)	24(0.4%)	43(1.1%)	-	-	-	-	-	-	-	-	17(0.5%)
	Fast (VIC)	41(0.7%)	53(0.8%)			80(1.6%)	-	-	-	-	-	-	-	80(1.6%)	35(0.6%)
	Stopping			9(0.3%)	9(0.3%)	4(0.1%)	-	4(0.2%)	3(0.2%)	3(0.3%)	7(1.0%)	7(1.2%)	7(1.3%)	7(1.3%)	6(1.5%)
	Total	**41(0.7%)**	**53(0.8%)**	**31(0.3%)**	**33(0.3%)**	**126(1.1%)**	**-**	**126(1.2%)**	**125(1.2%)**	**125(1.2%)**	**129(1.3%)**	**129(1.3%)**	**129(1.4%)**	**129(1.4%)**	**59(0.6%)**
Future Baseline 2032	Fast (LBG)			6,559	6,883	4,149	-	-	-	-	-	-	-	-	3,474
	Fast (VIC)	6,008	6,947			5,392	-	-	-	-	-	-	-	5,396	6,219
	Stopping			3,552	3,393	2,712	-	1,989	1,436	1,303	808	635	603	606	451
	Total	**6,008**	**6,947**	**10,110**	**10,276**	**12,253**	**-**	**11,529**	**10,977**	**10,844**	**10,349**	**10,176**	**10,144**	**10,152**	**10,143**
With Project 2032	Fast (LBG)			6,657	6,991	4,348	-	-	-	-	-	-	-	-	3,516
	Fast (VIC)	6,207	7,192			5,731	-	-	-	-	-	-	-	5,735	6,279
	Stopping			3,586	3,426	2,717	-	1,995	1,443	1,310	829	654	623	626	457
	Total	**6,207**	**7,192**	**10,243**	**10,418**	**12,796**	**-**	**12,074**	**11,522**	**11,389**	**10,908**	**10,733**	**10,702**	**10,709**	**10,253**
Change (%) 2032	Fast (LBG)			98(1.5%)	108(1.6%)	199(4.8%)	-	-	-	-	-	-	-	-	42(1.2%)
	Fast (VIC)	199(3.3%)	245(3.5%)			339(6.3%)	-	-	-	-	-	-	-	339(6.3%)	61(1.0%)
	Stopping			34(1.0%)	34(1.0%)	5(0.2%)	-	7(0.3%)	7(0.5%)	8(0.6%)	20(2.5%)	19(3.0%)	19(3.2%)	19(3.2%)	7(1.5%)
	Total	**199(3.3%)**	**245(3.5%)**	**133(1.3%)**	**141(1.4%)**	**543(4.4%)**	**-**	**545(4.7%)**	**545(5.0%)**	**546(5.0%)**	**558(5.4%)**	**557(5.5%)**	**558(5.5%)**	**557(5.5%)**	**110(1.1%)**
Future Baseline 2047	Fast (LBG)			7,398	7,945	5,448	-	-	-	-	-	-	-	-	4,619
	Fast (VIC)	7,023	8,153			6,739	-	-	-	-	-	-	-	6,743	8,411
	Stopping			3,970	3,747	3,078	-	2,353	1,756	1,602	1,169	981	944	928	664
	Total	**7,023**	**8,153**	**11,368**	**11,693**	**15,265**	**-**	**14,540**	**13,943**	**13,789**	**13,356**	**13,168**	**13,131**	**13,119**	**13,694**
With Project 2047	Fast (LBG)			7,492	8,062	5,675	-	-	-	-	-	-	-	-	4,661
	Fast (VIC)	7,155	8,332			7,022	-	-	-	-	-	-	-	7,026	8,419
	Stopping			4,003	3,782	3,104	-	2,381	1,786	1,634	1,230	1,041	1,004	981	671
	Total	**7,155**	**8,332**	**11,495**	**11,844**	**15,801**	**-**	**15,078**	**14,483**	**14,330**	**13,926**	**13,738**	**13,701**	**13,682**	**13,750**
Change (%) 2047	Fast (LBG)			95(1.3%)	117(1.5%)	227(4.2%)	-	-	-	-	-	-	-	-	42(0.9%)
	Fast (VIC)	132(1.9%)	179(2.2%)			283(4.2%)	-	-	-	-	-	-	-	283(4.2%)	8(0.1%)
	Stopping			33(0.8%)	35(0.9%)	26(0.8%)	-	28(1.2%)	30(1.7%)	32(2.0%)	60(5.2%)	60(6.1%)	60(6.4%)	53(5.7%)	7(1.0%)
	Total	**132(1.9%)**	**179(2.2%)**	**127(1.1%)**	**151(1.3%)**	**535(3.5%)**	**-**	**538(3.7%)**	**540(3.9%)**	**541(3.9%)**	**570(4.3%)**	**569(4.3%)**	**570(4.3%)**	**563(4.3%)**	**56(0.4%)**

Seated Load Factor assessment (Network peak)

9.6.17 A Seated Load Factor assessment has been undertaken for fast and stopping services operating in the northbound and southbound direction.

9.6.18 This assessment is calculated based on line loading and the number of seats available on trains. Detailed information is provided in the **Transport Assessment Annex B – Strategic Transport Modelling Report** (Doc Ref. 7.4), with rail data in its Appendix G.

9.6.19 For the Network peak hours, Diagram 9.6.2 to Diagram 9.6.4 show the Seated Load Factors for 2029, 2032 and 2047 respectively. The red line indicates when the Seated Load Factor is 1.0, ie all seats are occupied.

9.6.20 The increases in the Seated Load Factor are generally very small between the future baseline and with Project scenarios. On some services, the Seated Load Factors already exceed 1.0 in the future baseline. The key points are summarised below.

2029 Network peak

9.6.21 In both directions, there are seats available south of East Croydon for fast and stopping services.

9.6.22 In the northbound direction between 08:00 and 09:00, the number of passengers exceeds the number of seats on services departing East Croydon (both London Bridge and London Victoria branches) and Norwood Junction, with Seated Load Factors of just under 1.4 on fast services and 1.4 on stopping services. This occurs for both future baseline and with Project scenarios and the change in Seated Load Factor as a result of the Project is small.

9.6.23 In the southbound direction between 17:00 and 18:00, the number of passengers exceeds the number of seats on services departing Clapham Junction (London Victoria branch) and London Bridge and Norwood Junction (both on London Bridge branch), with Seated Load Factors of 1.3 on fast services departing these locations and 1.4 on stopping services. This occurs for both future baseline and with Project scenarios. Although the Project would increase the total number of rail passengers as a result of increased air passenger numbers and the SACs related to surface access interventions, the contribution of the Project to the Seated Load Factors which exceed 1.0 is less than 0.01, which is very small. Nevertheless, because the Seated Load Factor exceeds 1.0, an assessment of occupied standing capacity has been made and is described in paragraphs 9.6.37 to 9.6.49. South of East Croydon, there are seats available in all scenarios.

9.6.24 The sections of the route where standing occurs are within the 20-minute threshold that DfT recommends as an acceptable length of time to stand, as long as the standing capacity is not exceeded.

9.6.25 Table 9.6.5 and Table 9.6.6 give the wider context to the Seated Load Factors expected in 2029.

2032 Network peak

9.6.26 For the 2032 Network peak, similar Seated L Factor patterns to 2029 are expected for both the future baseline and with Project scenarios.

9.6.27 Between 08:00 and 09:00, northbound services north of East Croydon show Seated Load Factors of just over 1.4 on fast services and 1.4 on stopping services.

9.6.28 Southbound services departing London Bridge and London Victoria between 17:00 and 18:00 show Seated Load Factors of between 1.25 and 1.35 on fast services, with seats available south of East Croydon, and 1.6 on stopping services, with seats available south of Purley. These factors occur in the future baseline and the change resulting from the Project is small.

9.6.29 The seated load capacities increase nearer to 1.0 slightly sooner on the northbound journey in the morning (after Clapham Junction en-route to London Victoria on fast services, and after Purley on stopping services) and slightly later on the southbound journey in the evening (from London Victoria on fast services, and until leaving Purley on stopping services).

9.6.30 Although the Project would increase rail passenger demand substantially across the day, the changes in Seated Load Factor produced by the Project remain small when compared to the future baseline, and do not significantly alter the Seated Load Factors forecast in the future baseline. An assessment has been made of occupied standing capacity, described in paragraphs 9.6.37 to 9.6.49.

9.6.31 Table 9.6.7 and Table 9.6.8 give the wider context to the Seated Load Factors expected in 2032.

2047 Network peak

9.6.32 Background growth in rail demand between 2032 and 2047 leads to additional train loading in the future baseline.

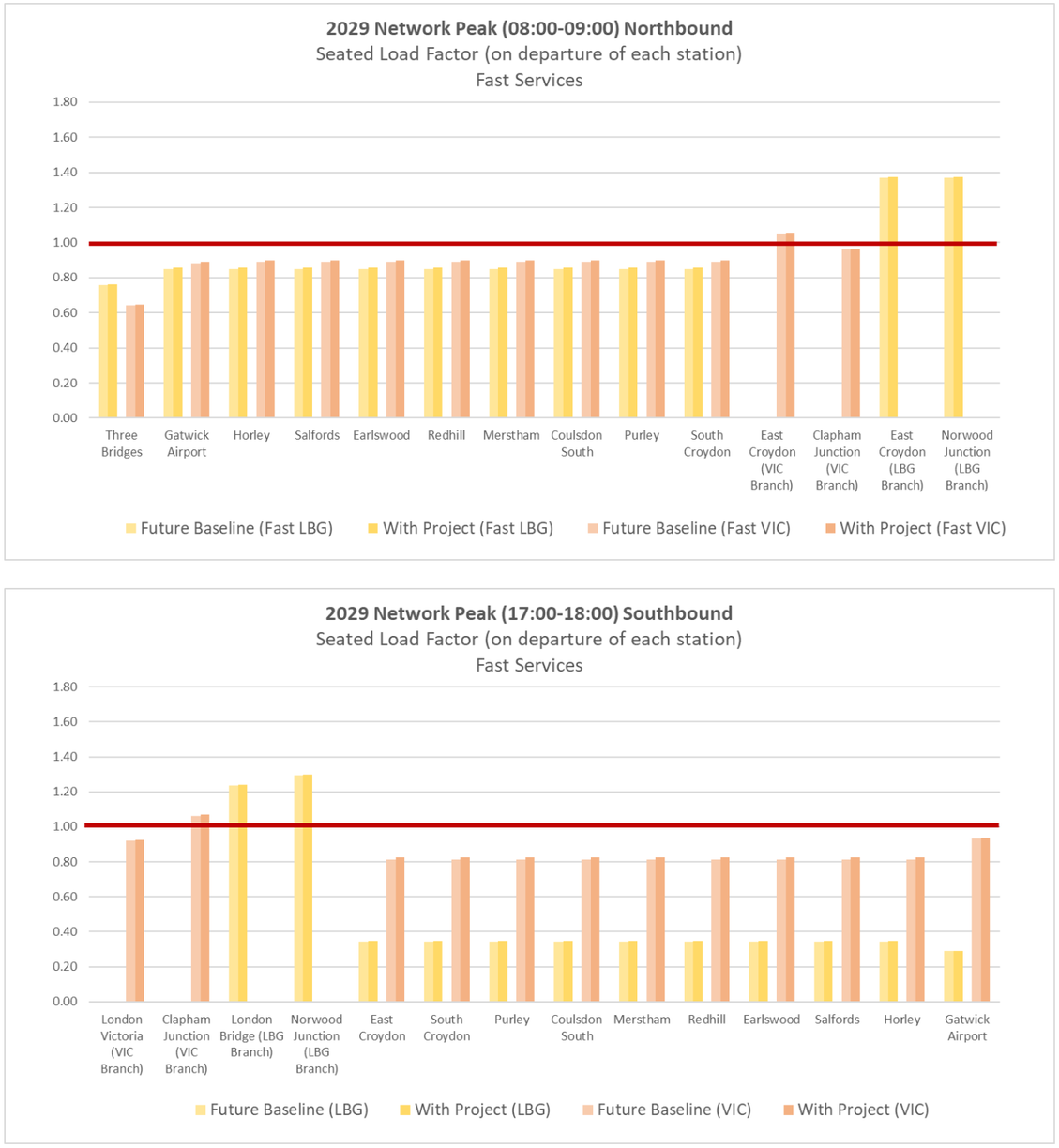
9.6.33 In the northbound direction between 08:00 and 09:00, the Seated Load Factor exceeds 1.0 along the entire route north of Gatwick Airport for fast services into both London Victoria and London Bridge. The Seated Load Factor is under 1.2 between Three Bridges and East Croydon, increasing to just over 1.2 on services to London Victoria and around 1.6 on services to London Bridge. On stopping services, the Seated Load Factor exceeds 1.0 on services north of Purley.

9.6.34 In the southbound direction between 17:00 and 18:00, the Seated Load Factor exceeds 1.0 along the whole of the route between London Victoria and Gatwick Airport on fast services, and on departure from London Bridge and Norwood Junction on the London Bridge fast services. On stopping services, all seats are occupied on departure from London Bridge and Norwood Junction, with the highest Seated Load Factor being around 1.6, whilst seats become available on these services on departure from Purley.

9.6.35 Despite the increases in rail patronage expected as a consequence of the Project, the changes to Seated Load Factors caused by the Project are also relatively small in 2047, being no more than an increase of 0.04. An assessment of occupied standing capacity has also been made and is described in paragraphs 9.6.37 to 9.6.49.

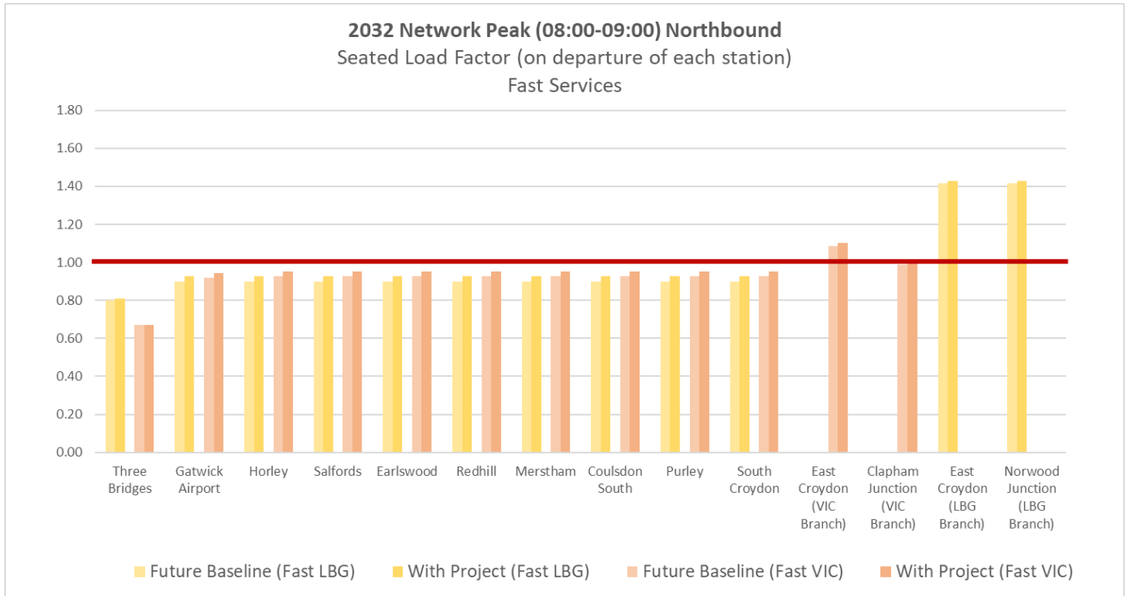
9.6.36 Table 9.6.9and Table 9.6.10 give the wider context to the Seated Load Factors expected in 2047.

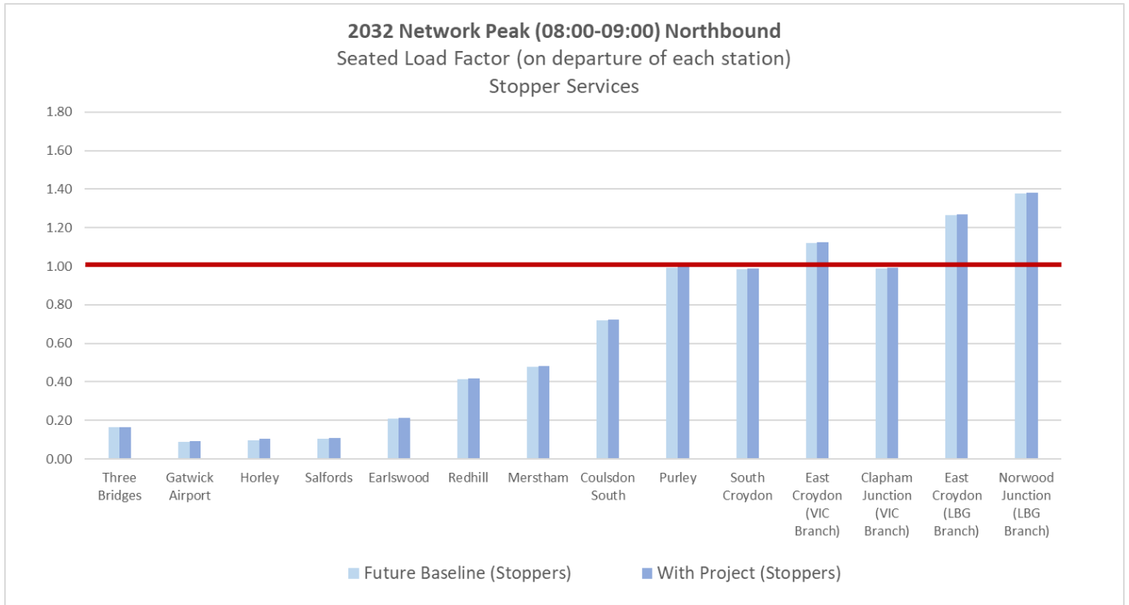
Diagram 9.6.2: 2029 Seated Load Factor – Network peak

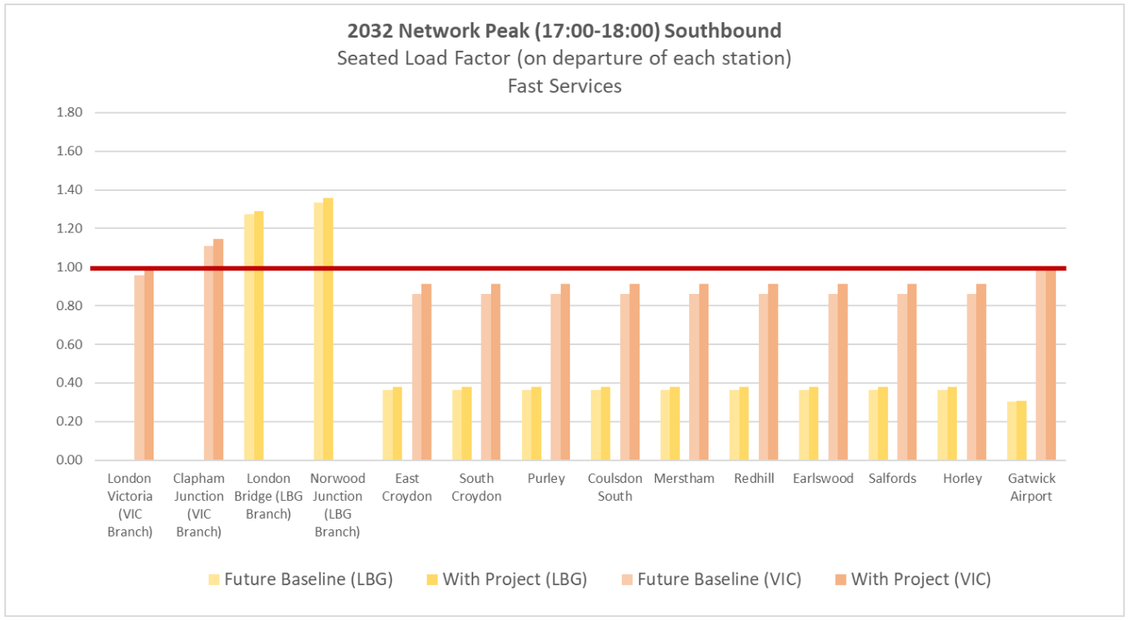


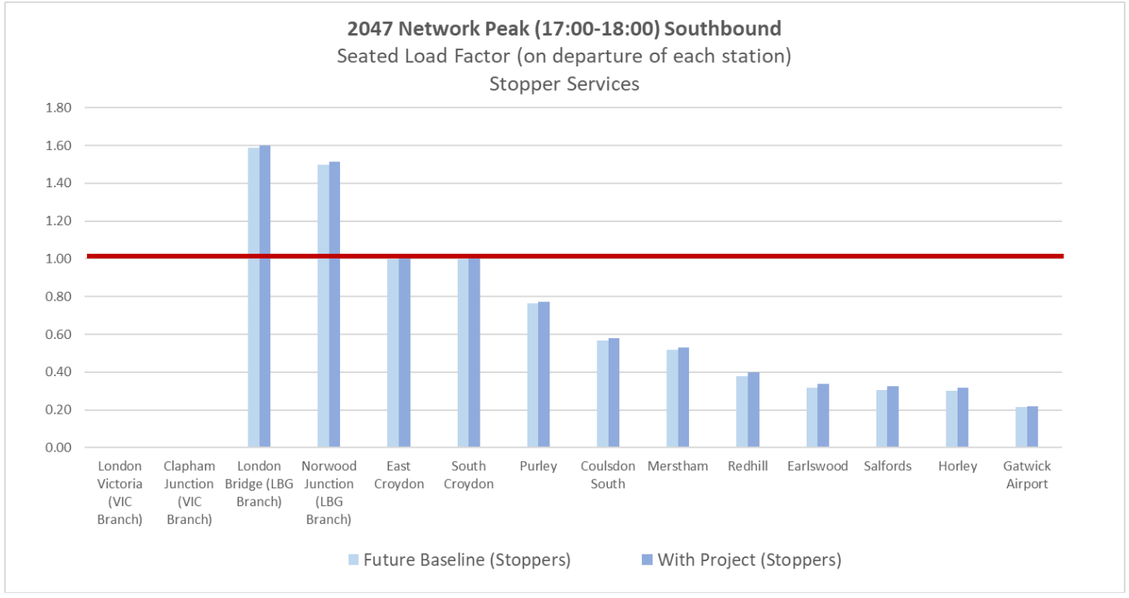
The red line indicates when the Seated Load Factor is 1.0, ie all seats are occupied.

Diagram 9.6.3: 2032 Seated Load Factor – Network peak



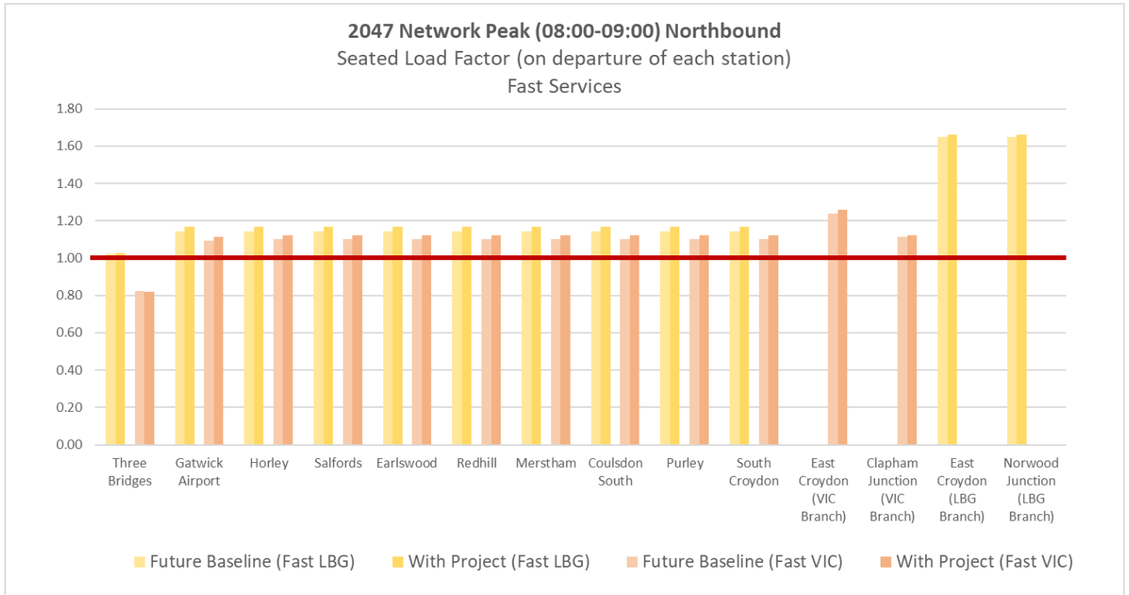


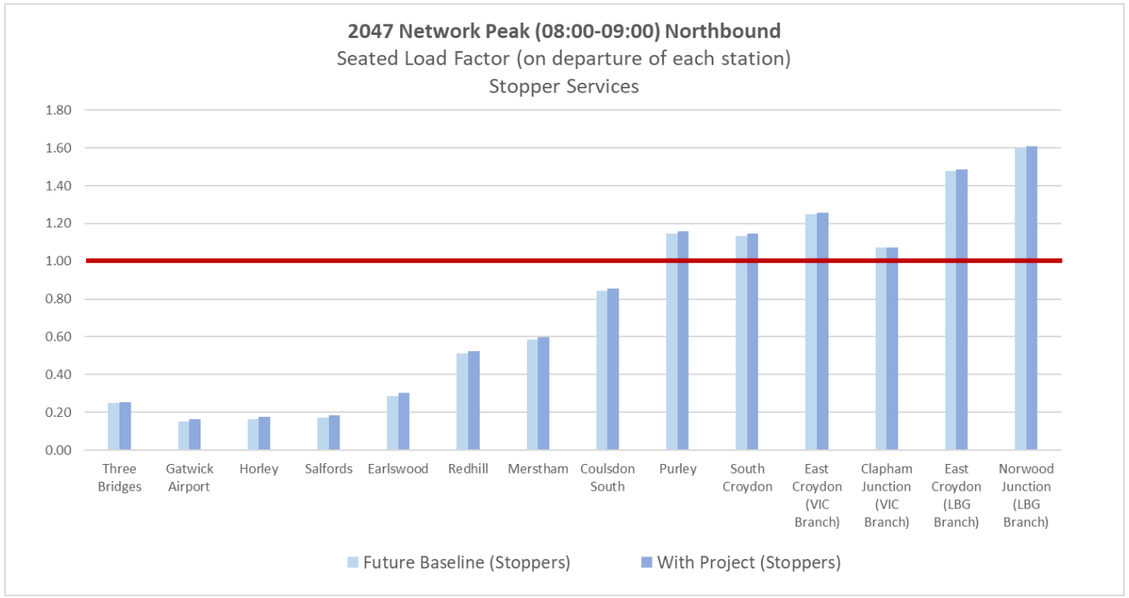


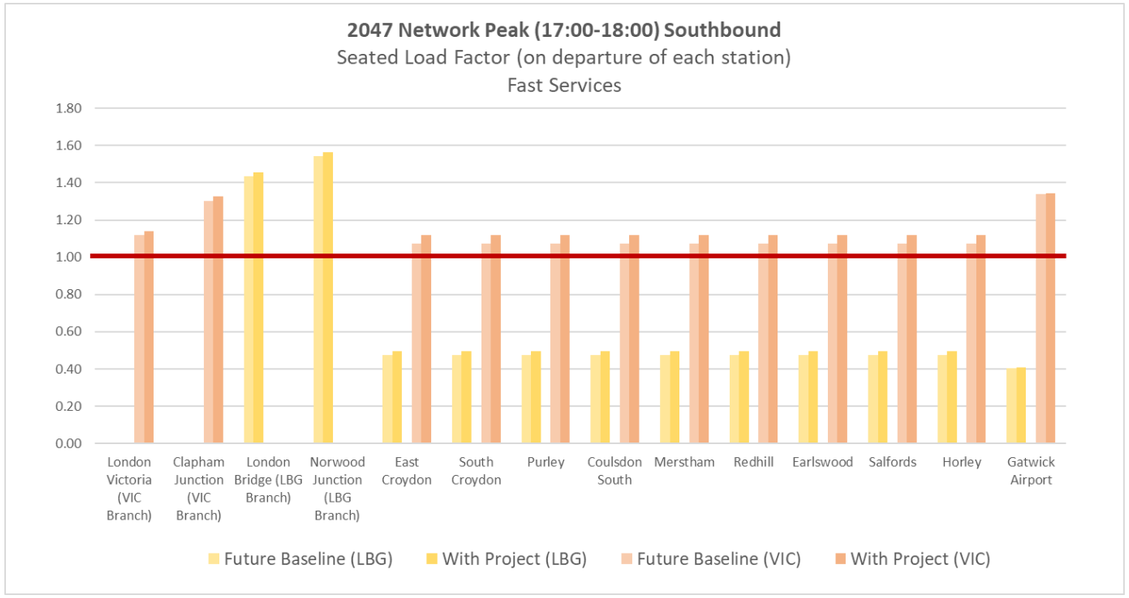


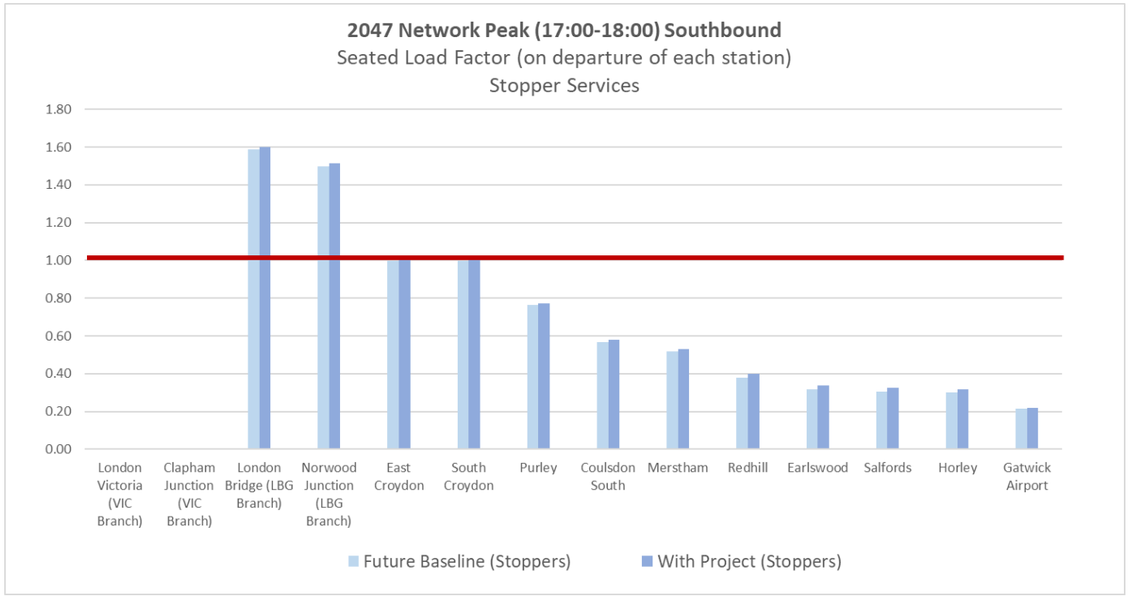
The red line indicates when the Seated Load Factor is 1.0, ie all seats are occupied.

Diagram 9.6.4: 2047 Seated Load Factor – Network peak









The red line indicates when the Seated Load Factor is 1.0, ie all seats are occupied.

Table 9.6.5: Northbound Seated Load Factors, 2029

Hour	Three Bridges to Gatwick	Gatwick to East Croydon	East Croydon to Clapham Junction	Clapham Junction to Victoria	East Croydon to London Bridge
Future baseline 2029					
06:00	0.53	0.61	0.35	0.31	1.07
07:00	0.61	0.76	0.92	0.84	1.20
08:00	0.70	0.87	1.05	0.96	1.37
09:00	0.44	0.85	0.85	0.66	1.31
10:00	0.28	0.53	0.54	0.42	0.82
With Project 2029					
06:00	0.55	0.61	0.35	0.31	1.07
07:00	0.62	0.76	0.92	0.84	1.20
08:00	0.70	0.87	1.06	0.97	1.37
09:00	0.44	0.89	0.89	0.68	1.34
10:00	0.28	0.56	0.56	0.43	0.85

Table 9.6.6: Southbound Seated Load Factors, 2029

Hour	Victoria to Clapham Junction	Clapham Junction to East Croydon	London Bridge to East Croydon	East Croydon to Gatwick	Gatwick to Three Bridges
Future baseline 2029					
15:00	0.34	0.45	0.68	0.44	0.22
16:00	0.75	0.87	1.06	0.64	0.42
17:00	0.92	1.06	1.30	0.79	0.51
18:00	0.81	0.86	1.63	0.86	0.70
19:00	0.62	0.66	1.25	0.66	0.54
With Project 2029					
15:00	0.35	0.47	0.70	0.46	0.23
16:00	0.76	0.87	1.06	0.65	0.42
17:00	0.93	1.07	1.30	0.80	0.52
18:00	0.81	0.87	1.63	0.87	0.71
19:00	0.62	0.67	1.25	0.67	0.54

Table 9.6.7: Northbound Seated Load Factors, 2032

Hour	Three Bridges to Gatwick	Gatwick to East Croydon	East Croydon to Clapham Junction	Clapham Junction to Victoria	East Croydon to London Bridge
Future baseline 2032					
06:00	0.56	0.65	0.37	0.33	1.12
07:00	0.64	0.80	0.95	0.86	1.24
08:00	0.73	0.91	1.09	0.99	1.41
09:00	0.47	0.90	0.90	0.69	1.38
10:00	0.30	0.57	0.57	0.44	0.87
With Project 2032					
06:00	0.58	0.64	0.36	0.32	1.11
07:00	0.64	0.82	0.96	0.87	1.25
08:00	0.74	0.94	1.10	1.00	1.43
09:00	0.48	0.97	0.95	0.73	1.43
10:00	0.30	0.61	0.60	0.46	0.90

Table 9.6.8: Southbound Seated Load Factors, 2032

Hour	Victoria to Clapham Junction	Clapham Junction to East Croydon	London Bridge to East Croydon	East Croydon to Gatwick	Gatwick to Three Bridges
Future baseline 2032					
15:00	0.35	0.48	0.71	0.47	0.24
16:00	0.78	0.90	1.09	0.68	0.44
17:00	0.96	1.11	1.34	0.84	0.54
18:00	0.84	0.91	1.70	0.92	0.75
19:00	0.65	0.70	1.31	0.71	0.57
With Project 2032					
15:00	0.38	0.52	0.76	0.53	0.25
16:00	0.81	0.94	1.11	0.72	0.45
17:00	0.99	1.15	1.36	0.88	0.55
18:00	0.87	0.94	1.72	0.97	0.76
19:00	0.67	0.72	1.32	0.74	0.58

Table 9.6.9: Northbound Seated Load Factors, 2047

Hour	Three Bridges to Gatwick	Gatwick to East Croydon	East Croydon to Clapham Junction	Clapham Junction to Victoria	East Croydon to London Bridge
Future baseline 2047					
06:00	0.71	0.82	0.43	0.38	1.37
07:00	0.80	0.98	1.08	0.97	1.44
08:00	0.92	1.12	1.24	1.11	1.65
09:00	0.67	1.19	1.11	0.86	1.74
10:00	0.42	0.75	0.70	0.54	1.10
With Project 2047					
06:00	0.74	0.81	0.43	0.38	1.36
07:00	0.80	1.00	1.10	0.98	1.45
08:00	0.92	1.14	1.26	1.12	1.66
09:00	0.68	1.28	1.18	0.91	1.81
10:00	0.43	0.81	0.74	0.57	1.14

Table 9.6.10: Southbound Seated Load Factors, 2047

Hour	Victoria to Clapham Junction	Clapham Junction to East Croydon	London Bridge to East Croydon	East Croydon to Gatwick	Gatwick to Three Bridges
Future baseline 2047					
15:00	0.41	0.57	0.87	0.61	0.37
16:00	0.91	1.06	1.26	0.87	0.60
17:00	1.12	1.30	1.54	1.07	0.74
18:00	1.02	1.12	2.09	1.22	1.01
19:00	0.78	0.86	1.60	0.93	0.78
With Project 2047					
15:00	0.45	0.63	0.92	0.69	0.38
16:00	0.93	1.08	1.28	0.91	0.60
17:00	1.14	1.33	1.56	1.11	0.74
18:00	1.05	1.16	2.11	1.27	1.03
19:00	0.80	0.89	1.62	0.98	0.79

Standing capacity assessment (Metwork peak)

9.6.37 Diagram 9.6.5 to Diagram 9.6.7 show the standing capacity occupied for services where the seating capacity is exceeded, for the assessment years 2029, 2032 and 2047 respectively.

2029 Network peak

9.6.38 In the 2029 future baseline, standing occurs in the morning on northbound fast services north of East Croydon on both the London Victoria and London Bridge services. London Victoria services have around 10% of standing capacity occupied, while London Bridge services have just under 30% of standing capacity occupied. Stopping services also have standing passengers north of East Croydon, at around 15-20% of standing capacity.

9.6.39 In the 2029 future baseline, standing occurs in the evening on southbound fast services from London Bridge until East Croydon, and from Clapham Junction to East Croydon on fast services from London Victoria. Approximately 20% of standing capacity is occupied. Stopping services from London Bridge also experience around 20% of standing capacity occupied.

9.6.40 These conditions are very similar in both the future baseline and with Project scenarios, as shown in Diagram 9.6.5 where the change in occupied standing capacity is less than 1.5 percentage points for locations where seated capacity is exceeded. This indicates that the Project does not significantly increase crowding on these services and ample standing capacity would remain available.

2032 Network peak

9.6.41 In the 2032 future baseline, the amount of standing capacity used on trains increases compared to that in 2029. Morning northbound fast services into London Victoria would have around 15% of standing capacity occupied, while those into London Bridge would have around 30% of standing capacity occupied, in both cases north of East Croydon. Stopping services would have around 20% of standing capacity occupied north of East Croydon.

9.6.42 In the 2032 future baseline, evening southbound fast services from London Bridge would have around 20% of standing capacity occupied until East Croydon; those from London Victoria would also have around 20% of standing capacity occupied between Clapham Junction and East Croydon. Stopping services from London Bridge would have around 25% of standing capacity occupied.

9.6.43 As in 2029, the additional demand from the Project does not create a significant increase in crowding on these services.

2047 Network peak

9.6.44 In the 2047 future baseline, northbound fast services in the morning would have standing passengers north of Gatwick Airport. Around 10-20% of standing capacity would be occupied, depending on the service, until East Croydon. Beyond East Croydon, around 40% of standing capacity would be occupied into London Victoria and around 50% into London Bridge.

9.6.45 On northbound stopping services, some 10% of standing capacity would be taken north of Purley, increasing to 40% on services into London Victoria and London Bridge.

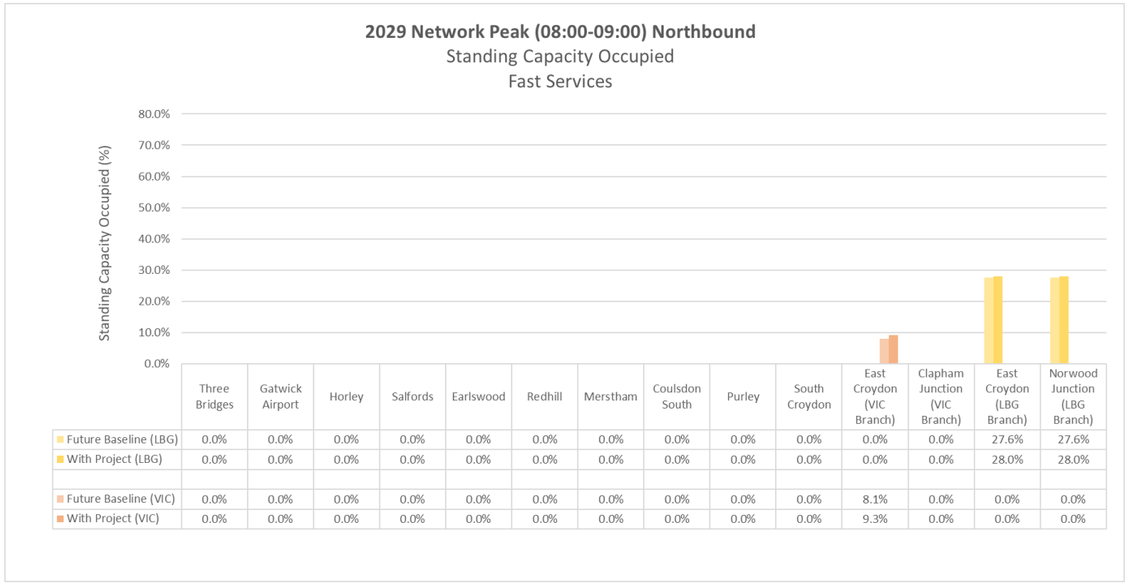
9.6.46 In the 2047 future baseline, southbound fast services from London Bridge would experience approximately 40% of standing capacity occupied until East Croydon, after which between 10% and 20% of capacity would be occupied through to Gatwick Airport.

9.6.47 Southbound stopping services from London Bridge would have approximately 40% of standing capacity occupied until East Croydon, after which a very small number of passengers per train would be standing until the services leave Purley.

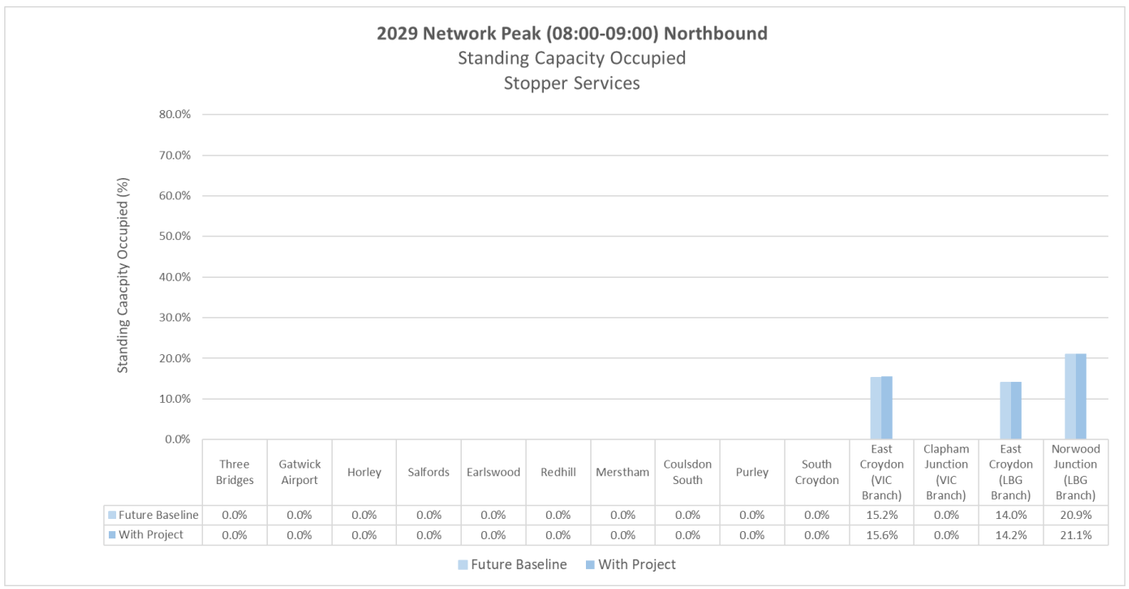
9.6.48 Although the additional rail demand from the Project represents a substantial increase in patronage overall, the impact of this on occupied standing capacity would be small when the additional patronage is distributed across the day and the available train services, and would not add significantly to crowding on these services. In all cases there would be ample standing capacity available.

9.6.49 Diagram 9.6.8 to Diagram 9.6.9 show the average number of people standing per carriage on northbound and southbound fast services in their respective Network peaks, to provide context.

Diagram 9.6.5: 2029 standing capacity occupied – Network peak

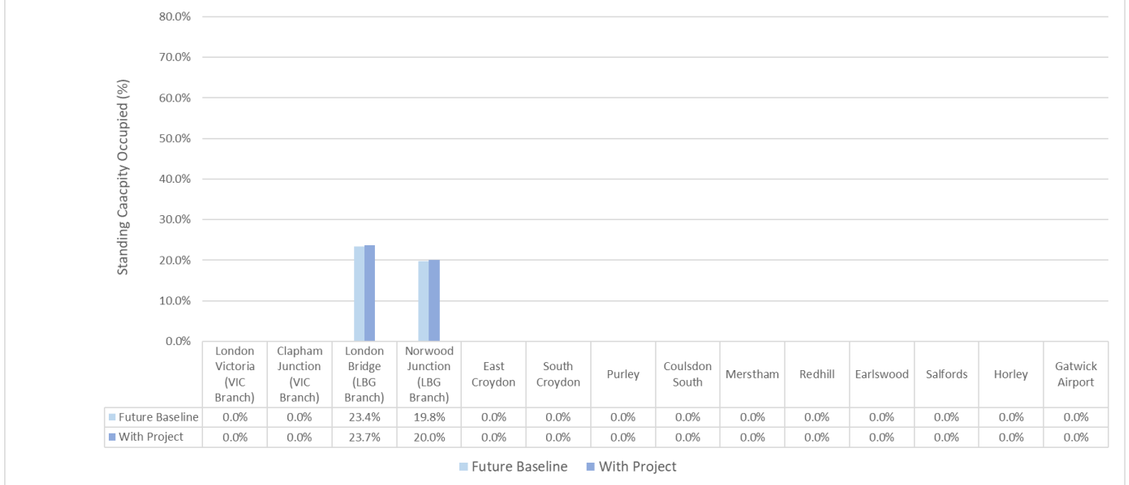


	Three Bridges	Gatwick Airport	Horley	Salfords	Earlswood	Redhill	Merstham	Coulsdon South	Purley	South Croydon	East Croydon (VIC Branch)	Clapham Junction (VIC Branch)	East Croydon (LBG Branch)	Norwood Junction (LBG Branch)
Future Baseline (LBG)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	27.6%	27.6%
With Project (LBG)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	28.0%	28.0%
Future Baseline (VIC)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	8.1%	0.0%	0.0%	0.0%
With Project (VIC)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	9.3%	0.0%	0.0%	0.0%



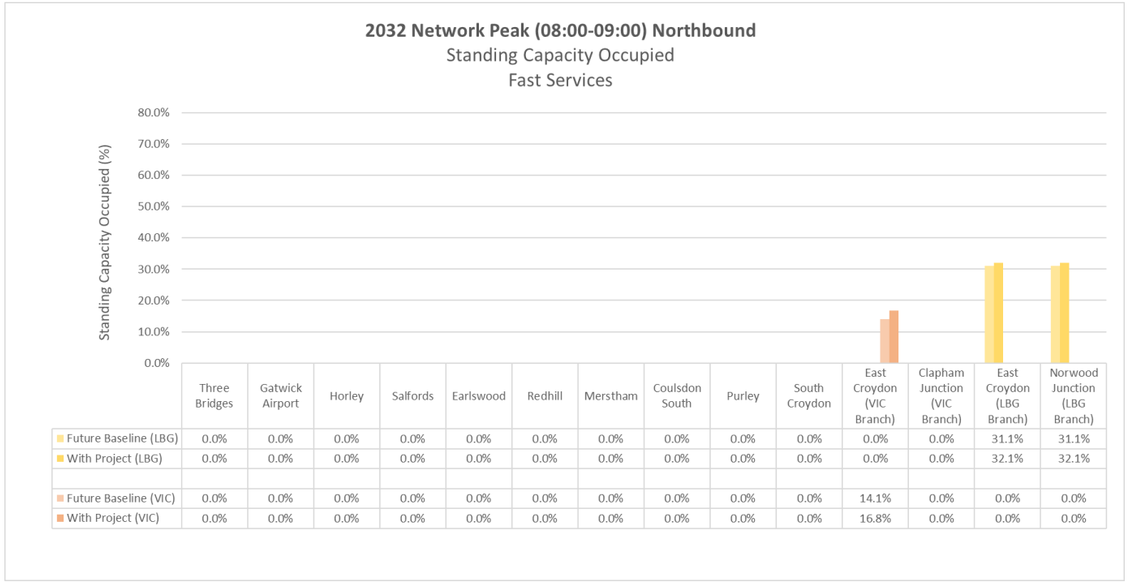
	Three Bridges	Gatwick Airport	Horley	Salfords	Earlswood	Redhill	Merstham	Coulsdon South	Purley	South Croydon	East Croydon (VIC Branch)	Clapham Junction (VIC Branch)	East Croydon (LBG Branch)	Norwood Junction (LBG Branch)
Future Baseline	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	15.2%	0.0%	14.0%	20.9%
With Project	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	15.6%	0.0%	14.2%	21.1%

	London Victoria (VIC Branch)	Clapham Junction (VIC Branch)	London Bridge (LBG Branch)	Norwood Junction (LBG Branch)	East Croydon	South Croydon	Purley	Coulsdon South	Merstham	Redhill	Earlswood	Salfords	Horley	Gatwick Airport
Future Baseline (LBG)	0.0%	0.0%	16.2%	20.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
With Project (LBG)	0.0%	0.0%	16.5%	20.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Future Baseline (VIC)	0.0%	10.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
With Project (VIC)	0.0%	11.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

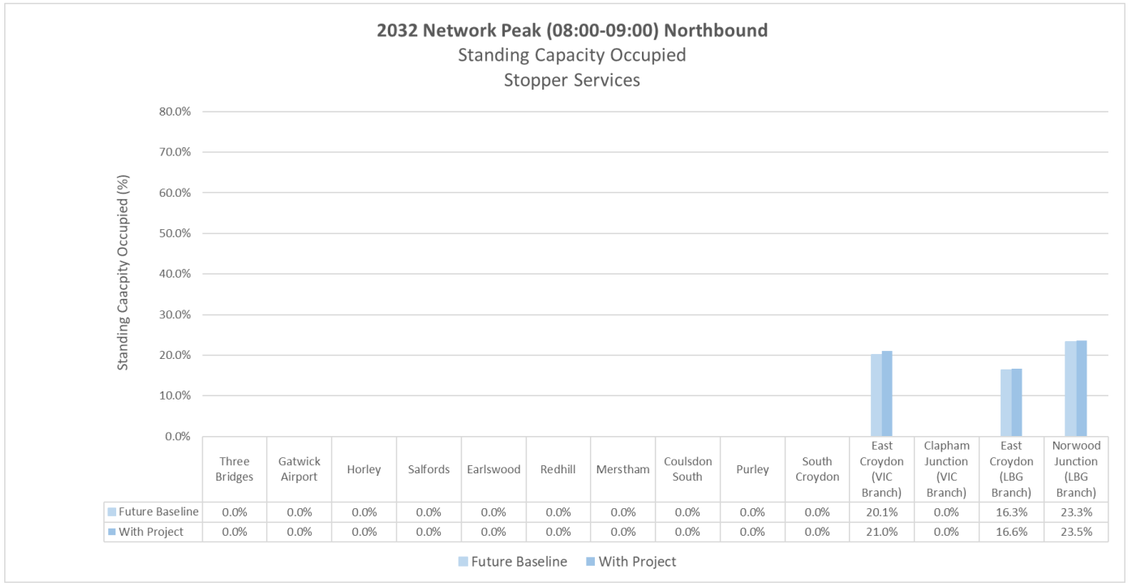


	London Victoria (VIC Branch)	Clapham Junction (VIC Branch)	London Bridge (LBG Branch)	Norwood Junction (LBG Branch)	East Croydon	South Croydon	Purley	Coulsdon South	Merstham	Redhill	Earlswood	Salfords	Horley	Gatwick Airport
Future Baseline	0.0%	0.0%	23.4%	19.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
With Project	0.0%	0.0%	23.7%	20.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

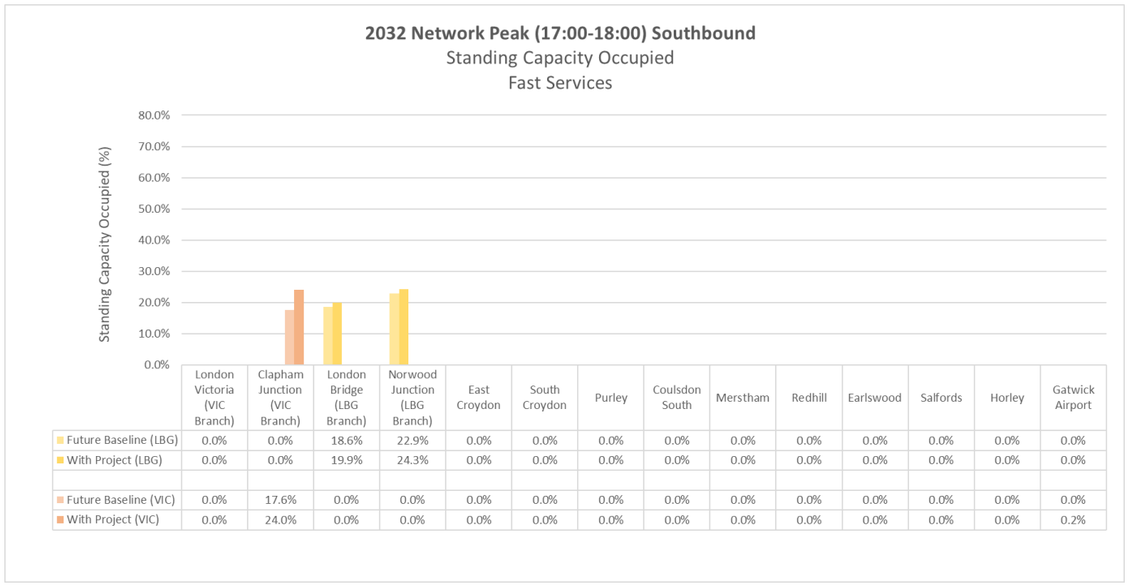
Diagram 9.6.6: 2032 standing capacity occupied – Network peak



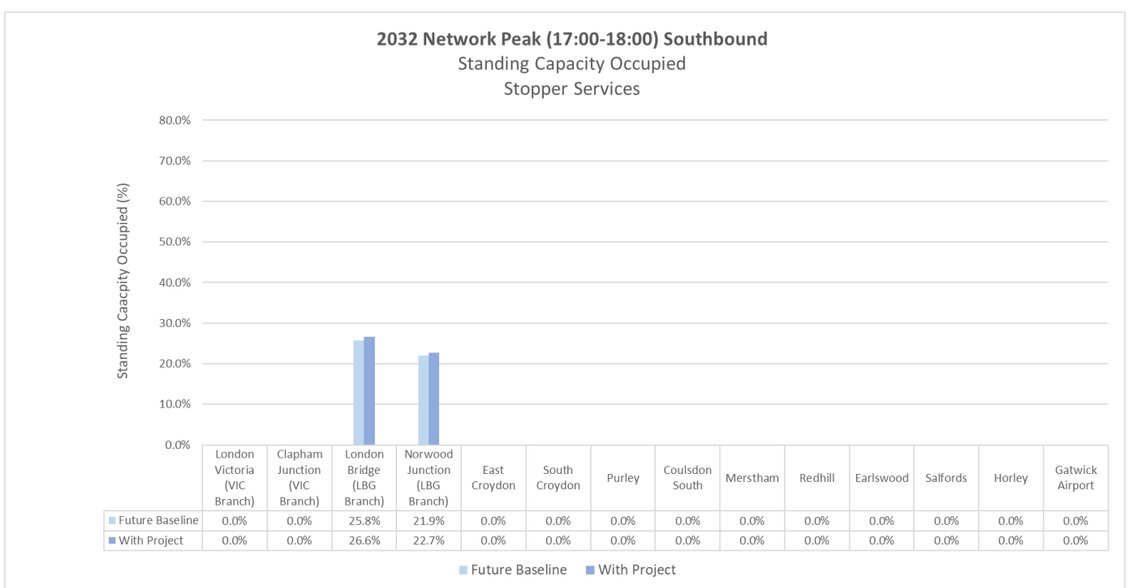
	Three Bridges	Gatwick Airport	Horley	Salfords	Earlswood	Redhill	Merstham	Coulsdon South	Purley	South Croydon	East Croydon (VIC Branch)	Clapham Junction (VIC Branch)	East Croydon (LBG Branch)	Norwood Junction (LBG Branch)
Future Baseline (LBG)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	31.1%	31.1%
With Project (LBG)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	32.1%	32.1%
Future Baseline (VIC)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	14.1%	0.0%	0.0%	0.0%
With Project (VIC)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	16.8%	0.0%	0.0%	0.0%



	Three Bridges	Gatwick Airport	Horley	Salfords	Earlswood	Redhill	Merstham	Coulsdon South	Purley	South Croydon	East Croydon (VIC Branch)	Clapham Junction (VIC Branch)	East Croydon (LBG Branch)	Norwood Junction (LBG Branch)
Future Baseline	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	20.1%	0.0%	16.3%	23.3%
With Project	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	21.0%	0.0%	16.6%	23.5%

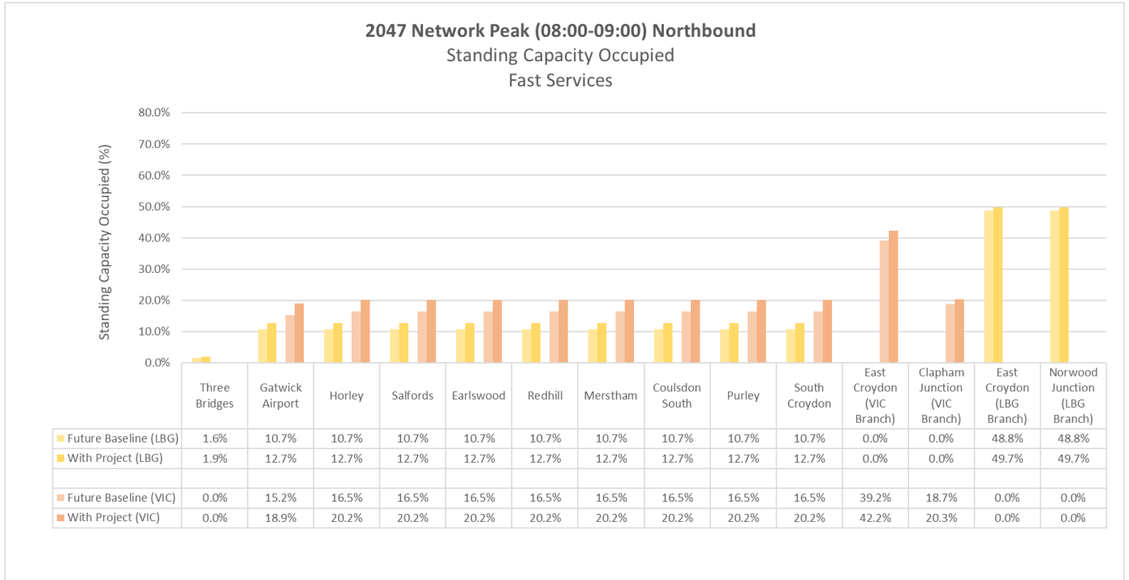


	London Victoria (VIC Branch)	Clapham Junction (VIC Branch)	London Bridge (LBG Branch)	Norwood Junction (LBG Branch)	East Croydon	South Croydon	Purley	Coulsdon South	Merstham	Redhill	Earlswood	Salfords	Horley	Gatwick Airport
Future Baseline (LBG)	0.0%	0.0%	18.6%	22.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
With Project (LBG)	0.0%	0.0%	19.9%	24.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Future Baseline (VIC)	0.0%	17.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
With Project (VIC)	0.0%	24.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%

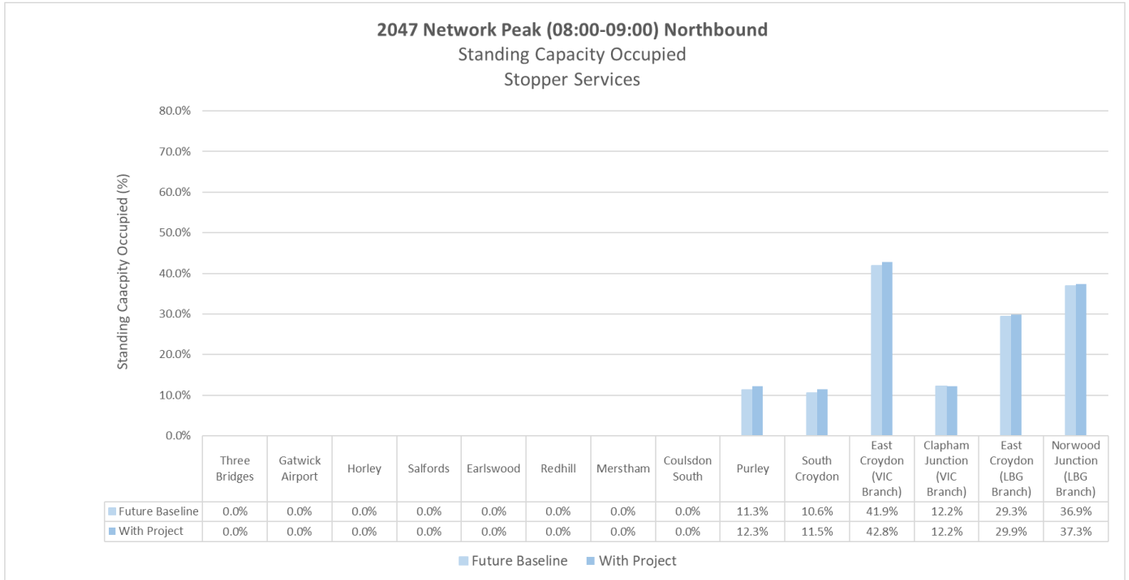


	London Victoria (VIC Branch)	Clapham Junction (VIC Branch)	London Bridge (LBG Branch)	Norwood Junction (LBG Branch)	East Croydon	South Croydon	Purley	Coulsdon South	Merstham	Redhill	Earlswood	Salfords	Horley	Gatwick Airport
Future Baseline	0.0%	0.0%	25.8%	21.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
With Project	0.0%	0.0%	26.6%	22.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

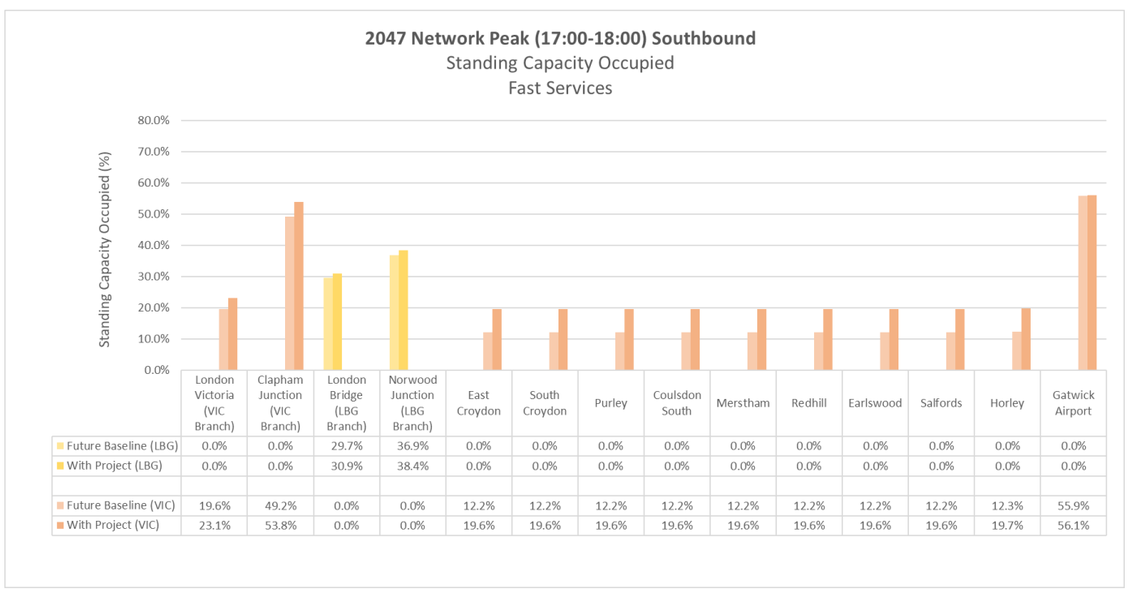
Diagram 9.6.7: 2047 standing capacity occupied – Network peak



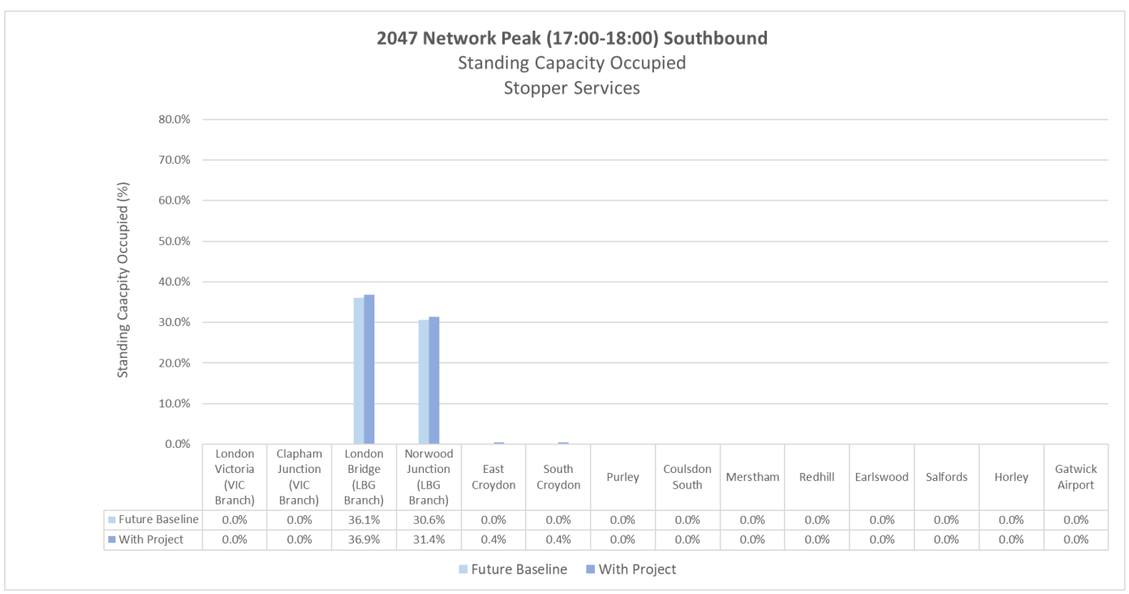
	Three Bridges	Gatwick Airport	Horley	Salfords	Earlswood	Redhill	Merstham	Coulsdon South	Purley	South Croydon	East Croydon (VIC Branch)	Clapham Junction (VIC Branch)	East Croydon (LBG Branch)	Norwood Junction (LBG Branch)
Future Baseline (LBG)	1.6%	10.7%	10.7%	10.7%	10.7%	10.7%	10.7%	10.7%	10.7%	10.7%	0.0%	0.0%	48.8%	48.8%
With Project (LBG)	1.9%	12.7%	12.7%	12.7%	12.7%	12.7%	12.7%	12.7%	12.7%	12.7%	0.0%	0.0%	49.7%	49.7%
Future Baseline (VIC)	0.0%	15.2%	16.5%	16.5%	16.5%	16.5%	16.5%	16.5%	16.5%	16.5%	39.2%	18.7%	0.0%	0.0%
With Project (VIC)	0.0%	18.9%	20.2%	20.2%	20.2%	20.2%	20.2%	20.2%	20.2%	20.2%	42.2%	20.3%	0.0%	0.0%



	Three Bridges	Gatwick Airport	Horley	Salfords	Earlswood	Redhill	Merstham	Coulsdon South	Purley	South Croydon	East Croydon (VIC Branch)	Clapham Junction (VIC Branch)	East Croydon (LBG Branch)	Norwood Junction (LBG Branch)
Future Baseline	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	11.3%	10.6%	41.9%	12.2%	29.3%	36.9%
With Project	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.3%	11.5%	42.8%	12.2%	29.9%	37.3%



	London Victoria (VIC Branch)	Clapham Junction (VIC Branch)	London Bridge (LBG Branch)	Norwood Junction (LBG Branch)	East Croydon	South Croydon	Purley	Coulsdon South	Merstham	Redhill	Earlswood	Salfords	Horley	Gatwick Airport
Future Baseline (LBG)	0.0%	0.0%	29.7%	36.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
With Project (LBG)	0.0%	0.0%	30.9%	38.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Future Baseline (VIC)	19.6%	49.2%	0.0%	0.0%	12.2%	12.2%	12.2%	12.2%	12.2%	12.2%	12.2%	12.2%	12.3%	55.9%
With Project (VIC)	23.1%	53.8%	0.0%	0.0%	19.6%	19.6%	19.6%	19.6%	19.6%	19.6%	19.6%	19.6%	19.7%	56.1%



	London Victoria (VIC Branch)	Clapham Junction (VIC Branch)	London Bridge (LBG Branch)	Norwood Junction (LBG Branch)	East Croydon	South Croydon	Purley	Coulsdon South	Merstham	Redhill	Earlswood	Salfords	Horley	Gatwick Airport
Future Baseline	0.0%	0.0%	36.1%	30.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
With Project	0.0%	0.0%	36.9%	31.4%	0.4%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Diagram 9.6.8: Standers per carriage between Gatwick Airport and East Croydon

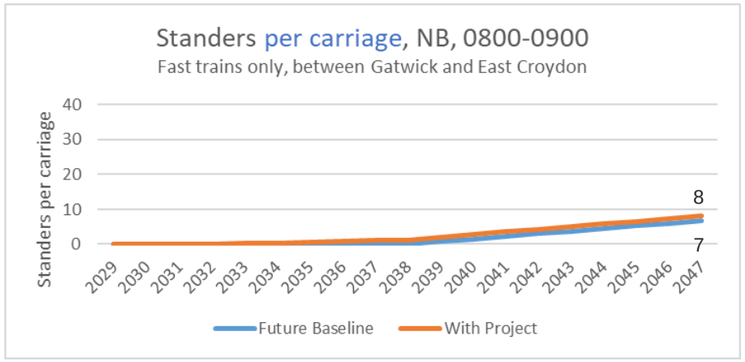


Diagram 9.6.9: Standers per carriage between East Croydon and London Bridge

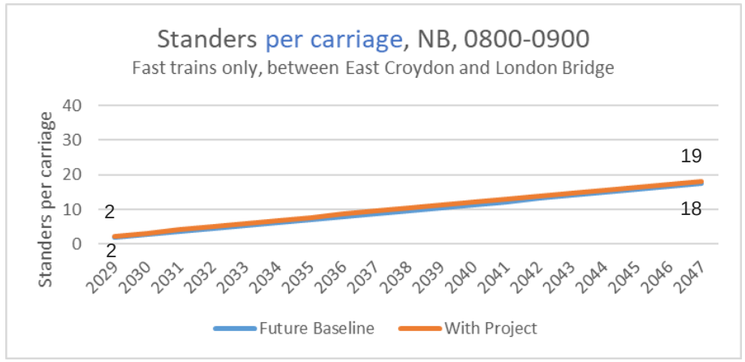
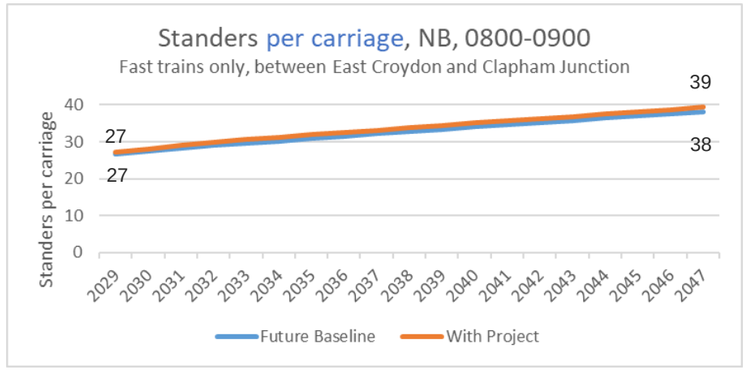
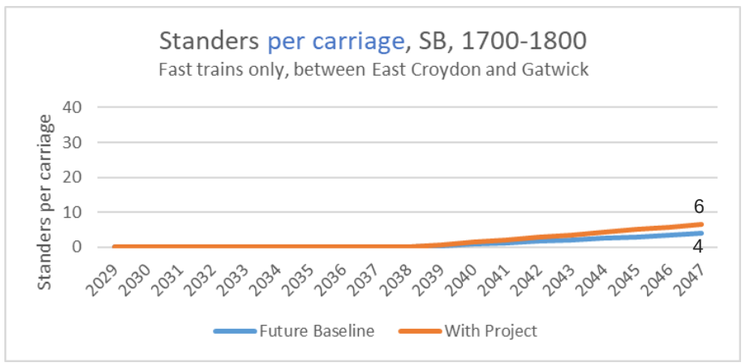
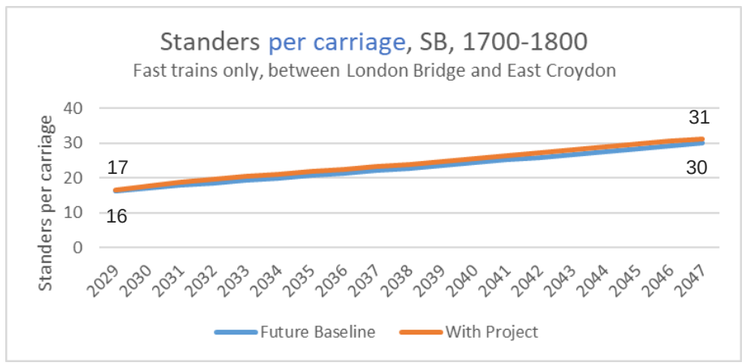
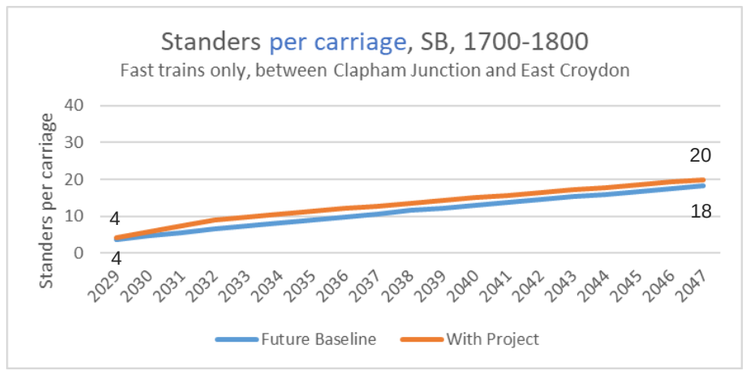


Diagram 9.6.10: Standers per carriage between East Croydon and Clapham Junction









9.7 Assessment for Project peak

9.7.1 The Project does not necessarily generate the highest number of additional rail journeys in the Network peak periods when trains are at their busiest overall. The Project peak has therefore been examined and this is the hour when greatest demand would arise from the Project on the rail services being considered. The Project peaks were illustrated in Diagram 9.3.4 and are:09:00 to 10:00 northbound from Gatwick Airport and 08:00 to 09:00 southbound to Gatwick Airport in 2029;

- 18:00 to 19:00 northbound from Gatwick Airport and 15:00 to 16:00 southbound to Gatwick Airport in 2032; and
- 18:00 to 19:00 northbound from Gatwick Airport and 15:00 to 16:00 southbound to Gatwick Airport in 2047.

9.7.2 The assessment for the Project peak is set out below for the Brighton Main Line services only. Information on the Arun Valley and North Downs Lines, in paragraphs 9.6.2 to 9.6.5, indicates that there would be no material impact from the Project in hours other than the Network peak hours on those lines.

Line loading assessment (Project peak)

9.7.3 Crowding has been assessed based on line loading in both directions in the Project peak. Table 9.7.1 shows the northbound line loading, Table 9.7.2 shows the southbound line loading.

9.7.4 The analysis shows that most passengers are expected on the fast train services from London Victoria and London Bridge and the changes in line loadings by assessment years are summarised below. The tables provide the future baseline line loadings, and the with Project line loadings. The net increase in line loading is provided, which illustrate the number of additional passengers as the result of the Project, compared against the future baseline.

2029 Project peak

9.7.5 In the northbound direction between 09:00 and 10:00, the Project adds up to 387 passengers onto future baseline line loadings, which represents an increase of 5%.

9.7.6 In the southbound direction between 08:00 and 09:00, the Project adds up to 284 passengers onto future baseline line loadings, which represents an increase just under 9%.

2032 Project peak

9.7.7 In the northbound direction between 18:00 and 19:00, the Project adds up to 1,113 passengers onto future baseline line loadings. This increase in passengers represents an increase of some 20%.

9.7.8 In the southbound direction between 15:00 and 16:00, the Project adds up to 742 passengers onto future baseline line loadings. This represents an increase of around 13%.

2047 Project peak

9.7.9 In the northbound direction between 18:00 and 19:00, the Project adds up to 1,403 passengers onto future baseline line loadings, which represents an increase of around 20%.

9.7.10 In the southbound direction between 15:00 and 16:00, the Project adds up to 924 passengers, which represents an increase of around 12.5%.

Table 9.7.1: Line loading – Project peak northbound

Scenario*	Services	Line loading (number of passengers on departure) - northbound Project Peak													
		Three Bridges	Gatwick Airport	Horley	Salfords	Earlswood	Redhill	Merstham	Coulsdon South	Purley	South Croydon	East Croydon (VIC Branch)	Clapham Junction (VIC Branch)	East Croydon (LBG Branch)	Norwood Junction (LBG Branch)
Future baseline 2029	Fast (LBG)	1,387	2,423	-	-	-	-	-	-	-	-			3,548	-
	Fast (VIC)	2,313	4,731	4,731	-	-	-	-	-	-	-	4,860	3,784		
	Stopping	797	556	564	568	750	1,023	1,081	1,311	1,684	1,677	164	130	3,661	3,886
	Total	**4,497**	**7,710**	**7,718**	**7,722**	**7,904**	**8,176**	**8,235**	**8,465**	**8,838**	**8,831**	**5,024**	**3,914**	**7,210**	**7,434**
With Project 2029	Fast (LBG)	1,404	2,540	-	-	-	-	-	-	-	-			3,645	-
	Fast (VIC)	2,343	4,983	4,983	-	-	-	-	-	-	-	5,062	3,913		
	Stopping	808	574	582	585	766	1,032	1,090	1,320	1,693	1,686	165	130	3,693	3,912
	Total	**4,555**	**8,098**	**8,105**	**8,108**	**8,290**	**8,555**	**8,613**	**8,843**	**9,216**	**9,209**	**5,226**	**4,044**	**7,338**	**7,557**
Change (%) 2029	Fast (LBG)	17 (1.2%)	117 (4.8%)	-	-	-	-	-	-	-	-			96 (2.7%)	-
	Fast (VIC)	30 (1.3%)	252 (5.3%)	252 (5.3%)	-	-	-	-	-	-	-	202 (4.2%)	130 (3.4%)		
	Stopping	11 (1.4%)	18 (3.2%)	17 (3.1%)	17 (3.0%)	17 (2.2%)	10 (1.0%)	9 (0.9%)	9 (0.7%)	9 (0.5%)	9 (0.5%)	1 (0.5%)	0 (0.0%)	32 (0.9%)	26 (0.7%)
	Total	**58 (1.3%)**	**387 (5.0%)**	**387 (5.0%)**	**387 (5.0%)**	**386 (4.9%)**	**379 (4.6%)**	**379 (4.6%)**	**378 (4.5%)**	**379 (4.3%)**	**379 (4.3%)**	**203 (4.0%)**	**130 (3.3%)**	**128 (1.8%)**	**123 (1.7%)**
Future baseline 2032	Fast (LBG)	515	1,719	-	-	-	-	-	-	-	-			2,629	-
	Fast (VIC)	1,000	3,395	-	-	-	-	-	-	-	-	3,733	2,634		
	Stopping	223	430	327	-	-	301	306	339	-	-			977	-
	Total	**1,737**	**5,544**	**5,441**	**-**	**-**	**5,415**	**5,420**	**5,453**	**-**	**-**	**3,733**	**2,634**	**3,606**	**-**
With Project 2032	Fast (LBG)	530	2,061	-	-	-	-	-	-	-	-			2,905	-
	Fast (VIC)	1,024	4,118	-	-	-	-	-	-	-	-	4,327	3,041		
	Stopping	227	478	374	-	-	335	341	373	-	-			1,029	-
	Total	**1,781**	**6,657**	**6,553**	**-**	**-**	**6,514**	**6,519**	**6,552**	**-**	**-**	**4,327**	**3,041**	**3,935**	**-**
Change (%) 2032	Fast (LBG)	15 (2.9%)	341 (19.9%)	-	-	-	-	-	-	-	-			276 (10.5%)	-
	Fast (VIC)	24 (2.4%)	723 (21.3%)	-	-	-	-	-	-	-	-	594 (15.9%)	408 (15.5%)		
	Stopping	4 (2.0%)	49 (11.3%)	47 (14.5%)	-	-	35 (11.6%)	34 (11.2%)	34 (10.0%)	-	-			53 (5.4%)	-
	Total	**44 (2.5%)**	**1113 (20.1%)**	**1112 (20.4%)**	**-**	**-**	**1099 (20.3%)**	**1099 (20.3%)**	**1099 (20.1%)**	**-**	**-**	**594 (15.9%)**	**408 (15.5%)**	**329 (9.1%)**	**-**
Future baseline 2047	Fast (LBG)	834	2,273	-	-	-	-	-	-	-	-			3,085	-
	Fast (VIC)	1,580	4,326	-	-	-	-	-	-	-	-	4,438	3,100		
	Stopping	312	538	420	-	-	383	392	428	-	-			1,116	-
	Total	**2,726**	**7,137**	**7,019**	**-**	**-**	**6,983**	**6,991**	**7,027**	**-**	**-**	**4,438**	**3,100**	**4,201**	**-**
With Project 2047	Fast (LBG)	856	2,702	-	-	-	-	-	-	-	-			3,433	-
	Fast (VIC)	1,619	5,238	-	-	-	-	-	-	-	-	5,186	3,612		
	Stopping	321	601	481	-	-	429	437	472	-	-			1,184	-
	Total	**2,796**	**8,541**	**8,421**	**-**	**-**	**8,369**	**8,377**	**8,412**	**-**	**-**	**5,186**	**3,612**	**4,617**	**-**
Change (%) 2047	Fast (LBG)	22 (2.6%)	429 (18.9%)	-	-	-	-	-	-	-	-			348 (11.3%)	-
	Fast (VIC)	39 (2.5%)	911 (21.1%)	-	-	-	-	-	-	-	-	748 (16.9%)	511 (16.5%)		
	Stopping	9 (2.9%)	62 (11.6%)	61 (14.6%)	-	-	46 (11.9%)	45 (11.5%)	45 (10.5%)	-	-			68 (6.1%)	-
	Total	**70 (2.6%)**	**1403 (19.7%)**	**1402 (20.0%)**	**-**	**-**	**1386 (19.9%)**	**1386 (19.8%)**	**1386 (19.7%)**	**-**	**-**	**748 (16.9%)**	**511 (16.5%)**	**416 (9.9%)**	**-**

**Note 2029 Project Peak (09:00-10:00) is different to the 2032 and 2047 Project Peak (18:00-19:00)*

Table 9.7.2: Line loading – Project peak southbound

Scenario*	Services	Line loading (number of passengers on departure) - southbound Project Peak													
		London Victoria (VIC Branch)	Clapham Junction (VIC Branch)	London Bridge (LBG Branch)	Norwood Junction (LBG Branch)	East Croydon	South Croydon	Purley	Coulsdon South	Merstham	Redhill	Earlswood	Salfords	Horley	Gatwick Airport
Future baseline 2029	Fast (LBG)			2,675	-	1,374	-	-	-	-	-	-	-	-	677
	Fast (VIC)	1,057	1,957			1,562	-	-	-	-	-	-	-	-	1,379
	Stopping			990	1,095	439	-	-	393	390	248	357	365	517	114
	Total	**1,057**	**1,957**	**3,664**	**3,770**	**3,375**	**-**	**-**	**3,329**	**3,326**	**3,184**	**3,294**	**3,301**	**3,454**	**2,171**
With Project 2029	Fast (LBG)	-	-	2,747	-	1,487	-	-	-	-	-	-	-	-	683
	Fast (VIC)	1,125	2,048			1,717	-	-	-	-	-	-	-	-	1,396
	Stopping			1,005	1,109	451	-	-	405	403	265	374	381	534	116
	Total	**1,125**	**2,048**	**3,753**	**3,857**	**3,655**	**-**	**-**	**3,609**	**3,607**	**3,469**	**3,578**	**3,585**	**3,738**	**2,195**
Change (%) 2029	Fast (LBG)			73(2.7%)	-	112(8.2%)	-	-	-	-	-	-	-	-	6(0.9%)
	Fast (VIC)	68(6.5%)	92(4.7%)			155(10.0%)	-	-	-	-	-	-	-	-	16(1.2%)
	Stopping			16(1.6%)	14(1.3%)	12(2.8%)	-	-	12(3.1%)	12(3.2%)	17(6.8%)	17(4.7%)	17(4.6%)	17(3.3%)	2(1.6%)
	Total	**68(6.5%)**	**92(4.7%)**	**88(2.4%)**	**87(2.3%)**	**280(8.3%)**	**-**	**-**	**280(8.4%)**	**280(8.4%)**	**284(8.9%)**	**284(8.6%)**	**284(8.6%)**	**284(8.2%)**	**24(1.1%)**
Future baseline 2032	Fast (LBG)			3,480	3,481	2,305	-	-	-	-	-	-	-	-	1,478
	Fast (VIC)	2,080	2,838			2,747	-	-	-	-	2,750	-	-	2,753	2,636
	Stopping			1,807	1,772	923	-	861	814	802	535	577	582	624	189
	Total	**2,080**	**2,838**	**5,286**	**5,253**	**5,976**	**-**	**5,914**	**5,866**	**5,855**	**5,590**	**5,632**	**5,637**	**5,682**	**4,303**
With Project 2032	Fast (LBG)			3,699	3,700	2,566	-	-	-	-	-	-	-	-	1,505
	Fast (VIC)	2,256	3,108			3,147	-	-	-	-	3,150	-	-	3,153	2,719
	Stopping			1,872	1,837	994	-	932	885	874	614	656	661	704	196
	Total	**2,256**	**3,108**	**5,571**	**5,537**	**6,708**	**-**	**6,646**	**6,599**	**6,587**	**6,331**	**6,373**	**6,378**	**6,424**	**4,420**
Change (%) 2032	Fast (LBG)			219(6.3%)	219(6.3%)	261(11.3%)	-	-	-	-	-	-	-	-	27(1.8%)
	Fast (VIC)	176(8.5%)	270(9.5%)			400(14.6%)	-	-	-	-	400(14.6%)	-	-	401(14.6%)	83(3.2%)
	Stopping			65(3.6%)	65(3.7%)	71(7.6%)	-	71(8.2%)	71(8.7%)	71(8.9%)	79(14.8%)	79(13.7%)	79(13.6%)	80(12.9%)	7(3.6%)
	Total	**176(8.5%)**	**270(9.5%)**	**284(5.4%)**	**284(5.4%)**	**732(12.3%)**	**-**	**732(12.4%)**	**733(12.5%)**	**733(12.5%)**	**741(13.3%)**	**741(13.2%)**	**741(13.1%)**	**742(13.1%)**	**117(2.7%)**
Future baseline 2047	Fast (LBG)			4,221	4,221	3,137	-	-	-	-	-	-	-	-	2,312
	Fast (VIC)	2,450	3,377			3,466	-	-	-	-	3,470	-	-	3,473	4,028
	Stopping			2,131	2,089	1,104	-	1,032	980	965	638	686	692	742	259
	Total	**2,450**	**3,377**	**6,351**	**6,310**	**7,707**	**-**	**7,636**	**7,584**	**7,568**	**7,245**	**7,293**	**7,298**	**7,352**	**6,599**
With Project 2047	Fast (LBG)			4,496	4,496	3,466	-	-	-	-	-	-	-	-	2,353
	Fast (VIC)	2,663	3,709			3,960	-	-	-	-	3,964	-	-	3,967	4,152
	Stopping			2,212	2,170	1,192	-	1,121	1,070	1,054	738	786	791	842	269
	Total	**2,663**	**3,709**	**6,707**	**6,666**	**8,618**	**-**	**8,547**	**8,496**	**8,481**	**8,167**	**8,216**	**8,221**	**8,276**	**6,774**
Change (%) 2047	Fast (LBG)			275(6.5%)	275(6.5%)	329(10.5%)	-	-	-	-	-	-	-	-	41(1.8%)
	Fast (VIC)	214(8.7%)	332(9.8%)			494(14.2%)	-	-	-	-	494(14.2%)	-	-	494(14.2%)	124(3.1%)
	Stopping			81(3.8%)	81(3.9%)	89(8.0%)	-	89(8.6%)	89(9.1%)	90(9.3%)	100(15.6%)	100(14.5%)	100(14.4%)	101(13.6%)	10(3.9%)
	Total	**214(8.7%)**	**332(9.8%)**	**356(5.6%)**	**356(5.6%)**	**911(11.8%)**	**-**	**912(11.9%)**	**912(12.0%)**	**912(12.1%)**	**923(12.7%)**	**923(12.7%)**	**923(12.6%)**	**924(12.6%)**	**175(2.7%)**

**Note 2029 Project Peak (08:00-09:00) is different to the 2032 and 2047 Project Peak (15:00-16:00)*

Seated Load Factor assessment (Project peak)

9.7.11 A Seated Load Factor assessment for the Project peak has been undertaken for both the northbound and southbound direction services in each year, as shown in Diagram 9.7.1 to Diagram 9.7.3.

9.7.12 The Project peak illustrates the highest additional number passengers on the rail network as the result of the Project. It should be noted that 2032 and 2047 have the same Project peak hour, but 2029 has a different Project peak hour which is earlier in the day and the network is busier. Therefore, the assessment years cannot be compared to each other directly.

2029 Project peak

9.7.13 The diagrams show that in the 2029 northbound Project peak (09:00 to 10:00), in both the future baseline and with Project scenarios, all northbound services would have no standing passengers until reaching East Croydon. Fast services from East Croydon to London Bridge would experience Seated Load Factors of approximately 1.3, while stopping services between East Croydon and London Bridge would experience factors of up to around 1.1. The contribution from the Project to these figures are 0.04 for the fast services and 0.01 for stopping services, which are minimal and there is plenty of standing capacity available, as described in paragraph 9.7.18 and shown in Table 9.7.3.

9.7.14 Services in the 2029 southbound Project peak (08:00 to 09:00) would all have sufficient capacity for all passengers to be seated in both the future baseline and with Project scenarios.

2032 Project peak

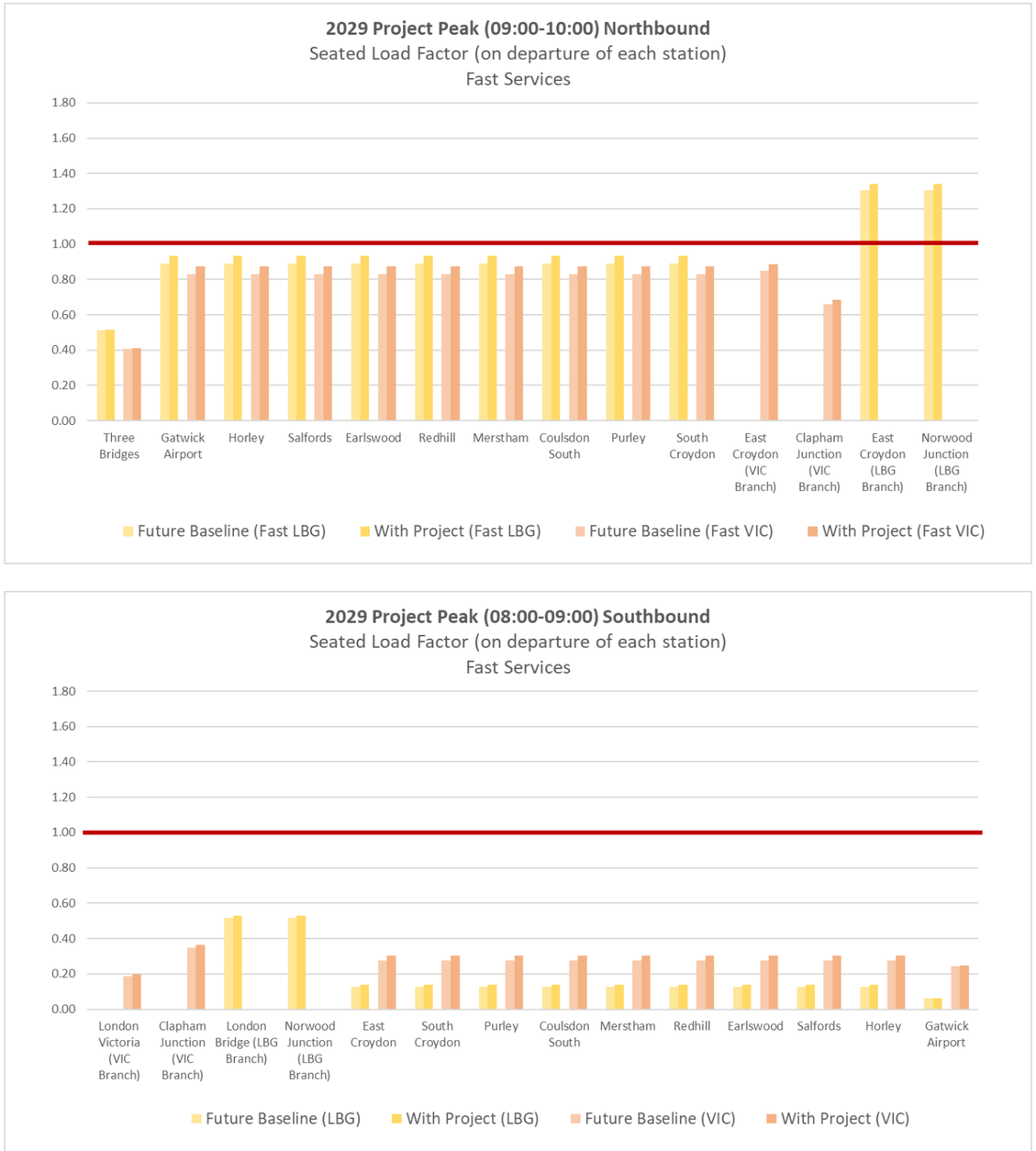
9.7.15 In the 2032 northbound Project peak (18:00 to 19:00) and southbound Project peak (15:00 to 16:00), there would be sufficient seats for all passengers on all services in both the future baseline and with Project scenarios.

2047 Project peak

9.7.16 In the 2047 northbound Project peak (18:00 to 19:00), there would be sufficient seats for all passengers on all northbound services until East Croydon in the future baseline and with Project scenarios. Fast services between East Croydon and London Bridge would experience Seated Load Factors of just under 1.0 in the future baseline, increasing to around 1.05 with the Project. Other northbound services would have sufficient seats north of East Croydon.

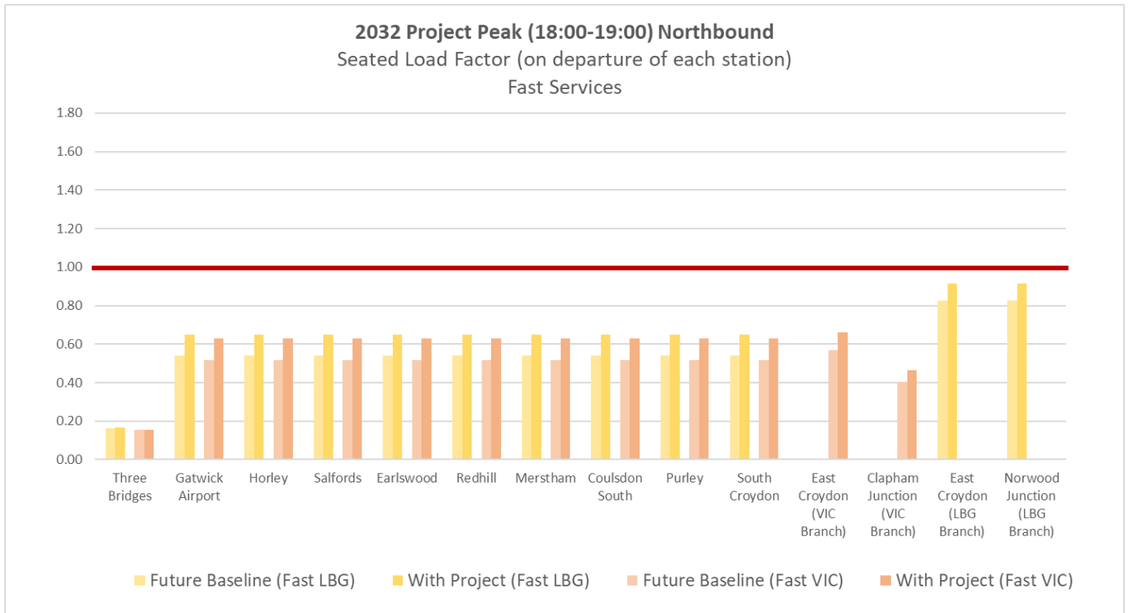
9.7.17 In the 2047 southbound Project peak (15:00 to 16:00) there would be sufficient seats for all passengers on all southbound services in both the future baseline and with Project scenarios.

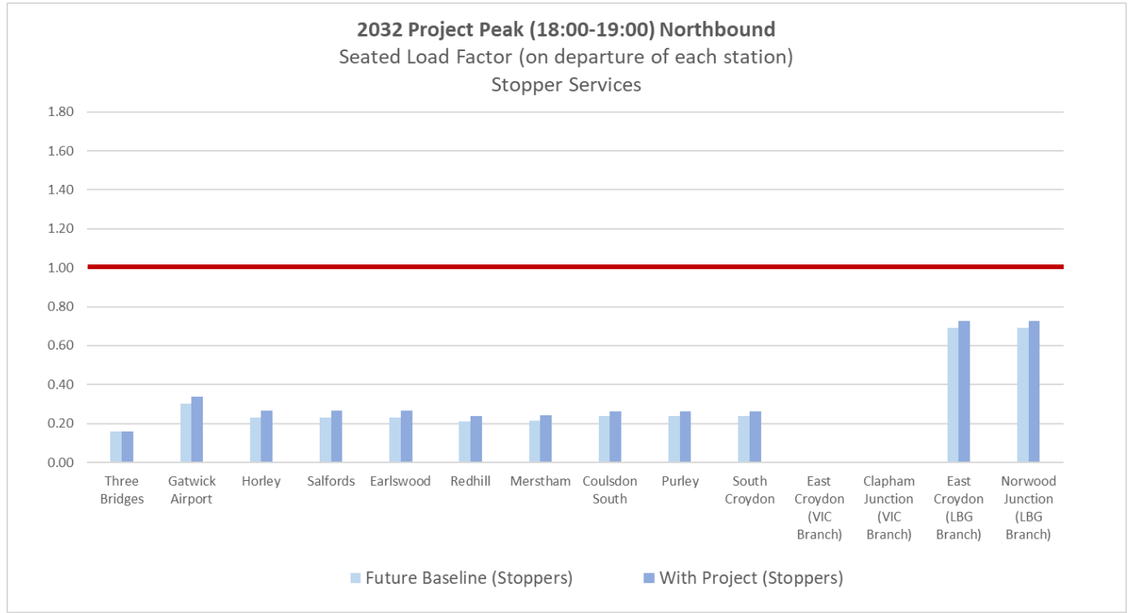
Diagram 9.7.1: 2029 Seated Load Factor – Project peak

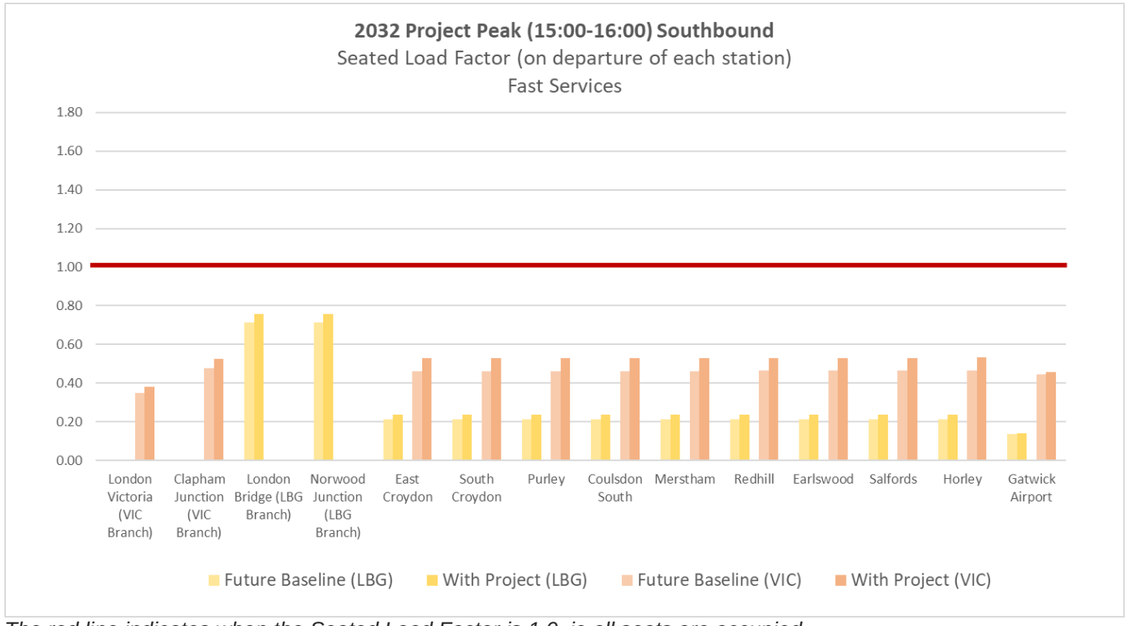


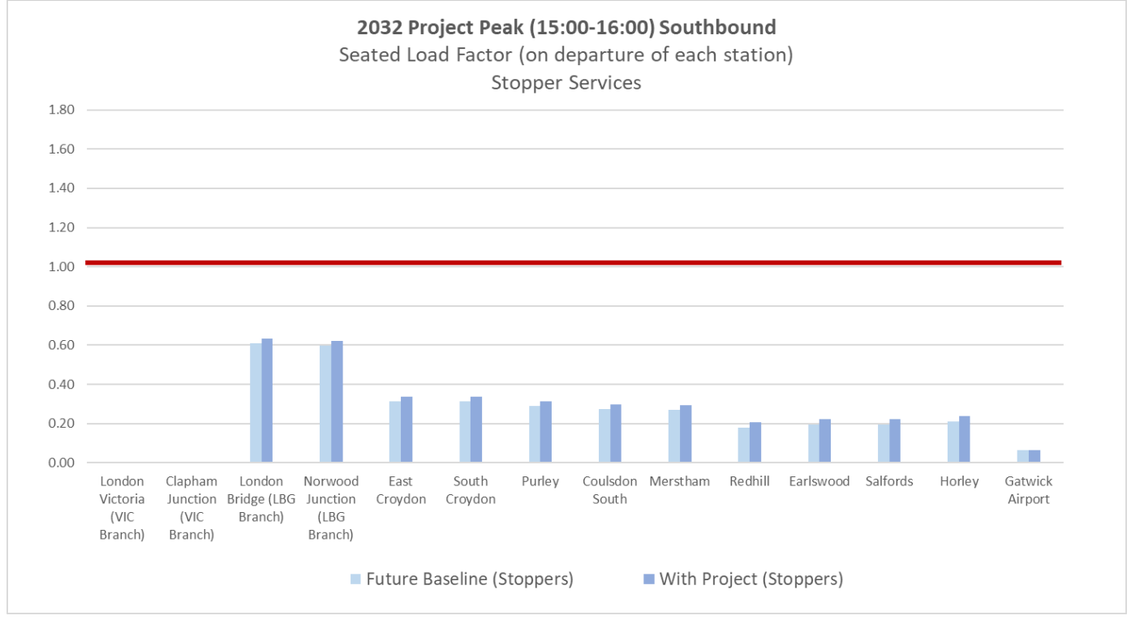
The red line indicates when the seated load factor is 1.0, ie all seats are occupied

Diagram 9.7.2: 2032 Seated Load Factor – Project peak



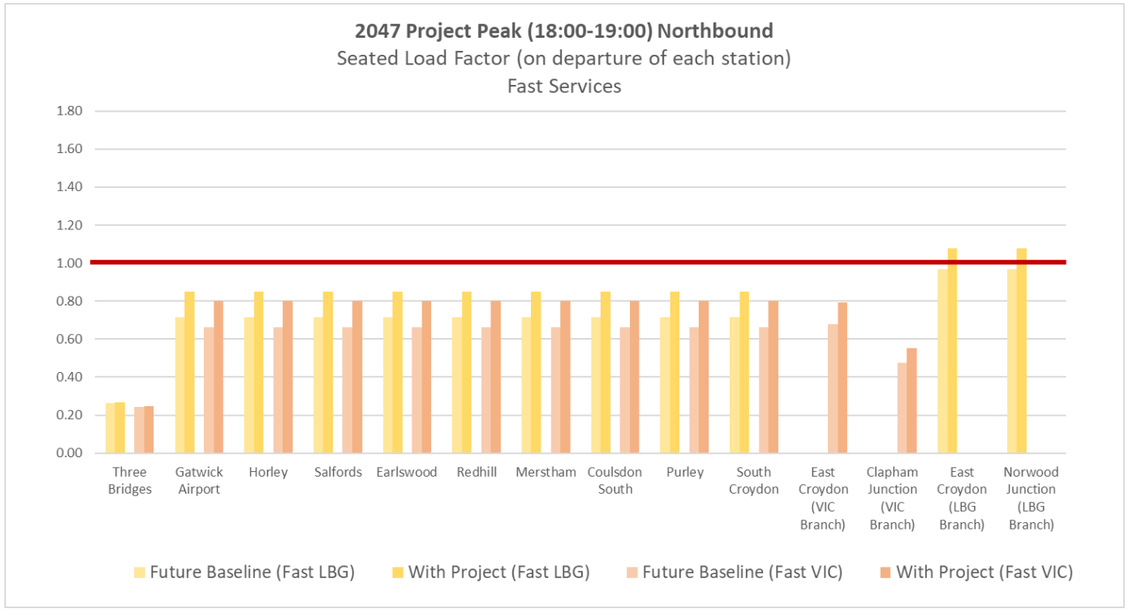


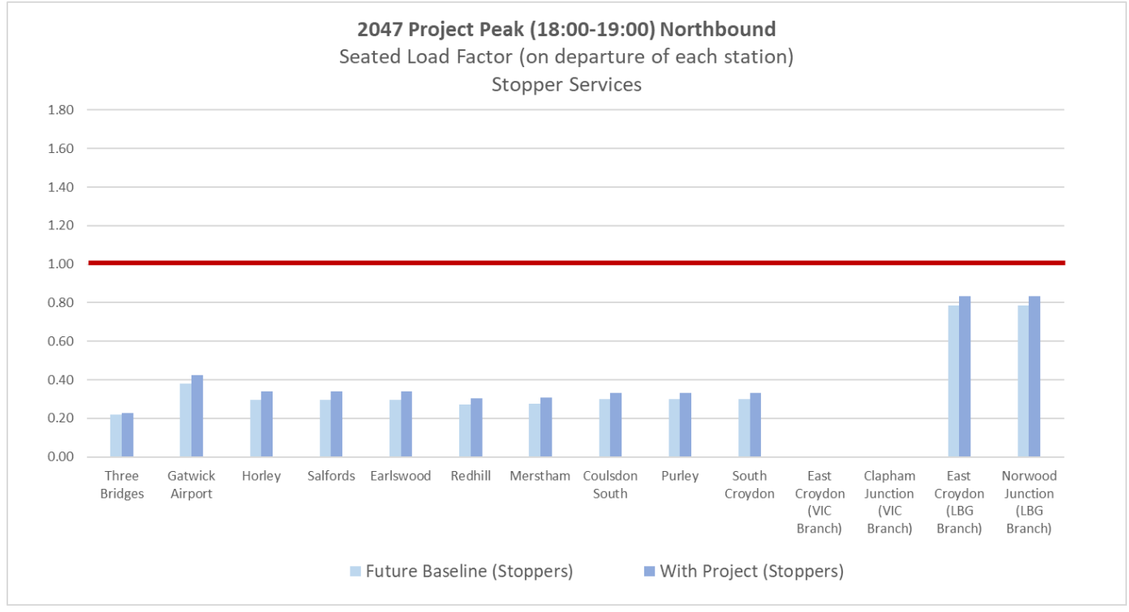


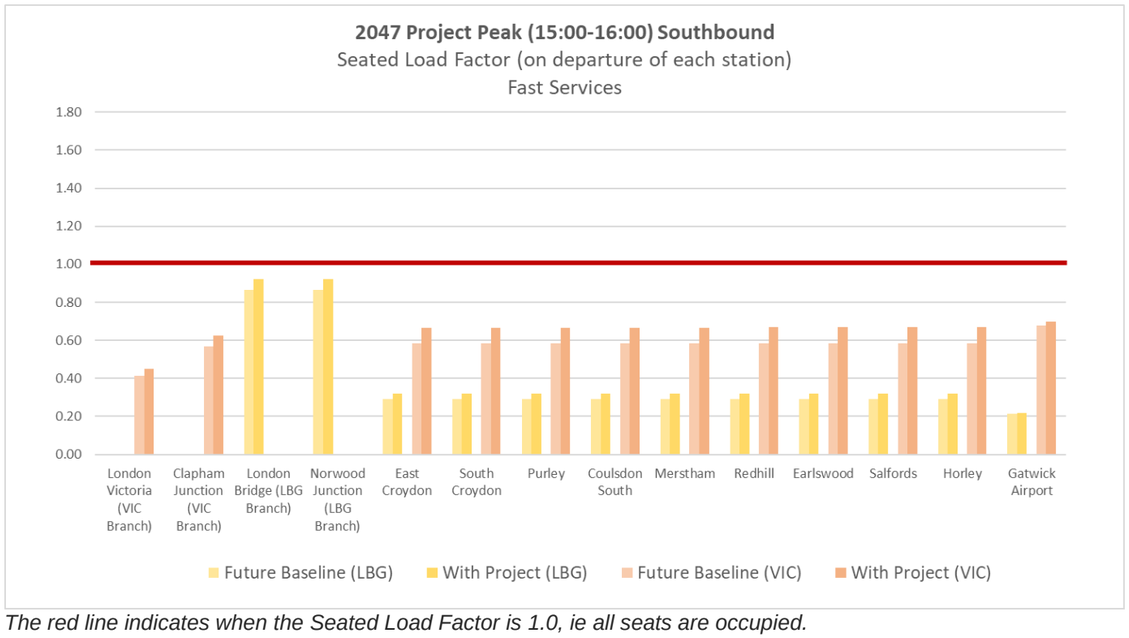


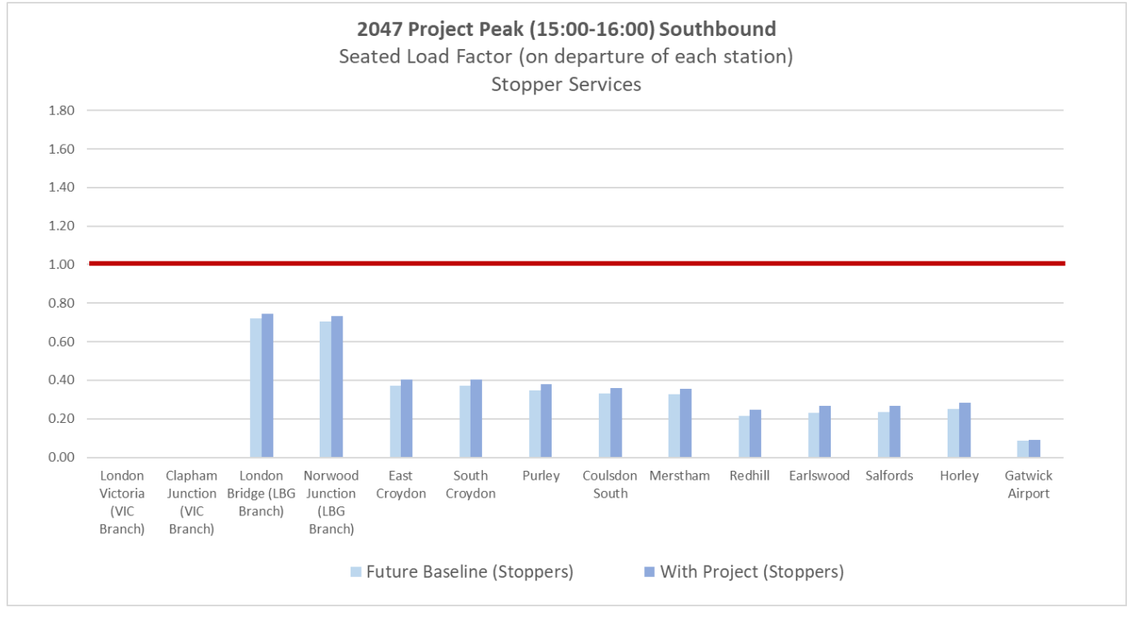
The red line indicates when the Seated Load Factor is 1.0, ie all seats are occupied.

Diagram 9.7.3: 2047 Seated Load Factor – Project peak









The red line indicates when the Seated Load Factor is 1.0, ie all seats are occupied.

Standing capacity assessment (Project peak)

9.7.18 Table 9.7.3 shows the standing capacity assessment for services where the number of seats is shown to be exceeded by the Seated Load Factor analysis. The table shows that the highest percentage of standing capacity occupied is 23.7%, which indicates that only around a quarter of the standing capacity is occupied and spare standing capacity is available.

Table 9.7.3: Standing assessment – Project Peak

Year	Service	Scenario	Percentage of Standing Capacity Occupied	
			East Croydon (LBG Branch)	Norwood Junction (LBG Branch)
2029	Northbound Fast (LBG), 09:00-10:00	Future baseline	21.2%	21.2%
		With Project	23.7%	23.7%
		Change	**+2.5 pts**	**+2.5 pts**
	Northbound Slow (LBG) 09:00-10:00	Future baseline	0.6%	4.4%
		With Project	1.1%	4.8%
		Change	**+0.5 pts**	**+0.4 pts**
2032	No services experience standing passengers in the Project peaks			
2047	Northbound Fast (LBG) 15:00-16:00	Future baseline	Seats available	
		With Project	5.5%	5.5%
		Change	**+5.5 pts**	**5.5 pts**

9.8 Summary and conclusions

9.8.1 The additional air passenger and staff demand generated by the Project, together with GAL's commitments to increasing sustainable transport mode share, would result in a substantial increase in the number of passengers using rail services.

9.8.2 Assessments of the impact on crowding on rail services have been undertaken for both the Network peak (when the trains are at their busiest) and the Project peak (when the Project would add the highest number of passengers), for the assessment years 2029, 2032 and 2047. A summary of the assessments is provided below.

Network peak

9.8.3 In the northbound direction in the morning, the highest increase in line loading is in 2047, where the Project adds 331 passengers (2.4% increase over the future baseline). In 2047 the Seated Load Factor exceeds 1.0 (ie all seats are occupied) along largely the entire route north of Gatwick Airport for fast services. The Project adds around three percentage points to the standing capacity occupied, which is around 20% between Gatwick Airport and East Croydon, and around 50% for services between East Croydon and London Bridge and London Victoria. This indicates that spare capacity is available.

9.8.4 In the southbound direction in the evening, the highest increase in line loading is in 2047, where the Project adds 570 passengers (4.3% increase over the future baseline) on the section between central London and Gatwick Airport. In 2047 the Project adds around seven percentage points to the standing capacity occupied, which is around 20% to 55% between London Bridge/London Victoria and East Croydon and 20% between East Croydon and Gatwick Airport. This indicates that spare capacity is available.

Project peak

9.8.5 In the Project peak for the northbound direction, the highest increase in line loading as a result of the Project is 1,403 passengers (about a 20% increase over the future baseline) in 2047. For this scenario, the Seated Load Factor at East Croydon for services towards London Bridge will exceed 1.0 in the with Project scenario. For these services, the percentage of standing capacity occupied is 24% (with Project), which illustrates that spare capacity is available.

9.8.6 In the Project peak for the southbound direction, the highest increases in line loading as a result of the Project is 924 passengers (about a 12% increase) in 2047. For this scenario, seats are still available. The highest Seated Load Factor is 0.9 for services departing East Croydon (London Bridge branch) towards Gatwick Airport. This means nine out of ten seats are expected to be occupied.

Summary

9.8.7 The Project would increase the number of rail passengers substantially across the day, but based on line loading, Seated Load Factor and standing capacity assessments, no significant increase in crowding on rail services is expected as a result of the Project.

9.8.8 There is generally standing on services in both directions between East Croydon and London Bridge and London Victoria in 2029 and 2032, in the future baseline and with Project scenarios. The travel time for this section of the route is within the 20-minute threshold that DfT use as guidance for acceptable standing, as long as the standing capacity is not exceeded.

9.8.9 In 2047, standing is anticipated to take place along more of the route in the future baseline and with Project scenarios. Standing for more than 20 minutes is strategically undesirable, but it should be noted that:

- No demand adjustments have been made in relation to post-Covid travel behaviours – the peak crowding may therefore be overestimated.
- There is a large standing area available especially in the Class 700 Thameslink units.

9.8.10 It should also be noted that the assessment includes all committed improvements proposed by the rail industry in the future baseline and the with Project scenarios. Moreover, the last Control Period considered for improvements is CP7 (which is to 2029) so the modelling currently assumes no further improvements between 2029 and 2047, which is considered a conservative assumption.

9.8.11 The rail crowding assessment indicates that no additional mitigation is required because of the Project.

10 Public transport: railway station and inter-terminal shuttle assessment

10.1 Gatwick Airport railway station

10.1.1 Opened in 1958, the current station is located adjacent to South Terminal with direct access from the terminal to the station concourse. Diagram 10.1.1 shows the original 1958 design, with the railway station integrated with the terminal and in close proximity to the forecourt area for private vehicle, taxi and bus access from the A23 – in essence, an integrated transport hub.

10.1.2 In 2014, the station underwent a £53 million improvement programme, with opening of an additional platform (Platform 7) and improved circulation for passengers.

10.1.3 However, despite this improvement, the current station is constrained with a shortfall of capacity on the concourse at peak times, including crowding at ticket barriers and information screens; queuing at ticket windows; congestion at ticket gates on the overbridge to access South Terminal; insufficient safeguarded space, also known as run-on and run-off, at the top and bottom of escalator and stair elements; narrow stairs; and inefficient use of platforms and therefore capacity issues for passengers when boarding and alighting trains.

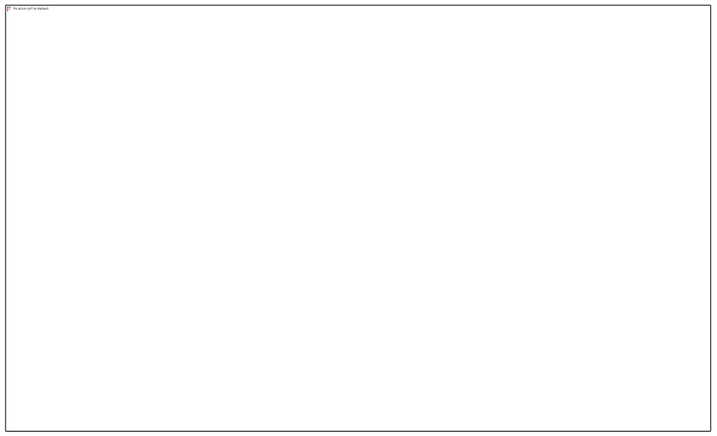
10.1.4 As such, GAL has been working with the Department for Transport, Network Rail, and other stakeholders to develop an appropriate design to improve passenger experience in the station, as part of the Station Project.

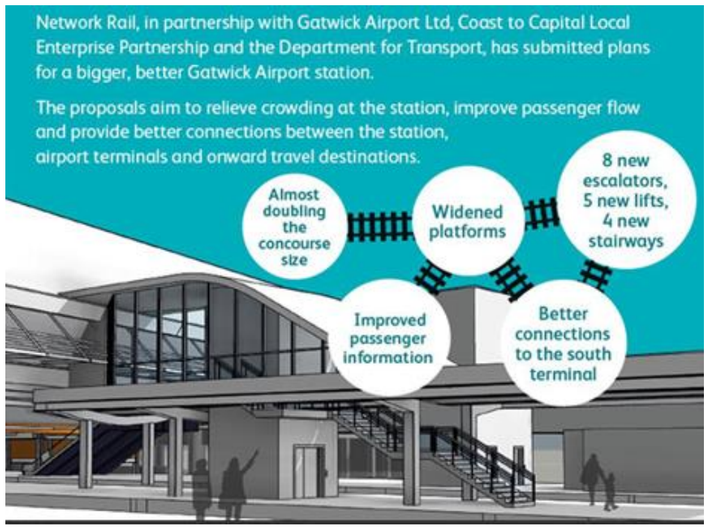
10.1.5 In July 2019, the Department for Transport announced a £150 million investment in the Station Project, which includes doubling the size of the station overbridge, adding five new lifts and eight escalators to improve passenger flow, and widening two platforms to reduce crowding.

10.1.6 Construction for the Station Project commenced in 2019 and is due for completion in 2023. It is therefore the reference design for all future assessment work and modelling of the station.

Diagram 10.1.1: Gatwick Airport station in 1958

Diagram 10.1.2: Station Project enhancements (Source: Network Rail)





10.2 Inter-terminal shuttle

10.2.1 Located in close proximity to the railway station is the Inter-terminal shuttle which takes passengers arriving by rail to or from the North Terminal. The shuttle operates as two trains of three Innovia APM 100 cars manufactured by Bombardier. These two trains each operate on their own track, with a peak headway of six minutes, which means that passengers never wait more than three minutes for a train at peak times.

Diagram 10.2.1: Gatwick inter-terminal shuttle system

10.2.2 There is a shuttle station at each end of the system, with a single central boarding platform between the two tracks and two alighting platforms, on the outside of each track. This means that boarding and alighting flows can be kept separate which reduces congestion and dwell times.

10.2.3 The system was upgraded in 2010 and has an average design life of 25 years, meaning another upgrade is likely to be required prior to the end of the assessment period. Modelling reported here has assumed the current shuttle configuration and service frequency.

10.3 Legion model

Model history

10.3.1 Network Rail's Governance for Railway Investment Projects (GRIP) defines different design stages for rail projects in the UK, with GRIP3 being the option selection phase, GRIP4 being further development of that single design option and GRIP5 representing Detailed Design stage of a preferred option to be taken forward for construction.

10.3.2 For use in the assessment for the DCO application, Network Rail provided GAL with the 2036 GRIP5 Legion model developed as part of the Gatwick Airport Station Project.

10.3.3 The GRIP5 model was developed by a third party on behalf of Network Rail to inform the business case and design development of the Gatwick Station Project. The model was calibrated and validated to observed survey data prior to being used for future year testing by Network Rail. The model was used to demonstrate the performance of the station under 2036 AM and PM peak demand conditions assuming incremental growth and no Northern Runway project.

10.3.4 The latest version of the model was provided to GAL by Network Rail on 18 August 2022 and has been modified to reflect the requirements of the DCO in terms of demand and assessment years (see 10.4) as well inclusion of the Inter-Terminal Shuttle system (see 10.6).

Model extents

10.3.5 The model of the station as provided by Network Rail includes the existing concourse, the new concourse and all seven platforms, as shown in Diagram 10.3.1.

10.3.6 The GRIP5 model provided by Network Rail has been built assuming the design that is currently being constructed, as follows:

- A gated station solution (ie including for ticket gates). This is different to the modelling undertaken for Preliminary Environmental Information Report (PEIR) which was based on the GRIP3 design for the redevelopment of the station. This GRIP3 design assumed that the station would be an 'open' station (ie there would be no gatelines within the station).
- The existing concourse is primarily the station entry concourse (ie for those departing Gatwick Airport on trains), with the main customer information screens and ticket retail accommodated in the reconfigured concourse.
- The airport entry concourse provides the main exit route from all platforms to the Airport, being an expansion of the existing station overbridge. This concourse also provides a new entry route to the station from the South Terminal forecourt and Passenger Terminal Interchange (PTI) Customer information screens will also be provided on this concourse.

- The station will continue to operate broadly as per current passenger flows, with boarding passengers encouraged to wait on the platforms as far as possible (to safeguard train dwell times).
- The passenger composition (the number of passengers with luggage and restricted mobility) passing through the station is based on Network Rail's passenger survey carried out at the station.

10.3.7 Arup has taken Network Rail's validated and calibrated Legion model and extended it to include the inter-terminal shuttle operation. Diagram 10.3.2 shows the South Terminal station but the model now also includes the North Terminal station which is configured in the same way, with a central boarding platform and alighting platforms on the outside.

10.3.8 The shuttle operation has been calibrated using video and CCTV footage, in particular for loading of boarding platforms and maximum loading of the shuttle itself.

Stakeholder engagement

10.3.9 Model files and outputs have been shared with Network Rail as part of the engagement process. At a meeting held to discuss the modelling on 1 December 2022, Network Rail indicated that the modelling approach was logical and that the results were as expected and proportionate.

Diagram 10.3.1: Legion model of Gatwick Airport railway station

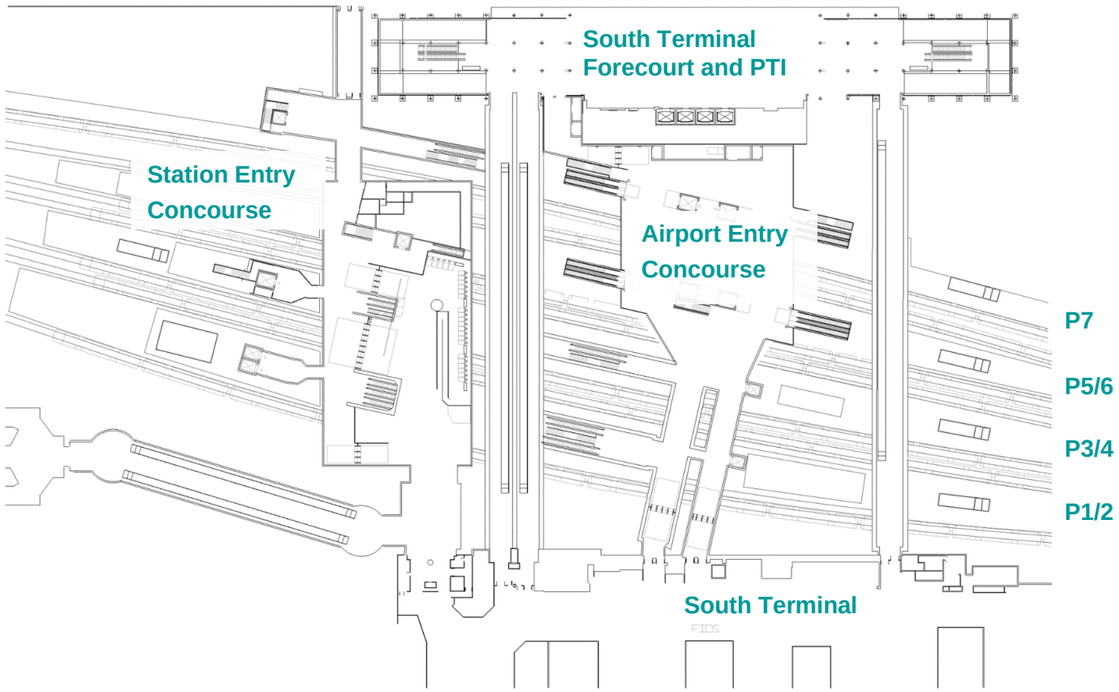
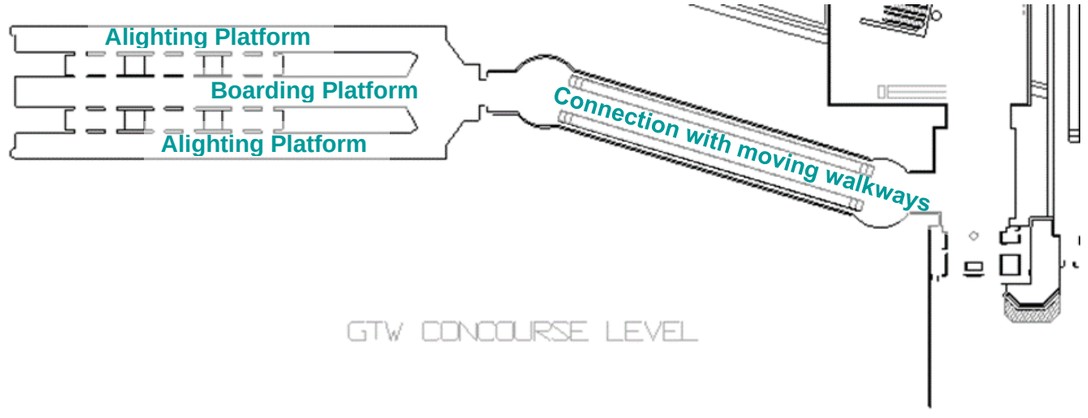


Diagram 10.3.2: Legion model of inter-terminal shuttle extension (South Terminal)



10.4 Demand

10.4.1 Testing of Gatwick Airport station and the shuttle has been undertaken for six future demand scenarios: the future baseline in 2029, 2032, and 2047 and the same years with the Project. Both the AM and PM two-hour peak have been modelled.

10.4.2 Demand into and out of the station is taken from the strategic rail model for the specific peak hours modelled.

10.4.3 Entity groups include passengers arriving at or departing from Gatwick Airport and using rail, passengers using the South Terminal forecourt and commuters using Gatwick Airport station.

10.4.4 Interchange movements are also included in the model and have been calculated as 7.3% of the total station entry and exit journeys, based on the Office of Road and Rail (ORR) Station Footfall figures for 2019/20 (ie pre-Covid).

10.4.5 Table 13.5.1 shows the total modelled demand across a two-hour AM and PM peak. These demand numbers include rail passengers as well as people using South Terminal forecourt and parts of the South Terminal.

10.4.6 The strategic transport model has been run for a 2019 year to allow comparison, calibration and validation with observed data, including observed 2019 gateline data for the station. Table 10.5.2 shows AM and PM station entry and exit demand for each assessment year factored to reflect the peaking profiles from the 2019 observed data.

10.4.7 Given that PM peak rail demand is higher than AM peak rail demand, PM peak output has been reported in this TA, with a full set of results described in the technical report which is provided in the **Transport Assessment Annex D – Station and Shuttle: Legion Modelling Report** (Doc Ref. 7.4).

Passenger types and luggage

10.4.8 The passenger composition is based on Network Rail's passenger survey carried out in May 2014, which is the calibration/validation year of the GRIP5 modelling undertaken for the Station Project, and divides passengers across three types: no luggage, medium luggage and large luggage, as per Table 10.5.3.

Train timetable

10.4.9 Diagram 10.5.1 and Diagram 10.5.2 show the frequency of train services per platform in the AM and PM peak period. Platforms 4 and 7 have the most train arrivals and departures.

10.5 Station operation

10.5.1 Vertical circulation in Gatwick Airport railway station and replicated in the 2036 Legion model provided by Network Rail is shown in Diagram 10.5.3. There are nine up and eight down escalators, eight bi-directional stairs and one one-way stair to and from the platforms.

Table 10.5.1: Demand modelled across 2-hour AM and PM peak

Total Demand	Future baseline 2029	Project 2029	Future baseline 2032	Project 2032	Future baseline 2047	Project 2047
AM 2 hours (07:00-09:00)	20,371	21,710	21,717	25,105	22,100	28,494
PM 2 hours (16:00-18:00)	19,707	20,965	20,512	25,265	23,920	28,557

Table 10.5.2: Station entry and exit demand modelled across each AM and PM peak hour for each horizon (calibrated to 2019 gateline counts)

Station Demand	Future baseline 2029	Project 2029	Future baseline 2032	Project 2032	Future baseline 2047	Project 2047
AM Entries (07:00-08:00)	1,446	1,555	1,587	1,829	1,833	2,192
AM Exits (07:00-08:00)	2,637	3,127	2,800	3,555	3,172	4,220
AM Entries (08:00-09:00)	3,143	3,353	3,402	4,051	3,871	4,679
AM Exits (08:00-09:00)	3,020	3,526	3,193	3,975	3,552	4,672
PM Entries (16:00-17:00)	2,237	2,363	2,318	2,839	2,912	3,339
PM Exits (16:00-17:00)	3,218	3,341	3,384	4,016	3,971	4,637
PM Entries (17:00-18:00)	2,713	2,948	2,816	3,507	3,440	4,031
PM Exits (17:00-18:00)	3,295	3,477	3,480	4,199	4,053	4,874

Table 10.5.3: Passenger types used in model

Type	No Luggage	Medium Luggage	Large Luggage
Alighters	54%	36%	10%
Boarders	51%	36%	13%
Meeters	100%	0%	0%
Interchange	90%	10%	0%
Staff	100%	0%	0%

Diagram 10.5.1: AM train departures per platform

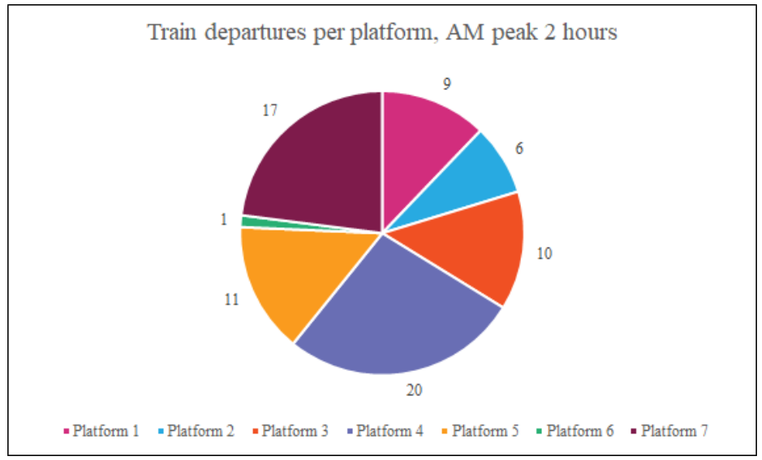


Diagram 10.5.2: PM train departures per platform

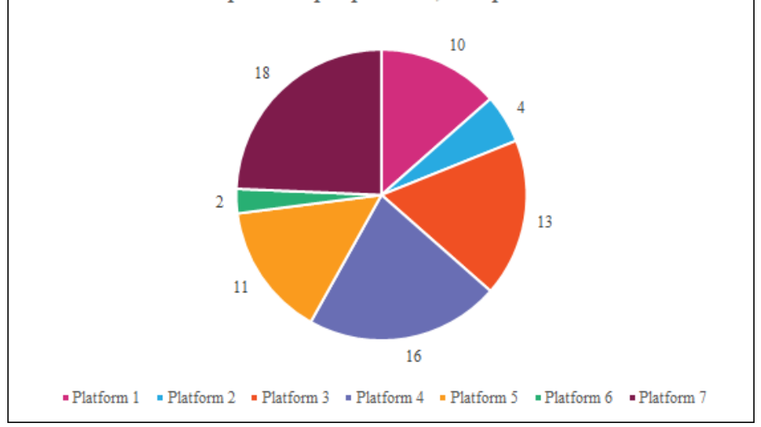
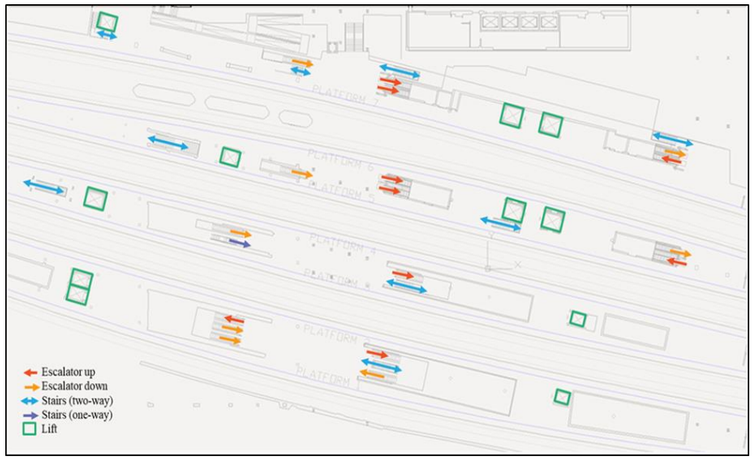


Diagram 10.5.3: Platform vertical circulation



10.5.2 Assumptions related to vertical circulation elements include the following and are as per the GRIP5 model provided to GAL by Network Rail:

- Escalator capacity flow rate at 54 passengers per minute.
- Lift capacity at 35% of the plated capacity.
- Lift cycle times of 110 seconds per cycle.

10.5.3 The above flow rates were confirmed during a site survey in July 2019. Train arrivals on all platforms between 16:00 and 17:30 were observed and escalator flow rates recorded. For escalators with a continuous demand over one minute, flow rates observed were between 52 and 57 people per minute.

10.5.4 The following maximum flow rates for stairs have been used from Network Rail's Station Capacity Planning Guidance (Network Rail, 2016).

- Stairs (one-way): 35 passengers/minute/metre.
- Stairway (two-way): 28 passengers/minute/metre.

Gateline operation

10.5.5 The gateline operation at concourse level comprises:

- Station Entry Concourse, consisting of three gatelines:
  - West: 3 Wide Aisle Gates (WAGs) – all Exit
  - Middle: 8 WAGs – all Entry
  - East: 4 WAGs – all Entry
- The Airport Entry concourse and overbridge, consisting of 2 gatelines:
  - North Bridge: 4 WAGs – all Exit
  - South Bridge: 3 WAGs + 1 standard width Automatic Ticket Gate (ATG) – all Exit
- PTI Gateline, consisting of 3 WAGs:
- Both AM and PM Peaks = 1 Entry, 1 Exit and 1 Reversible

10.5.6 The following gateline flow rate assumptions have been taken from the Network Rail model and were confirmed with Network Rail:

- passengers with large luggage/reduced mobility/in wheelchairs: flow rate of 12 ppl/min/gate.
- passengers with medium luggage: flow rate of 12 ppl/min/gate.
- passengers with small/no luggage: flow rate of 25 ppl/min/gate.

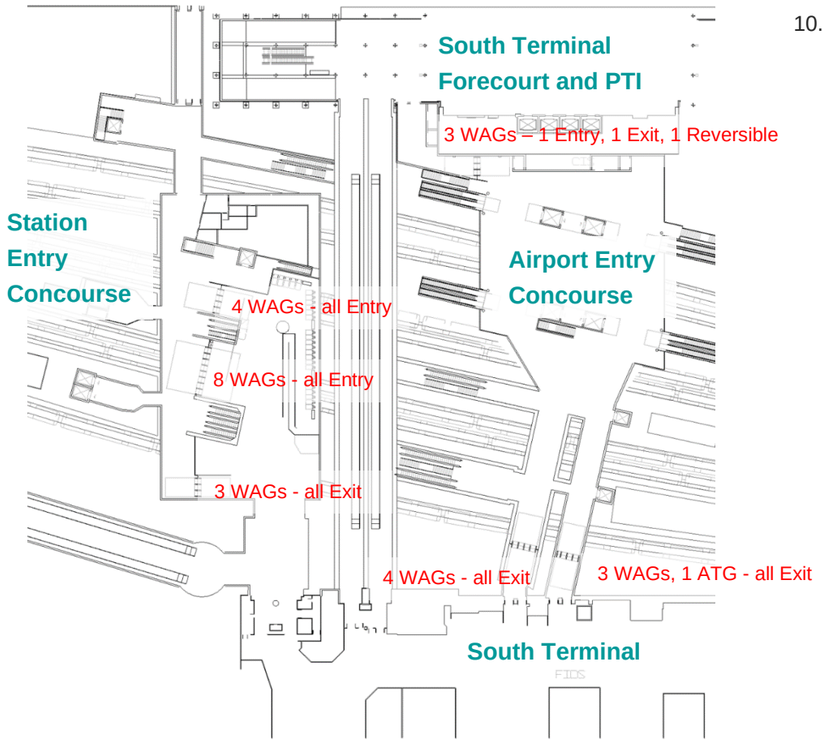
10.5.7 This approach is in line with Network Rail's standards which states that the "*maximum uni-directional WAG throughput may be equal to a standard ATG but it is recommended the throughput is reduced, to reflect the reduced travel speed of PRMs [Persons with Reduced Mobility]*".

10.5.8 Based on discussions in the meeting between GAL and Network Rail in December 2022, a level of signage and potential operational intervention has been assumed to improve the balance of demand between the two gatelines from the airport entry concourse into South Terminal. The same assumptions for signage and intervention have been assumed in the future baseline and with Project and are described below.

10.5.9 As agreed at the meeting, up to 25% of passengers arriving from the northern side of Platforms 5/6 and 7 are assumed to be directed by signage to the southern gateline. In addition, it is assumed that signage or operational staffing will be provided in peak periods in the North Bridge directing up to 25% passengers through to the South Bridge when queuing builds back across the access corridor from Platforms 1/2.

10.5.10 25% of rail passengers is equivalent to 50% of staff and 12.5% of air passengers from Platforms 5/6 and 7 being directed to use the South Bridge in the PM peak. The majority of staff who use rail to come to the Airport are aware of the southern gateline and therefore 50% using the southern gateline at busy times is considered realistic and appropriate.

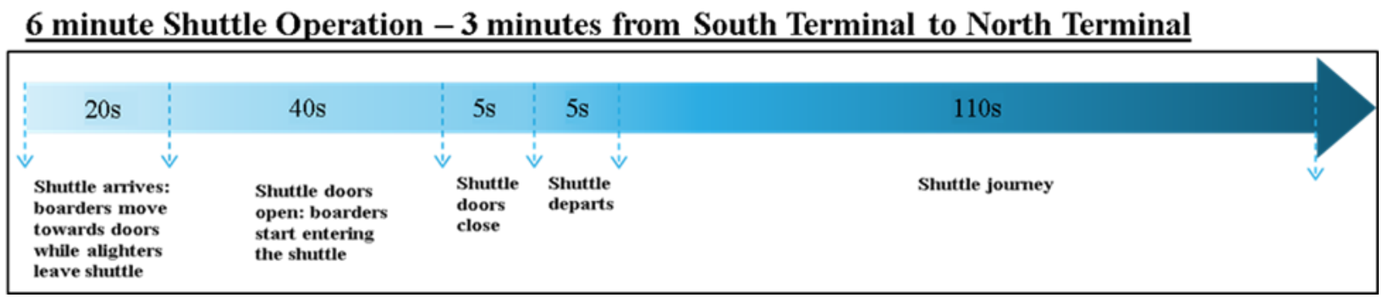
Diagram 10.5.4: PM train departures per platform



10.6 Shuttle operation

10.6.1 The shuttle connections between the North and South Terminals have been added to the Network Rail model. Diagram 10.6.1 shows the pattern of service to achieve a 6-minute shuttle headway. Timings are based on data received from GAL and a site survey undertaken by Arup in 2019.

Diagram 10.6.1: 6-minute shuttle operation times



10.7 Assessment criteria

Levels of service

10.7.1 The analysis has been undertaken against Network Rail's Station Capacity Planning Design Manual (December 2021). The assessment of crowding is based on Fruin Level of Service (LoS) criteria.

10.7.2 Fruin LoS is used to describe pedestrian movement, relating density of pedestrians and flow rates for walkways and circulation areas, stairs and in queues, with LoS A representing free flow and LoS F a complete breakdown in circulation as demonstrated on Diagram 13.7.1.

10.7.3 LoS C is typically used for designing transport interchanges as it provides a balance between congestion, design and operations. Network Rail therefore typically recommends LoS C or better for the design of new stations and station enhancements.

10.7.4 It is important to note that Fruin differentiates between LoS for walkways – areas where a pedestrian would expect free movement – and queues/waiting areas – where pedestrians tolerate higher densities and still consider their environment comfortable. The difference between flow rates and area requirements for walkways and queues at each LoS range are very different, as shown in Table 10.7.1.

10.7.5 Platforms are considered as a queuing/waiting environment and Network Rail guidance states that these should perform at LoS B/C or 0.93 m^2 per person. Similarly, concourse waiting areas should perform at LoS B for queuing/waiting behaviour at 1.0 m^2 per person.

10.7.6 This is an important consideration when reviewing any Legion outputs shown in this report. The typical approach is to show a Fruin walkways map such that the overall station performance can be considered. This mapping may show areas of queuing as LoS D or E for walkways – ie less than 1.0 m^2 per person. However, if these locations are where a queue is expected to occur, such as at the top or bottom of an escalator, at gatelines or for boarding on a platform, it should be assessed in terms of acceptable queuing density.

10.7.7 Given that the concourse level is a mix of circulation and waiting/queuing behaviours, LoS mapping for this level of the station is shown using both Fruin Level of Service criteria for walkways and queuing. Platforms have been shown using LoS criteria for walkways and for queuing, in order to show both higher density "hotspots" (using the walkways output) and the actual LoS experienced on the platform (using the queuing output).

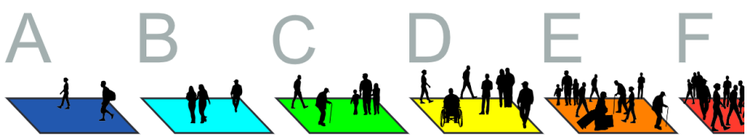
10.7.8 A summary of the assessment criteria in the Network Rail's Station Capacity Planning Guidance (Network Rail, 2016) to be used when assessing normal operations is as follows:

- Concourse circulation areas – LoS C Walkways
- Concourse waiting areas – LoS B Queuing
- Gateline queues – LoS D Queuing
- Platforms – LoS B/C Queuing

Table 10.7.1: Fruin Level of Service criteria for walkways and queuing

Level of Service	Fruin Walkways		Fruin Queuing
	Flow (people per m of circulation width)	Area per Person (m^2)	Area per Person (m^2)
A	23 or less	3.3 or more	1.2 or more
B	23 to 33	2.3 to 3.3	0.9 to 1.2
C	33 to 49	1.4 to 2.3	0.7 to 0.9
D	49 to 66	0.9 to 1.4	0.3 to 0.7
E	66 to 82	0.5 to 0.9	0.2 to 0.3
F	82 and over	0.5 or less	0.2 or less

Diagram 10.7.1: Levels of Service ranges



Level of service	Definition
A	Free circulation
B	Uni-directional flows and free circulation with only minor conflicts.
C	Slightly restricted circulation, with difficulty passing others. Reverse and cross-flows with difficulty.
D	Restricted circulation for most. Reverse and cross-flows with significant difficu
E	Restricted circulation for all. Intermittent stoppages and serious difficulty for reverse and cross-flows.
F	Complete breakdown of flow with frequent stoppages.

10.7.9 The following sections show Level of Service mapping from the Legion model. This mapping is colour coded as per Diagram 10.7.1, with the blue end of the spectrum showing more free flow conditions (LoS A and B) and yellow to red (LoS D to F) showing more congested conditions and a deterioration in Level of Service.

10.8 Comparison of future baseline and with Project scenarios

Concourse level, future baseline

10.8.1 Diagram 10.8.1 to Diagram 10.8.3 show LoS on the concourse level for the PM peak 15 minutes for 2029 through to the 2047 future baseline scenarios.

10.8.2 In general, the station concourse level performs at a comparable LoS through to the 2047 in the future baseline, with predominantly LoS A to LoS C (Walkways) shown by the modelling – specifically, 91% of passenger time at LoS C or better in 2029 reducing slightly to 87% by 2047. Whilst demand increases from around 11,500 passengers in the 2029 future baseline PM peak period to around 14,400 passengers by 2047, a difference of 2,900 passengers, there are 74 trains calling at Gatwick over that time period, meaning that this demand growth is on average only 39 more people per train, or if considering a 12-car train, three extra people per train car. Accordingly, the LoS experienced by passengers reflects this with only minor deterioration in LoS over time.

10.8.3 Higher densities are shown at the gatelines with LoS E (Walkways) shown by the model. This reflects that gatelines are queuing environments and accordingly people expect to slow down at these points of the journey and are prepared to tolerate higher densities.

10.8.4 LoS E for Walkways is equivalent to densities reducing to LoS C/D, for Queuing, as per Diagram 10.8.4 to Diagram 10.8.6, which is expected. For the future baseline, densities never exceed LoS C Queuing.

10.8.5 Higher densities are also shown on escalator elements which reflects people bunching on escalator treads which is typical and expected.

Concourse level, with Project

10.8.6 Diagram 10.8.7 to Diagram 10.8.9 show LoS on the concourse level for the PM peak 15 minutes for 2029 through to the 2047 with Project scenarios.

10.8.7 In general, the station concourse level performs at a comparable Level of Service through to 2047 with the Project, with predominantly LoS A to LoS C shown by modelling. Whilst demand increases from around 14,400 passengers in the 2047 future baseline PM peak period to around 16,900 passengers by 2047 with the Project, a difference of 2,500 passengers, there are 74 trains calling at Gatwick over that time period, meaning demand growth is on average only 34 more people per train, or if considering a 12-car train, three extra people per train car. Accordingly, the LoS mapping reflects this, with only a minor deterioration in LoS between the two scenarios.

10.8.8 Higher densities are shown at the gatelines with LoS E (Walkways) shown by the model. This reflects that gatelines are queuing environments and accordingly people expect to slow down at these points of the journey and are prepared to tolerate higher densities.

10.8.9 LoS E for Walkways is equivalent to densities reducing to LoS C/D for Queuing, as shown in Diagram 10.8.10 to Diagram 10.8.12: for 2029 to 2047 respectively. LoS C is expected and LoS D can be tolerated for queuing at gatelines for short periods at the height of the peak[9], noting that flows at this gateline are one-way and other circulation routes are unaffected.

Platform level, future baseline

10.8.10 Diagram 10.8.13 to Diagram 10.8.15 show LoS Walkways on the platform level for the PM peak 15 minutes for 2029 through to the 2047 future baseline scenarios.

10.8.11 It can be seen that platforms perform at an appropriate LOS, with predominantly LoS C or better (Walkways) shown by the modelling. Higher densities are shown on some narrower sections of platform as well as at the base of escalator elements, in particular on Platforms 3, 5 and 7, which reflects that these are waiting or queuing environments. As described in Section 10.7, these higher densities are typical and expected at such locations.

10.8.12 Diagram 10.8.16 to Diagram 10.8.18 show LoS Queuing on the platform level for the PM peak 15 minutes for 2029 through to the 2047 future baseline scenarios.

10.8.13 The model shows primarily LoS A for queuing environments, ie more than 1.2 m^2 per person, with pockets of higher density at LoS B/C, indicating acceptable conditions. LoS D is shown by the model at the base of escalators indicating slower moving queues at these locations.

Platform level, with Project

10.8.14 Diagram 10.8.19 to Diagram 10.8.21 show LoS Walkways on the platform level for the PM peak 15 minutes for 2029 through to the 2047 future baseline scenarios.

10.8.15 It can be seen that platforms perform at an appropriate LoS, with predominantly LoS C or better shown by the modelling. Higher densities are shown on some narrower sections of platform as well as at the base of escalator elements, in particular on Platforms 3, 5 and 7, which reflects that these are waiting or queuing environments.

10.8.16 Diagram 10.8.22 to Diagram 10.8.24 show LoS Queuing on the platform level for the PM peak 15 minutes for 2029 through to the 2047 future baseline scenarios.

10.8.17 The model shows primarily LoS A for queuing environments, ie more than 1.2 m^2 per person, with pockets of higher density at LoS B/C. LoS D is shown on Platform 3 at a localised platform pinchpoint. However, there is opportunity for passengers to move into less crowded areas on Platform 3 and, in general, modelling shows acceptable conditions.

[9] Modelling shows that LoS D is only shown for the peak 5 minutes within the peak 15 minutes.

Diagram 10.8.1: Concourse LoS, Fruin walkways – 2029 future baseline PM peak (17:30-17:45)

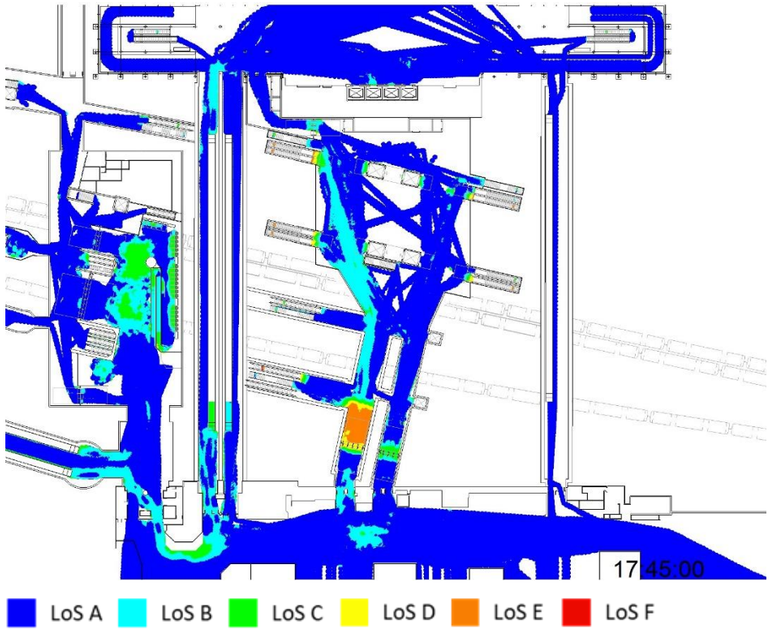


Diagram 10.8.2: Concourse LoS, Fruin walkways – 2032 future baseline PM peak (17:30-17:45)

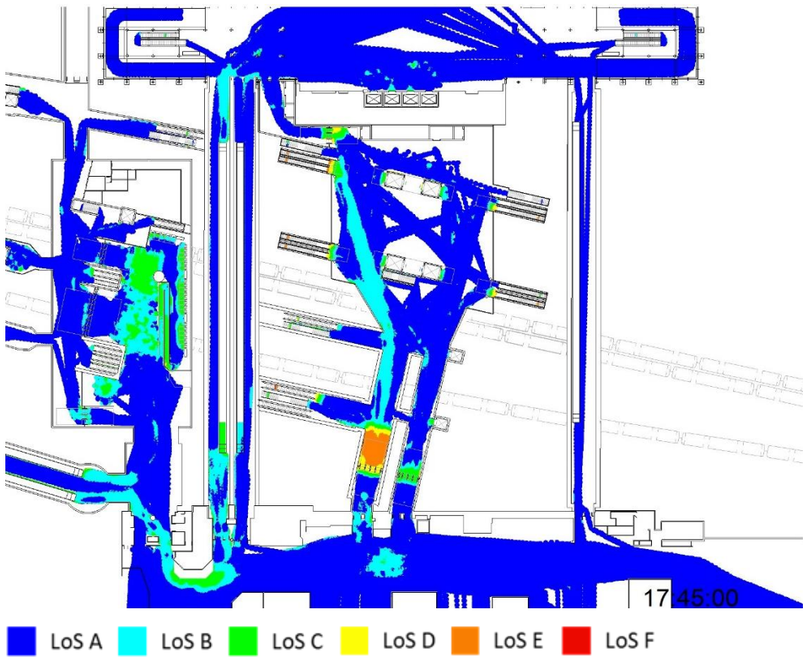


Diagram 10.8.3: Concourse LoS, Fruin walkways – 2047 future baseline PM peak (17:30-17:45)

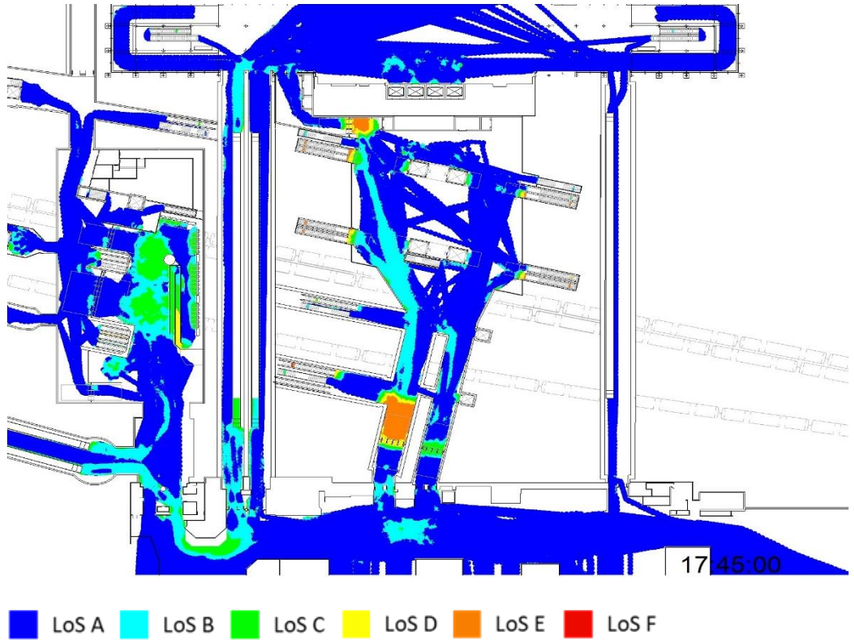


Diagram 10.8.4: Concourse LoS, Fruin queuing – 2029 future baseline PM peak (17:30-17:45)

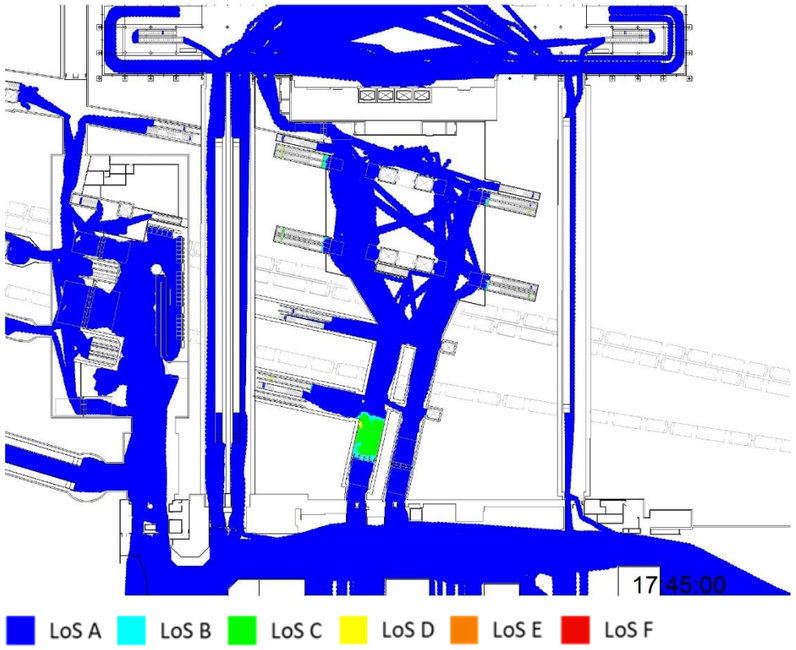


Diagram 10.8.5: Concourse LoS, Fruin queuing – 2032 future baseline PM peak (17:30-17:45)

Diagram 10.8.6: Concourse LoS, Fruin queuing – 2047 future baseline PM peak (17:30-17:45)

Diagram 10.8.7: Concourse LoS, Fruin walkways – 2029 with Project PM peak (17:30-17:45)

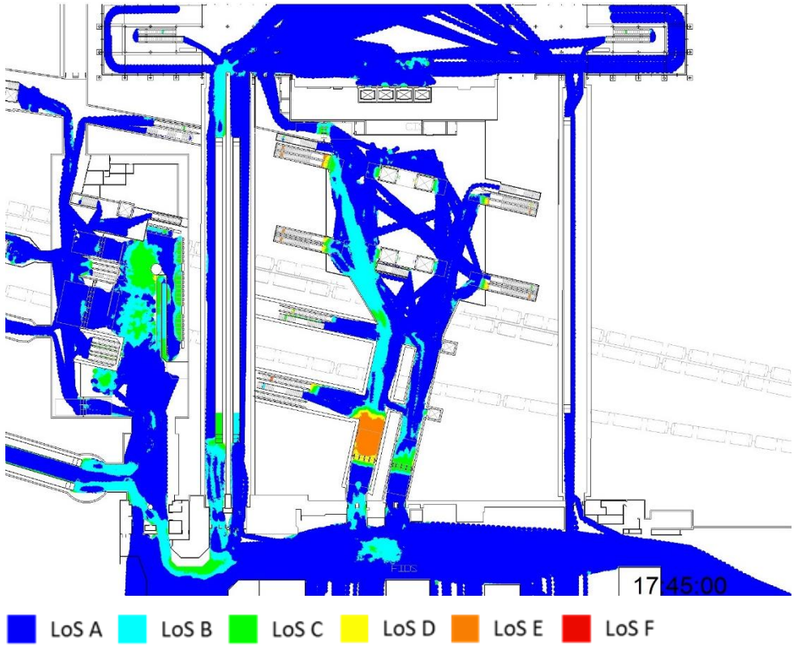


Diagram 10.8.8: Concourse LoS, Fruin walkways – 2032 with Project PM peak (17:30-17:45)

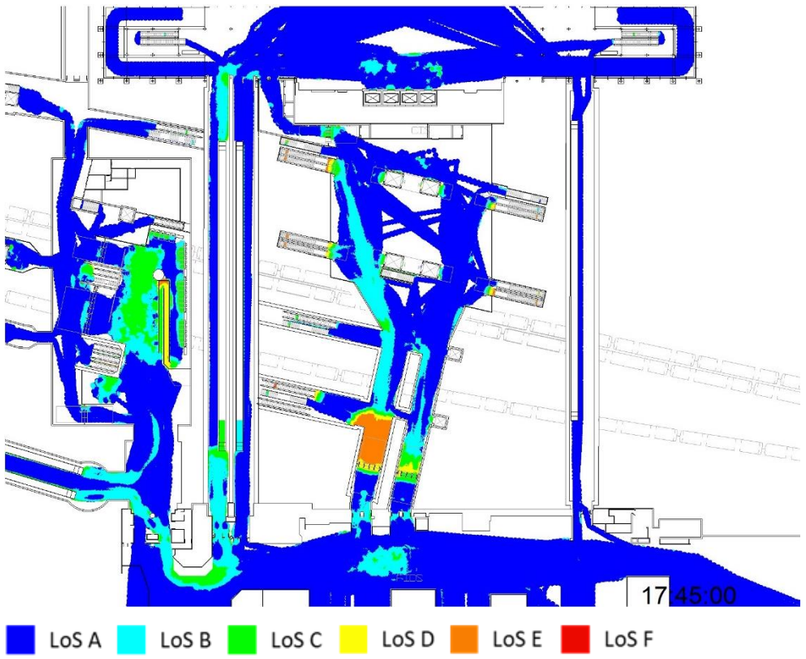


Diagram 10.8.9:: Concourse LoS, Fruin walkways – 2047 With Project PM peak (17:30-17:45)

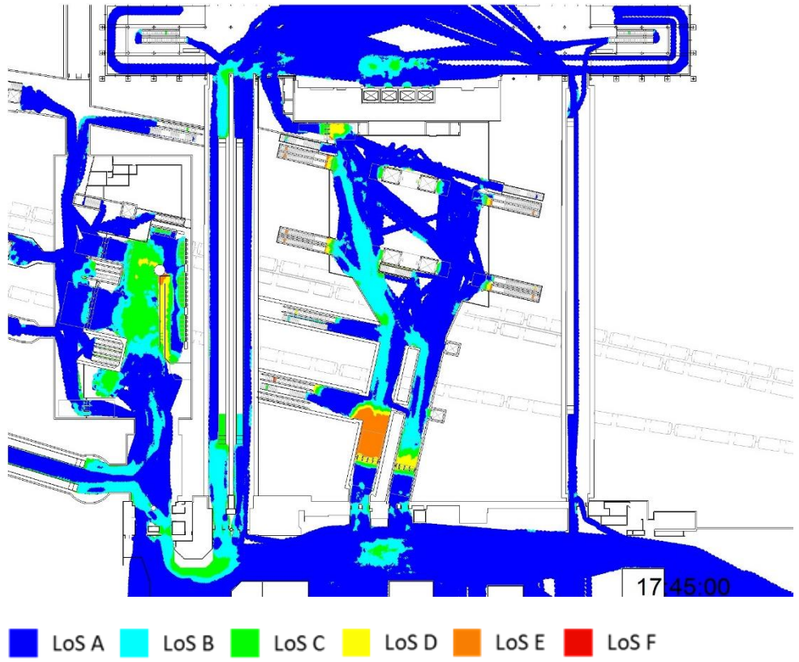


Diagram 10.8.10: Concourse LoS, Fruin queuing – 2029 with Project PM peak (17:30-17:45)

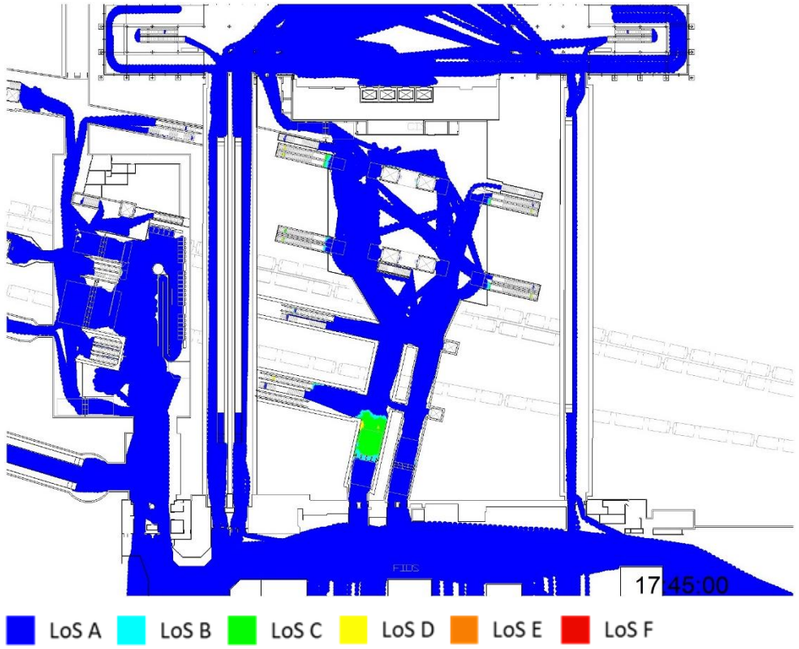


Diagram 10.8.11: Concourse LoS, Fruin queuing – 2032 with Project PM peak (17:30-17:45)

Diagram 10.8.12: Concourse LoS, Fruin queuing – 2047 with Project PM peak (17:30-17:45)

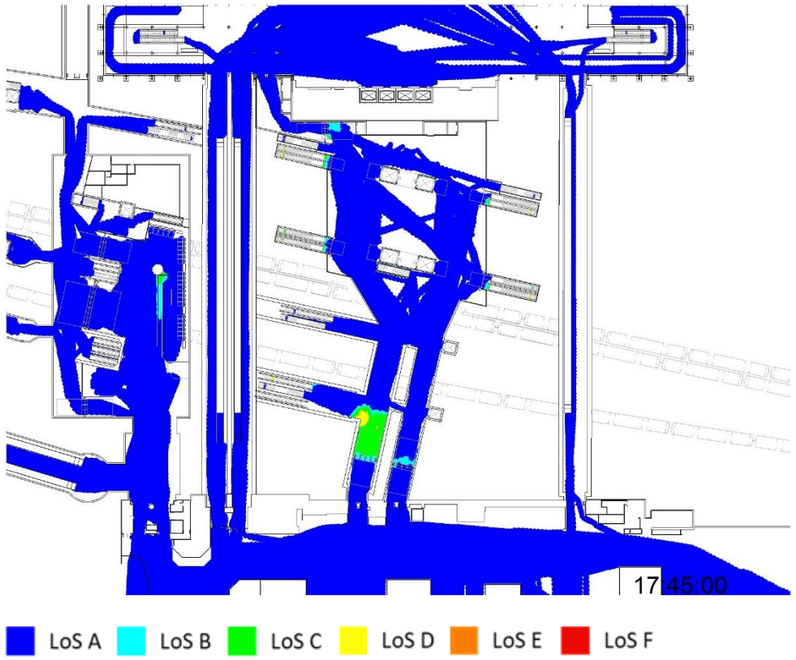


Diagram 10.8.13: Platform LoS, Fruin walkways – 2029 future baseline PM peak (17:00-17:15)

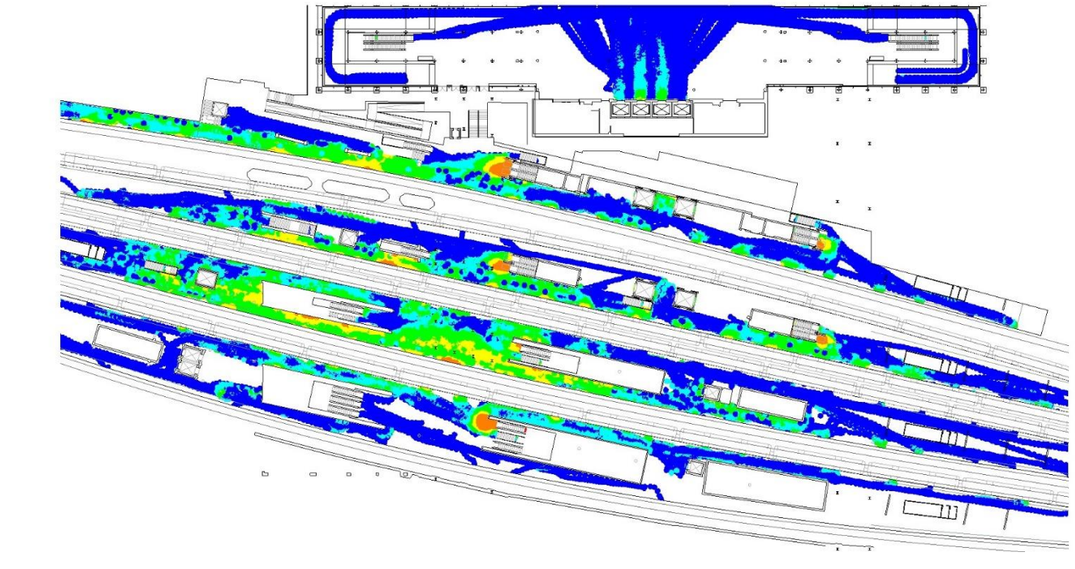


Diagram 10.8.14: Platform LoS, Fruin walkways – 2032 future baseline PM peak (17:00-17:15)

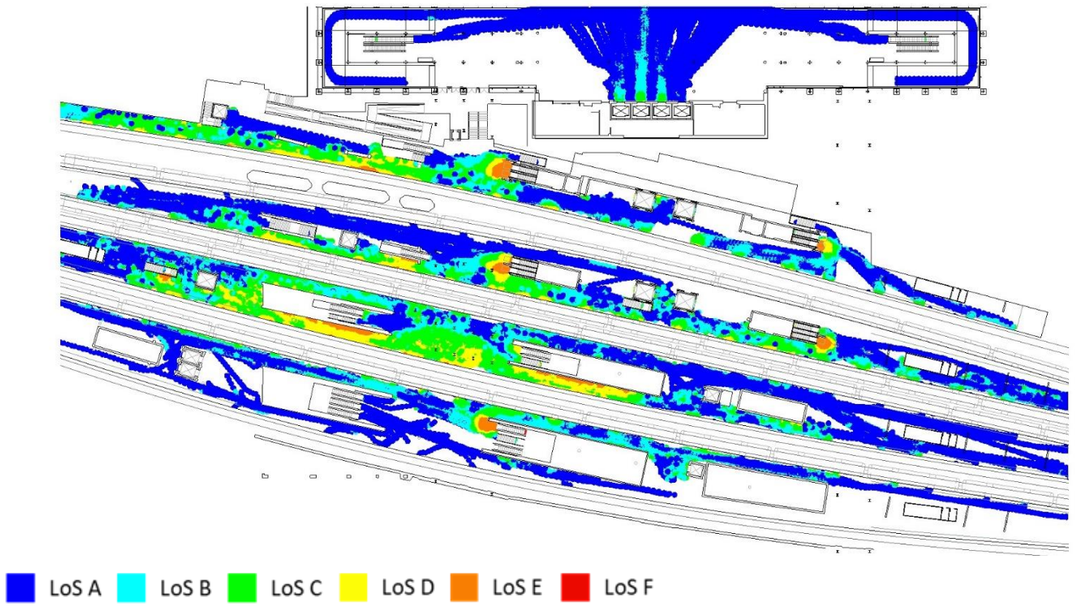


Diagram 10.8.15: Platform LoS, Fruin walkways – 2047 future baseline PM peak (17:00-17:15)

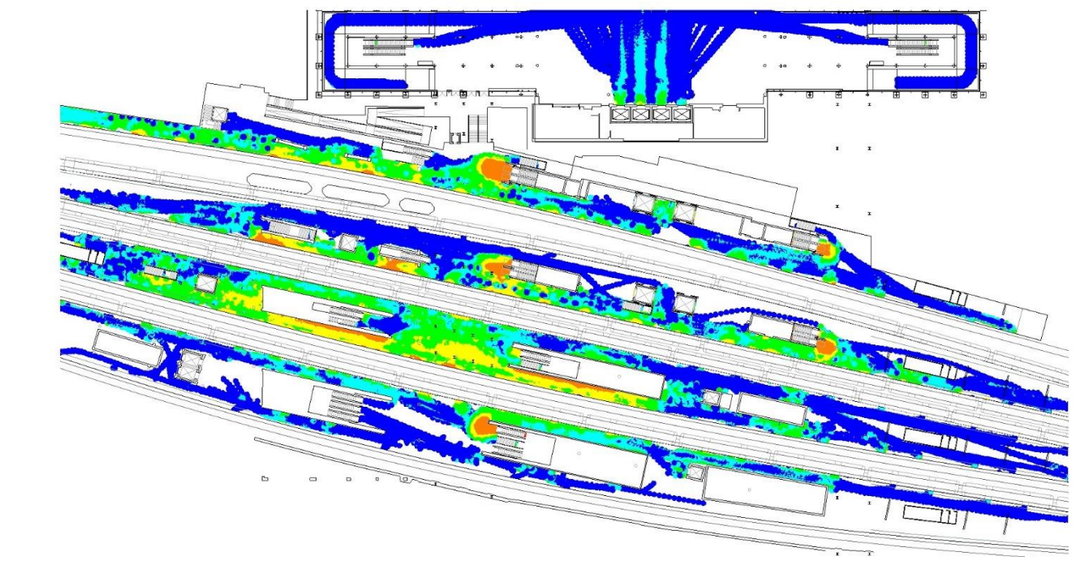


Diagram 10.8.16: Platform LoS, Fruin queuing – 2029 future baseline PM peak (17:00-17:15)

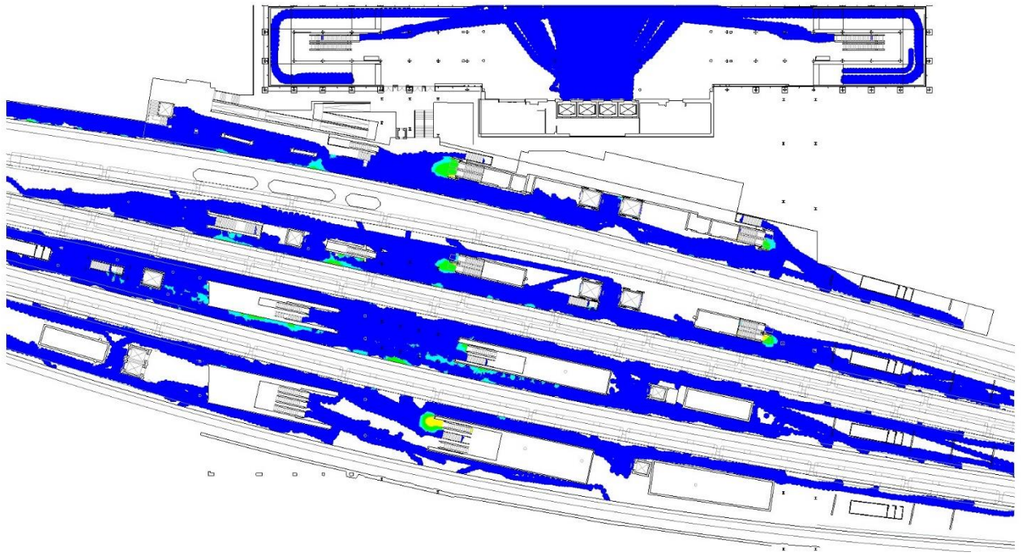


Diagram 10.8.17: Platform LoS, Fruin queuing – 2032 future baseline PM peak (17:00-17:15)

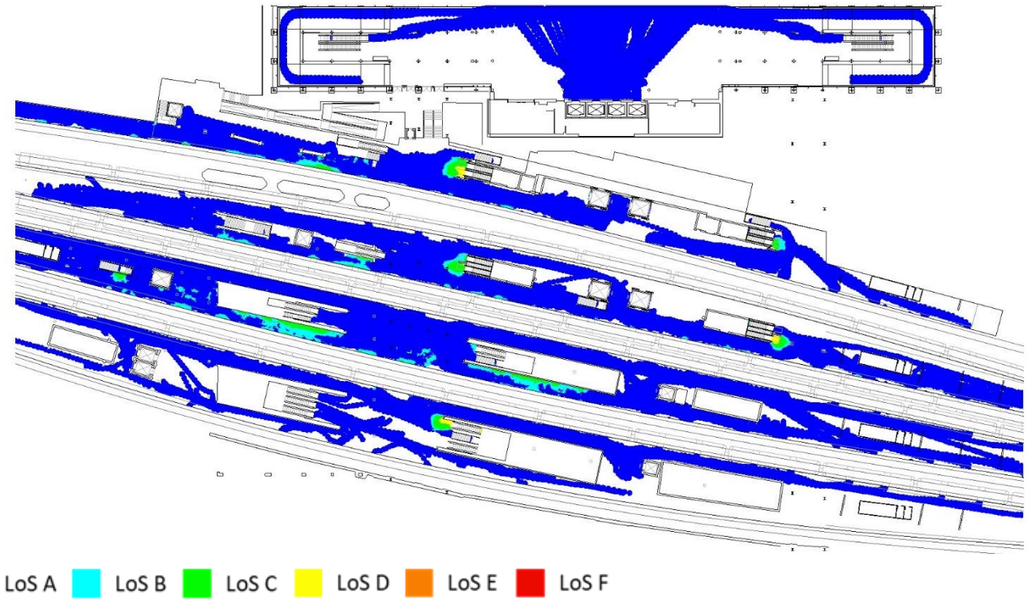


Diagram 10.8.18: Platform LoS, Fruin queuing – 2047 future baseline PM peak (17:00-17:15)

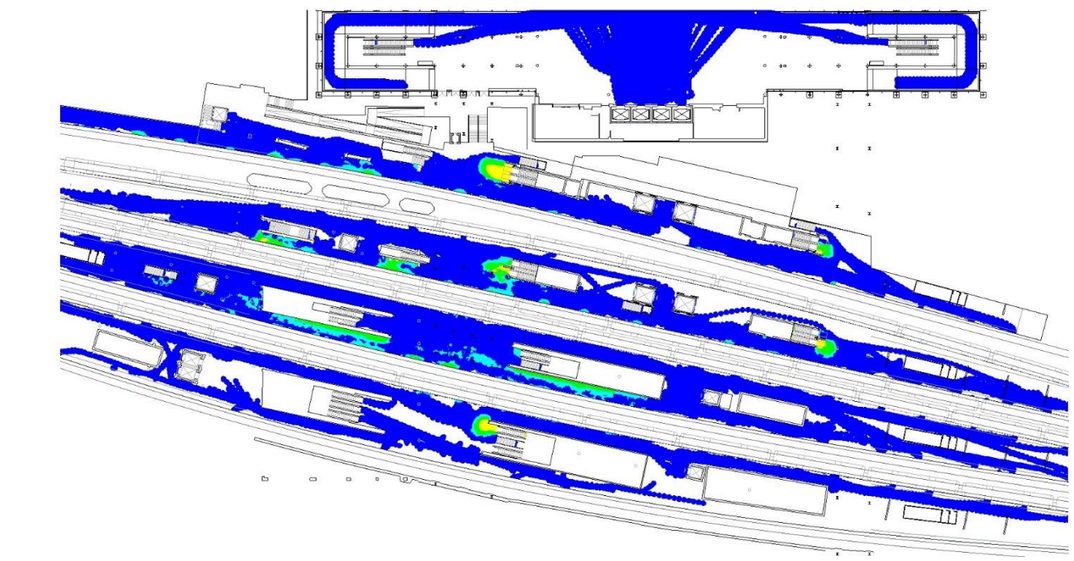


Diagram 10.8.19: Platform LoS, Fruin walkways – 2029 with Project PM peak (17:00-17:15)

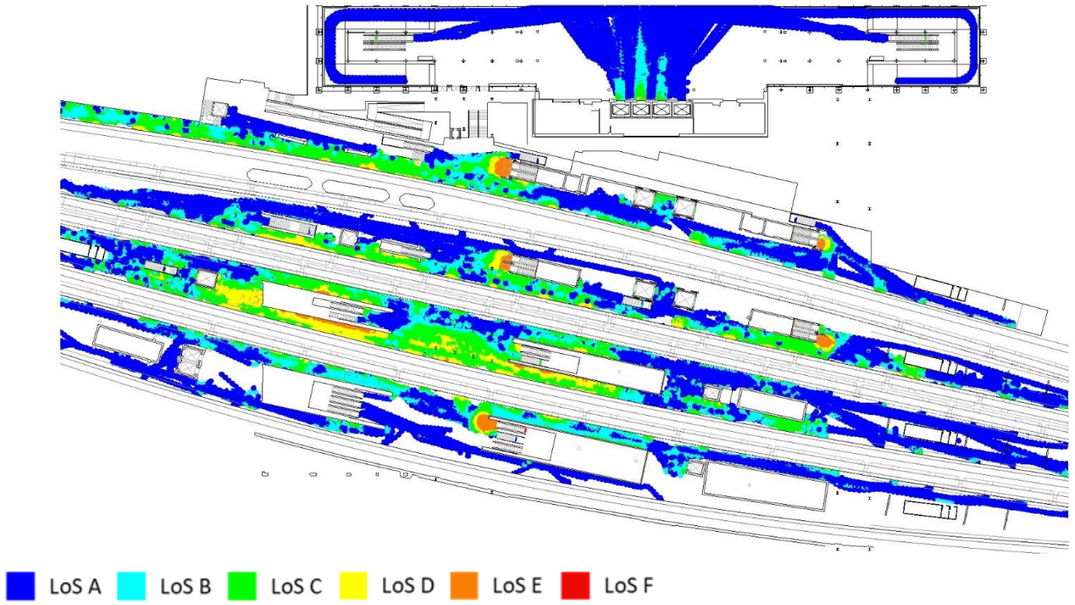


Diagram 10.8.20: Platform LoS, Fruin walkways – 2032 with Project PM peak (17:00-17:15)

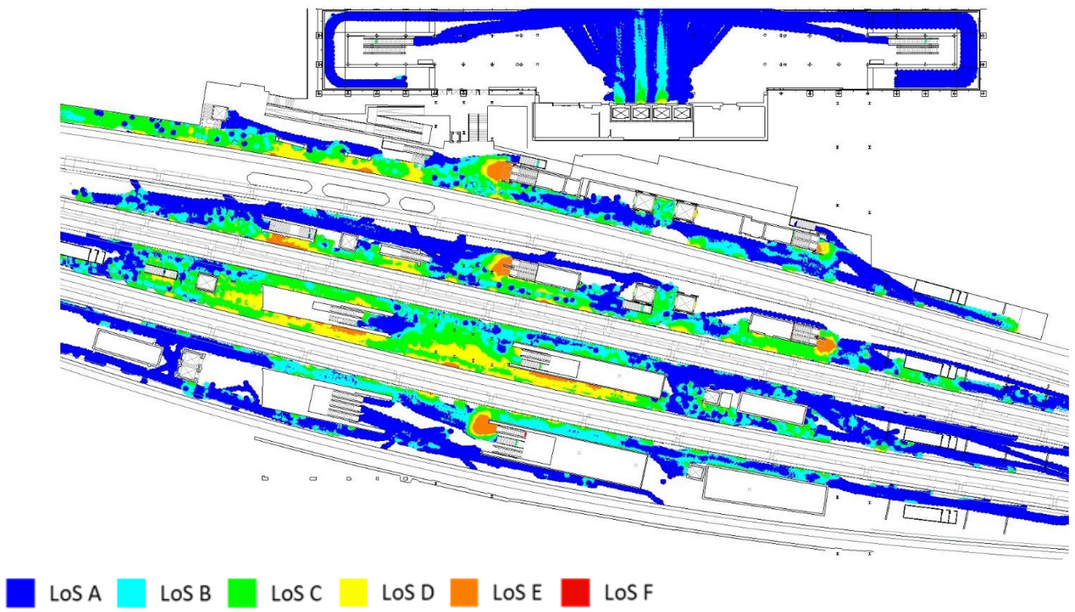


Diagram 10.8.21: Platform LoS, Fruin walkways – 2047 with Project PM peak (17:00-17:15)

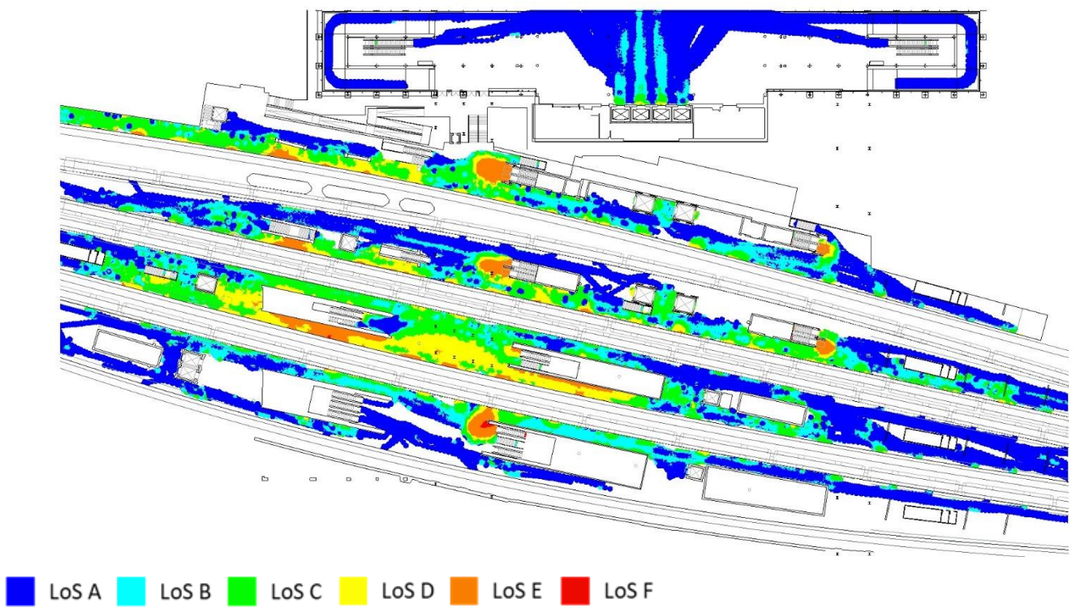


Diagram 10.8.22: Platform LoS, Fruin queuing – 2029 with Project PM peak (17:00-17:15)

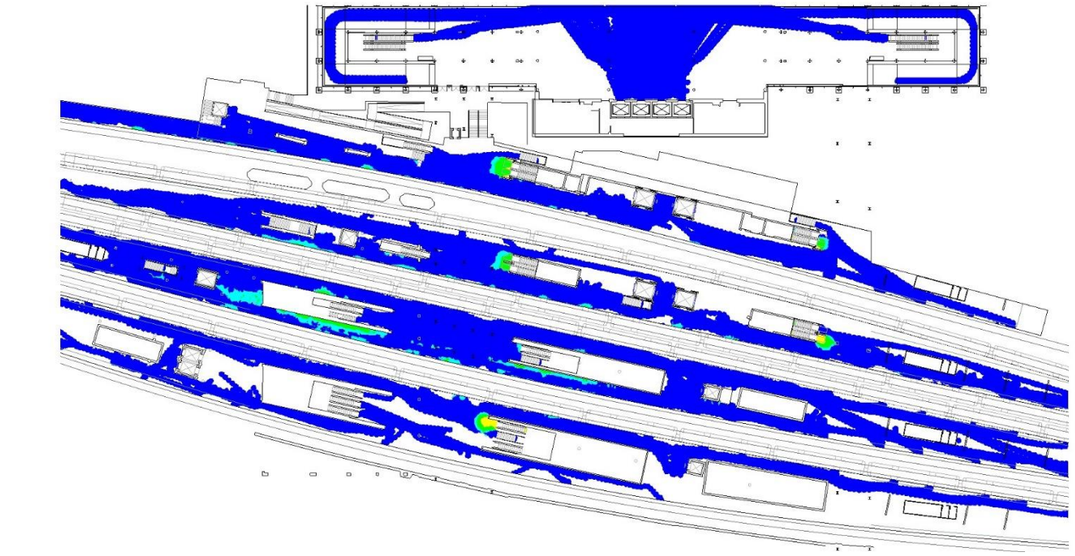


Diagram 10.8.23: Platform LoS, Fruin queuing – 2032 with Project PM peak (17:00-17:15)

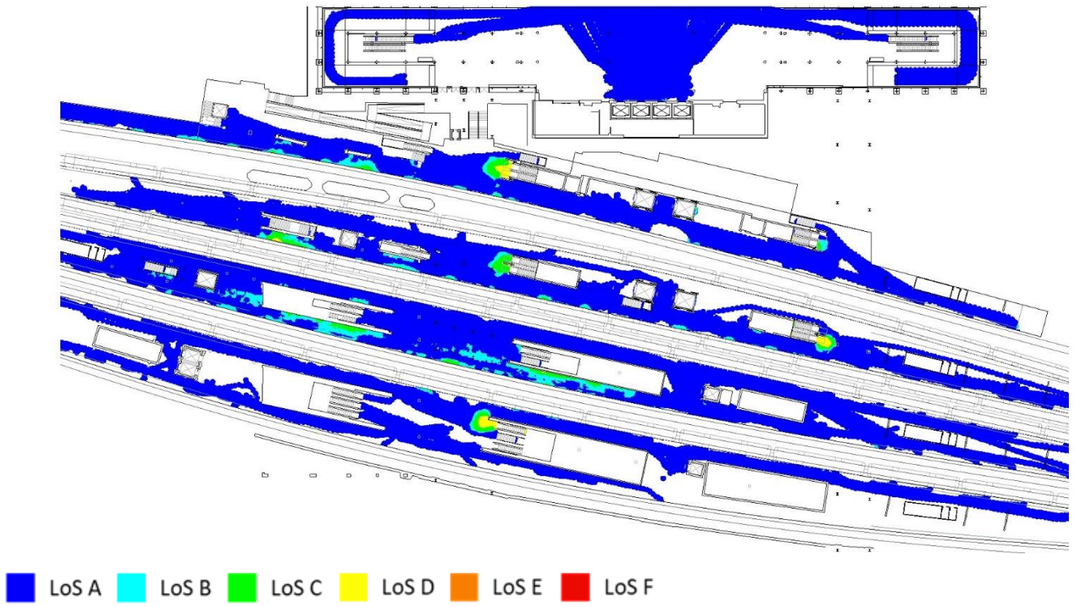
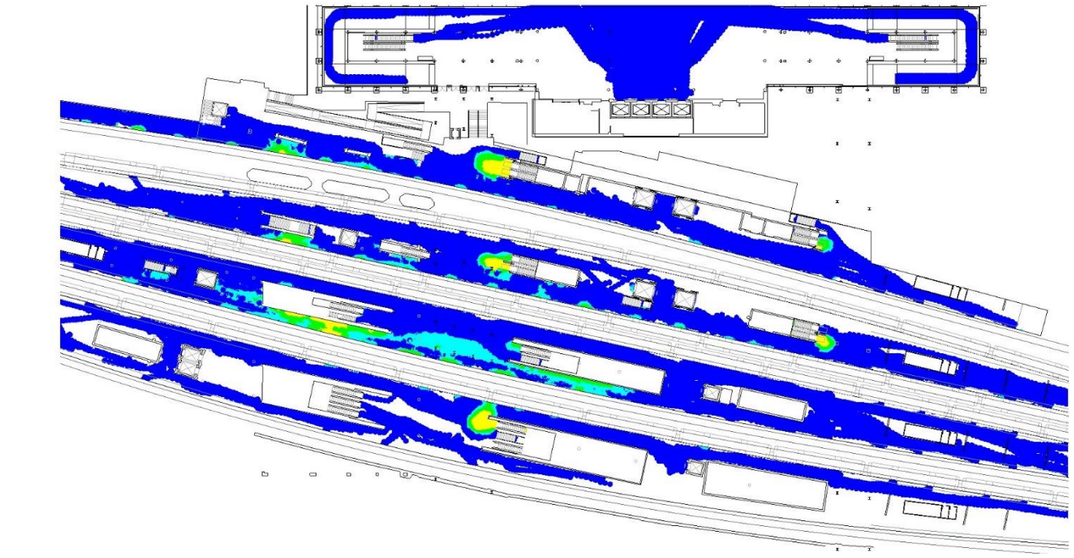


Diagram 10.8.24: Platform LoS, Fruin Queuing – 2047 with Project PM Peak (17:00-17:15)



Summary of performance

Level of Service (LoS)

10.8.18 The Walkways LoS performance across all scenarios for the station entry and airport entry concourses is shown in Diagram 10.8.25 and Table 10.8.1,excluding escalator elements.

10.8.19 The percentage of passenger time spent at different LoS ranges varies between scenarios however all future years show station performance at concourse level being predominantly LoS C or better for Walkways (81% to 91% of passenger time at LoS C or better depending on scenario)[10]. The chart and table show that there is little difference in performance between the baseline and with Project scenarios and that performance is generally acceptable and appropriate, though at peak times at gatelines into the terminal, passengers will experience more congested conditions, as per paragraph 10.8.20. Gatwick Airport station has seven platforms and there are 74 trains calling at Gatwick in peak periods, meaning demand is spread over a high number of services and therefore impacts between future baseline and with Project scenarios and between assessment years are incremental, as illustrated by the charts and tables in this chapter.

10.8.20 This is reconfirmed by the LoS Queuing outputs for the concourses in Diagram 10.8.26 and Table 10.8.2 which show 84% to 92% at LoS A depending on scenario. The crowding at the gateline in the North Bridge of the station entry concourse is the primary cause of the 2% to 5% of passenger time spent at LoS D.

10.8.21 The Walkways LoS performance across all scenarios for the station platforms is shown in Diagram 10.8.27 Diagram 10.8.28 and Table 10.8.3, excluding escalator queuing areas and escalator elements, using a Walkways comparison, ie as if the platforms were circulation environments.

10.8.22 All future years show station performance at platform level at predominantly LoS C or better (63% to 78% of passengers experience LoS C or better depending on scenario).

Diagram 10.8.25: Concourse LoS, Fruin walkways – all scenarios, PM peak (16:00-18:00)

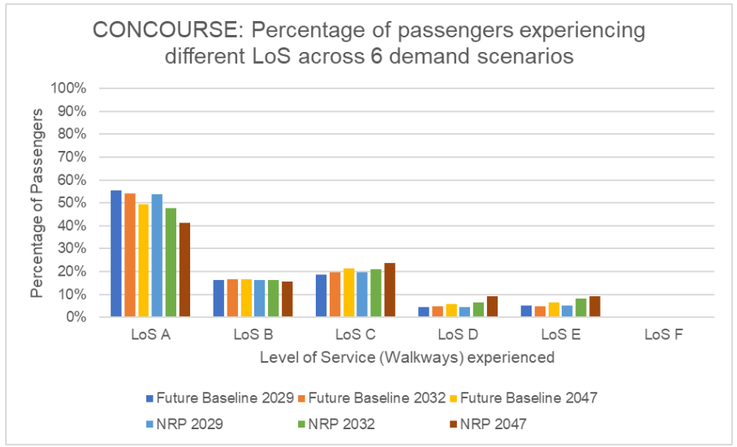


Table 10.8.1: Concourse LoS, Fruin walkways – all scenarios, PM peak (16:00-18:00)

	PM Level of Service Walkways					
	Future baseline			Project		
	2029	2032	2047	2029	2032	2047
LoS A	55%	54%	49%	54%	48%	41%
LoS B	16%	17%	17%	16%	16%	16%
LoS C	20%	20%	21%	20%	21%	24%
LoS D	4%	5%	6%	5%	6%	9%
LoS E	5%	5%	6%	5%	8%	9%
LoS F	0%	0%	0%	0%	0%	1%

Diagram 10.8.26: Concourse LoS, Fruin queuing – all scenarios, PM peak (16:00-18:00)

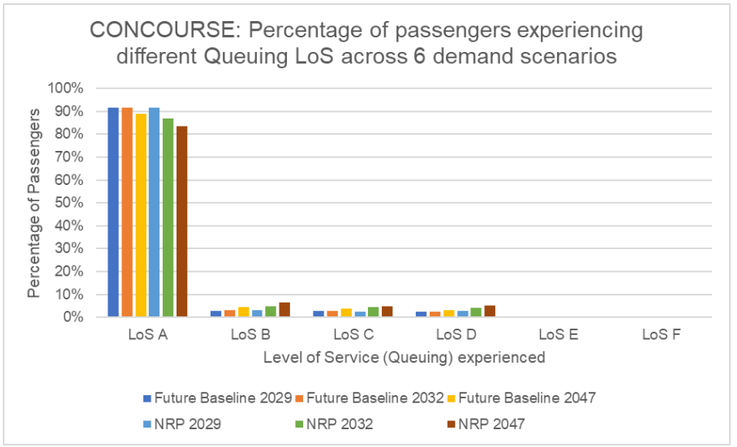


Table 10.8.2: Concourse LoS, Fruin queuing – all scenarios, PM peak (16:00-18:00)

	PM Level of Service Queuing					
	Future baseline			Project		
	2029	2032	2047	2029	2032	2047
LoS A	92%	92%	89%	91%	87%	84%
LoS B	3%	3%	4%	3%	5%	7%
LoS C	3%	3%	4%	3%	4%	5%
LoS D	3%	3%	3%	3%	4%	5%
LoS E	0%	0%	0%	0%	0%	0%
LoS F	0%	0%	0%	0%	0%	0%

10.8.23 It should be noted that platforms are considered more of a queuing environment than a typical walking environment as platforms typically have a mix of passengers waiting and standing still (essentially queuing) or walking at slower speeds to either move along or exit from the platform. To reflect this type of environment, Network Rail recommends using Fruin Queuing LoS for platforms, which represents a lower overall space requirement per passenger. The guidance states that platforms should perform at Queueing LoS B/C or 0.93 m^2 per person or better.

[10] Please note tables in this section have been rounded to the nearest integer.

Diagram 10.8.27: Platforms LoS, Fruin walkways – all scenarios, PM peak (16:00-18:00)

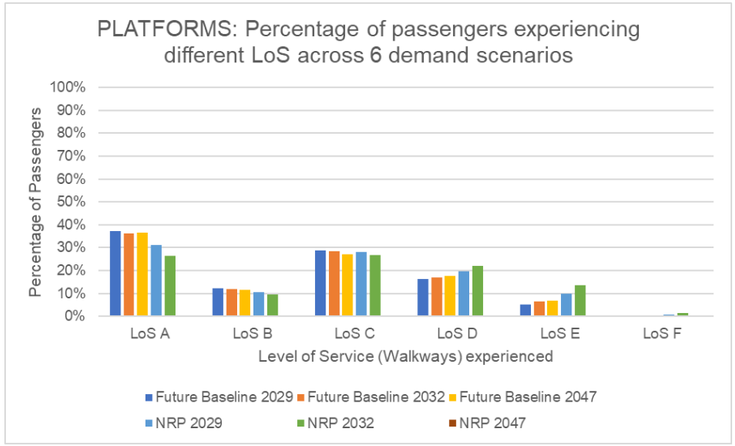


Diagram 10.8.28: Platforms LoS, Fruin queuing – all scenarios, PM peak (16:00-18:00)

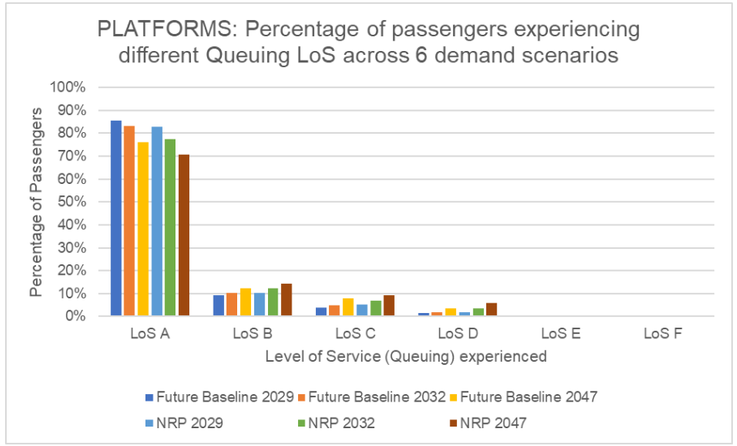


Table 10.8.3: Platform LoS, Fruin walkways – all scenarios, PM peak (16:00-18:00)

	PM Level of Service Walkways					
	Future baseline			Project		
	2029	2032	2047	2029	2032	2047
LoS A	37%	36%	31%	36%	31%	26%
LoS B	12%	12%	10%	12%	11%	10%
LoS C	29%	28%	27%	27%	28%	27%
LoS D	16%	17%	20%	18%	20%	22%
LoS E	5%	6%	11%	7%	10%	14%
LoS F	0%	0%	1%	0%	1%	1%

Table 10.8.4: Platform LoS, Fruin queuing – all scenarios, PM peak (16:00-18:00)

	PM Level of Service Queuing					
	Future baseline			Project		
	2029	2032	2032	2029	2032	2032
LoS A	86%	83%	76%	83%	77%	71%
LoS B	9%	10%	12%	10%	12%	14%
LoS C	4%	5%	8%	5%	7%	9%
LoS D	1%	2%	4%	2%	4%	6%
LoS E	0%	0%	0%	0%	0%	0%
LoS F	0%	0%	0%	0%	0%	0%

10.8.24 The LoS performance across all scenarios for the station platforms is shown in Diagram 10.8.28 and Table 10.8.4 using LoS Queuing criteria, excluding escalator-related elements. This shows performance at predominantly LoS B or better in terms of Fruin Queuing (85% to 95% of passengers depending on scenario), so acceptable conditions. Small areas of localised congestion do occur, with a low proportion of passenger time sent at LoS D (6% or lower depending on scenario).

10.9 Conclusions

10.9.1 Improvements to Gatwick Airport Station, which have already been consented and are scheduled to be complete in 2023, form the basis of the Legion model used for testing the impact of the Project.

Station performance

10.9.2 In the PM peak, modelling shows station performance at concourse level being predominantly LoS C or better for Walkways (81% to 91% of passengers experience LoS C or better depending on scenario), as follows:

- 2029 future baseline at 91% LoS C or better for Walkways as compared to 90% LoS C or better for 2029 with Project.
- 2032 future Baseline at 91% LoS C or better for Walkways as compared to 85% LoS C or better for 2032 with Project.
- 2047 future baseline at 87% LoS C or better for Walkways as compared to 81% LoS C or better for 2047 with Project.

10.9.3 Congestion does occur at the gateline in the North Bridge of the station entry concourse, and this is the main cause of passenger time spent at LoS D Queuing by 2047 with Project. The level of queuing at LoS D is acceptable as it is only for short periods, with flows being one-way and other circulation routes being unaffected. When comparing assessment years:

- 2029 future baseline at 3% LoS D Queuing as compared to 3% LoS D for 2029 with Project.
- 2032 future baseline at 3% LoS D Queuing as compared to 4% LoS D for 2032 with Project.
- 2047 future baseline at 3% LoS D Queuing as compared to 5% LoS D for 2047 with Project.

10.9.4 The modelling shows station performance at platform level being predominantly LoS B or better in terms of Fruin Queuing (85% to 95% of passengers depending on scenario), so acceptable conditions, as follows:

- 2029 future baseline at 95% LoS B or better for Queuing as compared to 93% LoS B or better for 2029 with Project.
- 2032 future baseline at 93% LoS B or better for Queuing as compared to 89% LoS B or better for 2032 with Project.
- 2047 future baseline at 88% LoS B or better for Queuing as compared to 85% LoS B or better for 2047 with Project.

10.9.5 Small areas of localised congestion do occur, with a low proportion of passenger time spent at LoS D (6% or lower depending on scenario). When comparing assessment years:

- 2029 future baseline at 1% LoS D Queuing as compared to 2% LoS D for 2029 with Project.
- 2032 future baseline at 2% LoS D Queuing as compared to 4% LoS D for 2032 with Project.
- 2047 future baseline at 4% LoS D Queuing as compared to 6% LoS D for 2047 with Project.

10.9.6 As described in Section 10.7, Network Rail has developed guidelines using Level of Service criteria which allow the performance of existing and new stations to be assessed *"to provide adequate levels of comfort without making stations uneconomically large"*[11]. These guidelines do not give specific thresholds at which station performance is, or is not, acceptable, but allow the levels of passenger comfort and crowding to be identified and reviewed for overall performance in the context of an operational station. Thus, although the Legion modelling for Gatwick Airport station indicates that there would be some congestion to 2047 both without and with the Project, this is limited to peak times when busier conditions would be expected in any event and the degree of congestion indicated is not unexpected or untypical of busier stations across the rail network.

10.9.7 The above modelling and analysis demonstrates that the Project does not require any additional works beyond those already committed to the station to mitigate the Project's impact, as station performance remains acceptable as described in paragraphs 10.9.2 to 10.9.5.

Stakeholder engagement

10.9.8 Model files and outputs have been shared with Network Rail as part of the DCO process. At a meeting held to discuss the modelling in December 2022, Network Rail indicated that the modelling approach was logical and that results were as expected and proportionate.

[11] p.12, Network Rail, Station Capacity Planning, Design Manual NR/GN/CIV/100/03 (December 2021)

11 Public transport: bus and coach

11.1 Introduction

11.1.1 Gatwick Airport is served by bus and coach services at both North and South Terminals. At North Terminal, the bus stops are located on Furlong Way. At South Terminal, the bus stops are on either side of the A23 and are accessible by lift from South Terminal arrivals (for the northbound stops towards Redhill and Horley) and from the inter-terminal shuttle station, near the train station (for southbound stops), as shown in Diagram 3.2.1. There is also a pedestrian walkway which connects both sides of the road.

11.1.2 Bus and coach operators include Metrobus, National Express, Megabus and Oxford Bus Company. Destinations include Brighton, London, Heathrow Airport, South Wales, the South West, Hampshire and the West Midlands. Bus and coach mode share for air passengers was around 6% pre-pandemic, and these modes accounted for 16% of staff travel.

11.2 Bus and Coach services at Gatwick Airport

Coach services

11.2.1 The airport is served by a range of coach services, which both complement and compete with the rail network. The most popular National Express direct services to and from Gatwick are shown inTable 6.4.1 for the modelling (2016) and current (2022) baselines. Coach services have yet to fully recover to the pre-pandemic frequencies but are expected to do so as demand continues to return to the airport.

11.2.2 Other coach services include:

- Megabus routes, serving Gatwick from London (EB1) and Bristol (M25).
- the Airline service between Gatwick and Oxford operated by the Oxford Bus Company.

11.2.3 Through GAL's Sustainable Transport Fund, some coach services have been part funded by GAL in the past but currently all services are operated commercially without financial support from GAL. GAL is in active negotiations and discussions with potential operators on future routes.

11.2.4 Many operators have invested in high-quality vehicles, customer service improvements and effective marketing which have contributed to more attractive coach services.

Table 11.2.1: Popular National Express coach services to Gatwick

Routes	Modelling Baseline (2016)		Existing Baseline (2022)		Fastest Journey Time
	Service	Daily Services	Service	Daily Services	
London (Victoria) to Gatwick	A3	37	025	22	1hr 50 mins
Brighton to Gatwick	025, 026, 028, 029, 201, 206, 747	23	025	19	40 mins
Heathrow to Gatwick	200, 201, 210, 230, 707, 727, 747	81	025, 201, 210	43	50 mins
Bristol to Gatwick	200, 201	19	201	8	3hrs 35 mins
Birmingham to Gatwick	210	23	210	10	3hrs 50 mins
Cardiff to Gatwick	201	22	201	8	4hrs 30 mins
Swansea to Gatwick	201	15	201	8	5hrs 40 mins

Local bus services

11.2.5 The majority of local bus services are provided by Metrobus and are used by airport staff and air passengers, as well as rail passengers accessing Gatwick Airport station.

11.2.6 Metrobus provides three 'Fastway' bus routes, calling at stops with shelters and real-time information displays and using a combination of bus lanes and guided busways to achieve bus priority over general traffic:

- 10: Bewbush – Broadfield – Crawley – Gatwick Airport
- 20: Broadfield – Three Bridges – Gatwick Airport – Crawley – Horley
- 100: Maidenbower – Three Bridges – Crawley – Gatwick Airport – Horley – Redhill

11.2.7 Metrobus also provides conventional routes:

- 3 Crawley – Three Bridges – Gatwick Airport
- 4 and 5: County Oak – Crawley – Wakeham Green
- 22: Holbury St Mary – Docking – Crawley
- 200: Horsham – Gatwick Airport
- 400: East Grinstead – Gatwick Airport – Redhill – Caterham
- 420/460: Sutton/Epsom – Redhill – Crawley

11.2.8 There is also the Southdown PSV service operating one route: 422 Reigate – Gatwick Airport – Crawley.

11.2.9 Particular emphasis has been placed on improving early morning and evening services to the airport every day of the week, as well as strengthening weekend services, in order to enable shift work staff to travel by bus.

11.2.10 GAL has worked with Metrobus to develop an extensive, 24-hour, local bus network. GAL is currently funding some of these local bus services through its Sustainable Transport Fund. Typically, GAL will provide Metrobus with catchment information and Metrobus will provide a proposed route and a funding plan for the period before the route is expected to become commercially viable.

11.2.11 GAL provided over £1m in funding support to local bus services in the period 2018 to 2020. GAL also part-funded the introduction of hydrogen buses on Metrobus services, which are expected to be operational in the first half of 2023.

11.2.12 Diagram 11.2.1 shows the Metrobus services and frequencies and Diagram 11.2.2 provides a bandwidth plot of frequencies in the vicinity of Gatwick, which have been used to inform the modelling. Diagram 11.2.1 shows that South Terminal generally has more frequent Metrobus services, with up to 30 buses in the peak hour. There is good local bus coverage in the local areas of Crawley and Horley, and north towards Redhill, which is reflected in the staff mode shares in these areas.

11.2.13 All buses are low floor, wheelchair accessible vehicles. Metrobus has introduced a range of ticketing options through the use of smart ticketing in the form of a smart Key Card. Airport staff are entitled to the Gatwick Travelcard key card which enables them to buy discounted bus travel that is not available to members of the public. Staff can top up their smartcard online or at local travel shops and, since its introduction, it has been very successful.

11.2.14 All local buses are fitted with GPS technology so users can find out how far away their bus is in real time, from any bus stop on the network using the internet or their smart phone. Many bus stops are also fitted with screens providing this information, as well as the exit from Gatwick Airport railway station. QR codes and NFC tags at bus stops, compatible with smart phone readers, make it even easier for users to get this information. Buses are also fitted with the ‘Next Stop’ screens which are very useful for first time travellers.

Diagram 11.2.1: Metrobus services frequencies

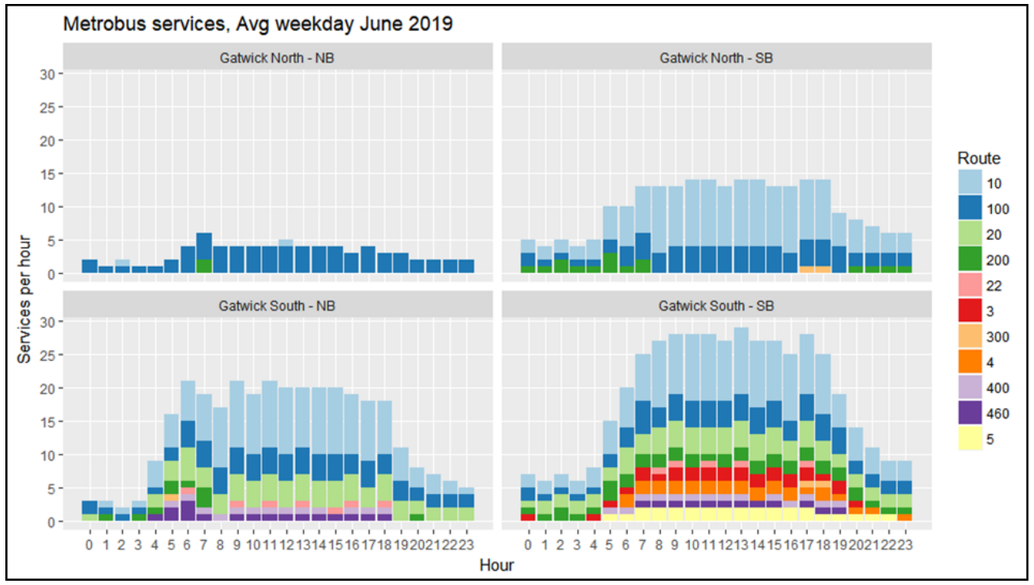


Diagram 11.2.2: Bandwidth plot of Metrobus frequencies

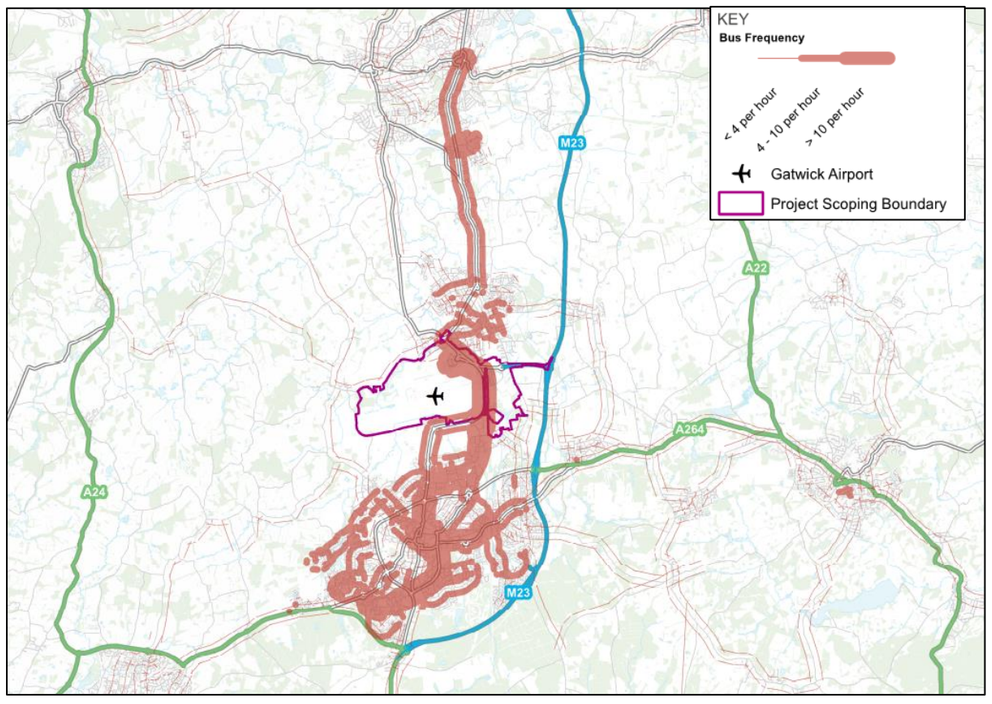
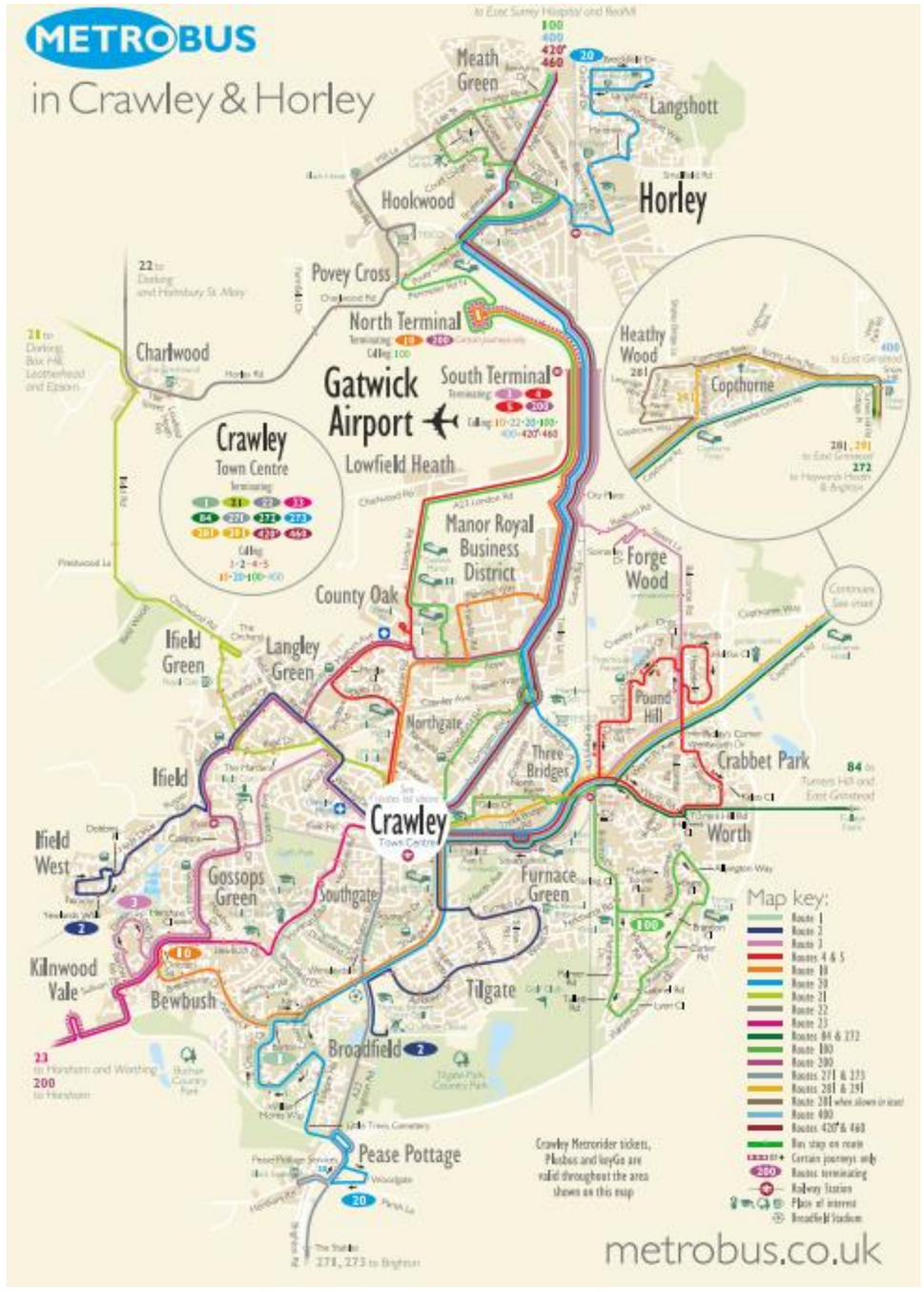


Diagram 11.2.3: Metrobus local service in Crawley and Horley (August 2022)



11.2.15 GAL has improved the customer experience for bus and coach services at the Airport through provision of a new waiting area at the South Terminal for passengers. GAL is also developing a proposal to increase the capacity of bus and coach facilities on Furlong Way at the North Terminal and has improved pedestrian access between the South Terminal and local bus stops located on the A23.

Other bus and coach services

11.2.16 In common with other large airports, Gatwick also has a wide range of staff buses and coaches, licensed car park and car hire shuttle buses, hotel and guest house shuttle buses.

11.2.17 Hotel bus routes which operated on circular routes calling at both terminals in one direction. All routes operated seven days per week and included journeys in the early morning and late evening, in order to match demand from departing and arriving passengers.

11.2.18 There were also guest houses or hotels that operated services on request and charter coach services. Additional bus movements occur which are associated with authorised off-airport car parks.

11.3 Approach and methodology

Modelling methodology

11.3.1 A bus and coach network model has been developed in EMME software and complements the rail modelling undertaken in PLANET South to create the overarching Gatwick public transport model.

11.3.2 The public transport model includes all bus and coach services used to access the airport by air passengers and employees. The information for bus and coach route coding has been obtained through discussions with operators, data from GAL and other publicly available data sources.

11.3.3 The bus and coach model has been developed as a standard public transport frequency-based assignment tool using the inbuilt modules of the EMME software and applying a standard generalised journey time function with weight on the components of time as recommended in TAG.

Assessment criteria

11.3.4 Based on GAL's experience, bus and coach operators respond to sustained increases in demand by increasing the number of services. Therefore, given the adaptability of bus and coach provision, crowding on bus and coach services has not been assessed explicitly within the modelling framework. The assessment considers service coverage, frequency and quality as a measure of public transport amenity, and is used to test proposed routes and services that could support achieving GAL's mode share commitments.

Study area

Coaches

11.3.5 Coach services are considered to be most relevant to air passengers, though some local coach services (eg from Brighton and London) may fulfil a limited commuter role for Airport employees.

11.3.6 Analysis of CAA data shows significant airport passenger use of coach to access Gatwick from Brighton, Bournemouth, Southampton, Bristol, Oxford, London, and Heathrow (transfers), as shown in Diagram 11.3.1.

11.3.7 The public transport model includes all coach routes serving the Airport together with the England-wide National Express and Megabus networks. This ensures that there is a reasonable representation not just of direct coach routes to Gatwick but also those requiring an interchange, eg from Margate to Gatwick, requiring interchange in London.

Local bus services

11.3.8 Local bus services are used predominantly by Gatwick employees and those air passengers living locally. For airport employees, the existing catchment of bus users is shown in Diagram 11.3.2.

11.3.9 Diagram 11.3.2 shows that most Gatwick employees who use bus or coach live in Crawley and Horley, with smaller clusters in surrounding towns and villages and the suburbs of Brighton.

11.3.10 The model includes all local bus routes that serve Gatwick, Horley and Crawley, including journeys that require interchange at Crawley bus station.

Diagram 11.3.1: Gatwick Airport passenger catchments for coach (and bus)

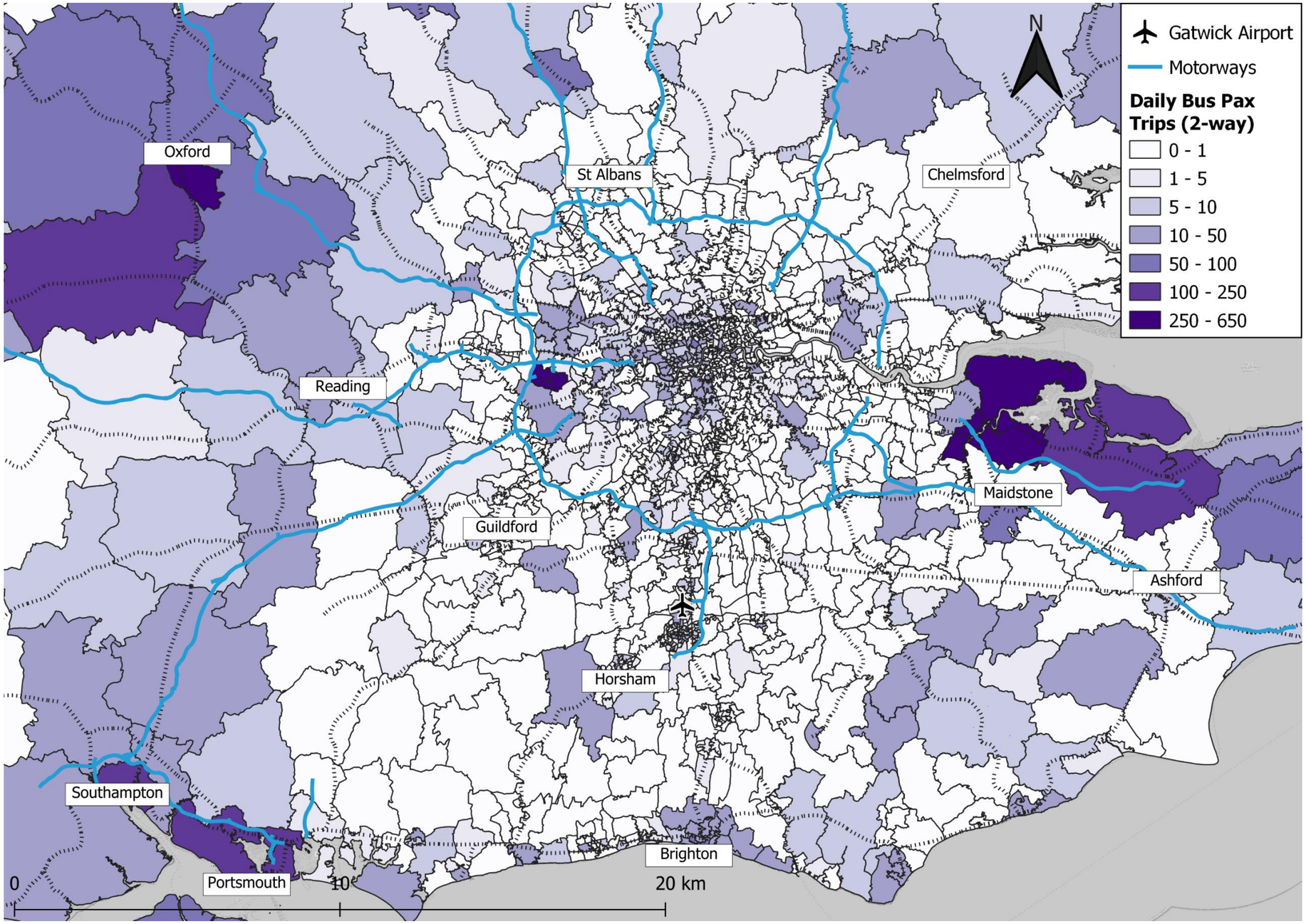
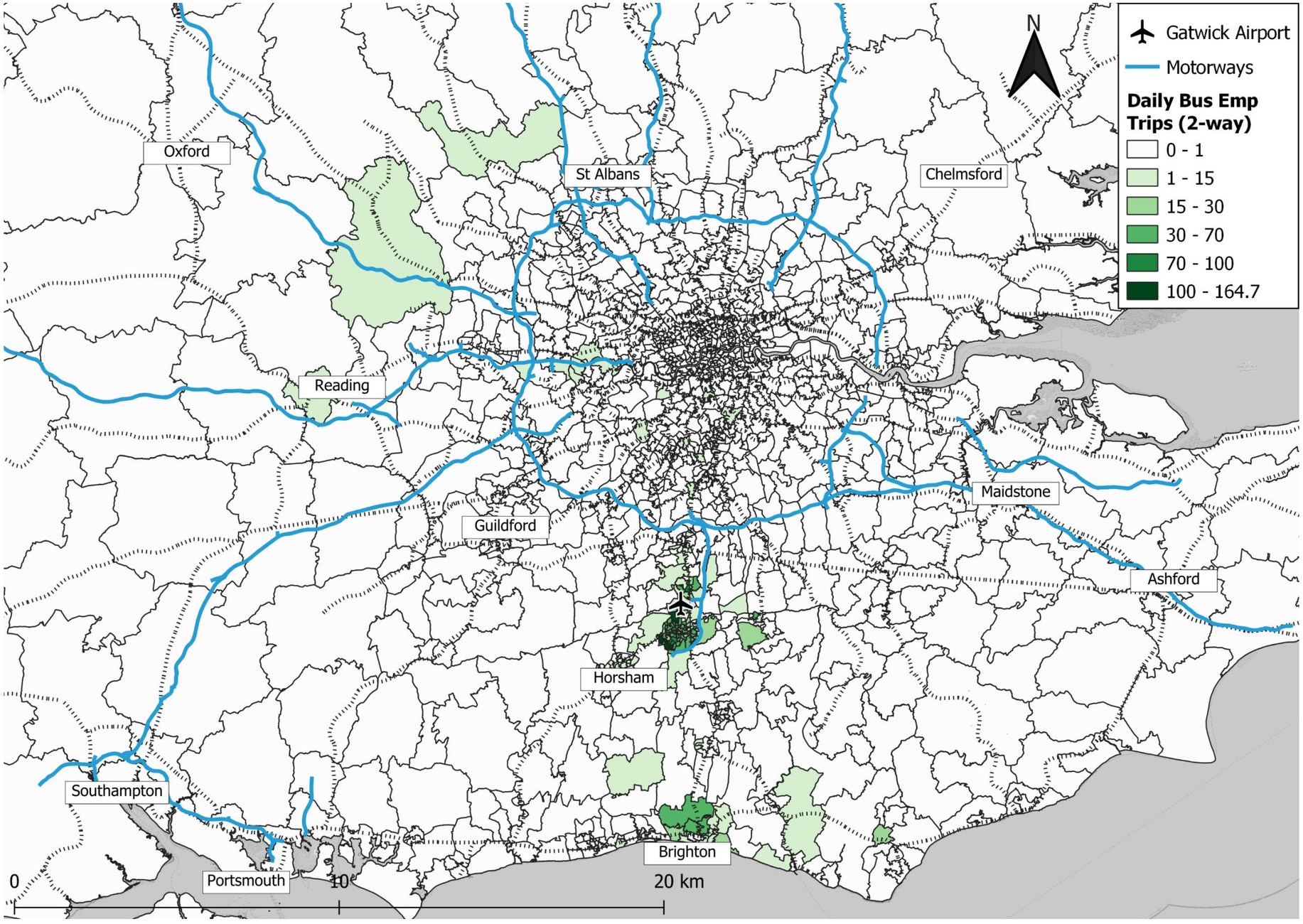


Diagram 11.3.2: Gatwick Airport employee catchments for bus (and coach)



Modelled improvements

11.3.11 As part of the current ASAS (see Chapter 6), GAL will continue to support the introduction of new and enhanced coach or regional express bus services and local bus services as part of its efforts to increase public transport mode share.

11.3.12 GAL has also reviewed and tested the coach and local bus networks to identify potential new or enhanced routes which would respond to the additional travel demand generated by the Project and support progress towards achieving the mode share commitments which GAL has made.

11.3.13 The changes that have been incorporated into the public transport modelling are described below and summarised in Table 11.3.1, Table 11.3.2 and Table 11.3.3.

11.3.14 Bus and coach demand matrices have been developed for airport passengers and airport employees using data from the expanded CAA passenger survey and GAL staff survey respectively. The local bus network principally serves the airport employees, while coach principally serves air passengers.

Future baseline

11.3.15 The future baseline scenarios in the model reflect measures which GAL is proposing to take as part of the current ASAS, together with the expected commercial response of the bus and coach industry to increased demand in general. The following have been included in the future baseline scenarios:

- Increases to coach frequencies in proportion to growth in air passengers over time, representing the expected commercial response of operators even without additional support from GAL. These are shown in Table 11.3.1;
- New regional bus or coach route (hourly in peaks, otherwise two-hourly) Uckfield – East Grinstead – Gatwick. This and the following regional bus or coach enhancements are shown in Table 11.3.2;
- New regional bus or coach route (two-hourly) Chatham – Maidstone – Sevenoaks – Gatwick;
- New regional bus or coach route (hourly) Romford – Upminster – Dartford – Gatwick; and
- Frequency enhancements on local bus routes 4/5, 10, 20, 22 and 100. These are shown in Table 11.3.3.

11.3.16 With the exception of the normal commercial response of the bus and coach industry, other enhancements could be supported through the Sustainable Transport Fund or by other means, using the current GAL engagement with operators.

Project improvements

11.3.17 Chapter 7 summarises the Surface Access Commitments (SACs) (**ES Appendix 5.4.1: Surface Access Commitments** (Doc Ref. 5.3)) for the Project. The modelling work includes the following improvements for the with Project scenarios (see Table 7.3.1 and Table 7.3.2):

- Further increases to coach frequencies in proportion to the additional growth in air passengers resulting from the Project, representing the expected commercial response of operators even without additional support from GAL. These are shown in Table 11.3.1;
- Increased frequency (half-hourly daytime, hourly early/late) on regional bus or coach route Chatham – Maidstone – Sevenoaks – Gatwick. This and the following regional bus or coach enhancements are shown in Table 11.3.2;
- New regional bus or route (hourly) Bexley – Footscray – Gatwick;
- New regional bus or route (half-hourly) Tunbridge Wells – East Grinstead – Gatwick; and
- New regional bus or route (hourly) Worthing – Horsham – Gatwick.

11.3.18 To support achieving the mode shares identified in the SACs, GAL will provide financial support to enable the above services, or others which result in an equivalent level of public transport accessibility, to be established and to sustain their operation and promote their use for a minimum of five years from their implementation. GAL recognises that agreement with operators and/or local authorities will be needed on the detail of each route.

11.3.19 The public transport modelling work for this assessment assumes that these services will be in place by 2029, the first full year of opening of the northern runway, which is in advance of the assumed completion date for the highway works which form part of the Project.

Table 11.3.1: Modelled number of coaches per day – industry commercial response

Terminus	2029		2032		2047	
	Future baseline	With Project	Future baseline	With Project	Future baseline	With Project
Bognor Regis	2	2	2	3	2	3
Brighton	21	23	22	27	25	30
Bristol	7	8	8	9	9	10
Cardiff	9	10	10	12	11	13
Derby/ Nottingham	12	13	12	15	14	17
Heathrow	5	5	5	6	5	7
Northampton	9	10	10	12	11	13
Norwich	11	12	12	14	13	16
Oxford	27	28	27	33	31	37
Park Royal	12	13	12	15	14	16
Poole	11	11	11	13	12	15
Rayleigh	16	17	16	20	19	22
Southend	16	17	16	20	19	22
Swansea	13	14	14	17	16	19
Victoria	61	65	62	76	71	85
Worthing	4	4	4	5	5	6
Wolverhampton	8	9	8	10	9	11

Table 11.3.2: Proposed routes and frequencies for new regional bus or coach services – future baseline and with Project proposals

Route	Frequency in future baseline	Indicative frequency with Project
Uckfield – East Grinstead – Gatwick (continued support)	Two-hourly; hourly in peaks	Two-hourly; hourly in peaks
Romford – Upminster – Dartford – Gatwick (continued support)	Hourly	Hourly
Chatham – Maidstone – Sevenoaks – Gatwick	Two-hourly	Half-hourly daytime, hourly early/late
Bexley – Footscray – Gatwick	-	Hourly
Tunbridge Wells – East Grinstead – Gatwick	-	Half-hourly
Worthing – Horsham – Gatwick	-	Hourly

Table 11.3.3: Proposed routes and frequencies for enhanced local bus services future baseline and with Project proposals

Route	Indicative frequency in future baseline	Indicative frequency with Project
4/5	6 bph daytime; 4 bph early/late	As for future baseline
10	10 bph daytime; 6 bph early/late	
20	6 bph daytime; 4 bph early/late	
22	2 bph in peaks, 1 bph other times	
100	6 bph daytime; 4 bph early/late	

bph: buses per hour

Comparison of future baseline and with project scenarios

11.3.20 The daily bus and coach trips in the future baseline and with Project scenarios are shown in Table 11.3.4. The mode shares for passengers and employees are shown in Table 11.3.5. Further information is provided in **Transport Assessment Annex B – Strategic Transport Modelling Report** (Doc Ref. 7.4).

11.3.21 It should be noted that bus and coach operators are able to adjust capacity to manage loadings more readily than rail services by adjusting frequencies as Gatwick demand grows. Additionally, GAL holds regular discussions with operators which will help to anticipate potential changes in demand. Coach and bus loadings are therefore not assessed against a fixed capacity plan. Air passenger demand is forecast to grow at a higher rate than airport employees hence the growth in coach use is higher than local bus use.

11.3.22 With the assumed bus and coach service improvements, the modelling work shows that demand on bus and coach services increases more than doubles approximately 5,600 passengers in 2016 to 13,400 daily passengers with the Project in 2047, as shown in Table 11.3.4.

11.3.23 Within this overall growth, there are significant increases in employee travel on local bus services in Crawley, an increase of almost 1,400 passengers with the Project in 2047 against a high base of over 1,900 passengers, albeit with bus share remaining largely constant across Local Authority areas.

11.3.24 On coach services, London is by far the largest market for air passengers and demand on coach services to and from London increases by 1,400 daily passengers between 2016 and 2047 with the Project, albeit that London's share of all coach trips decreases from 22% to 19% throughout the assessment period as a result of stronger take-up of bus and coach routes in other areas. Gains in the proportion of total coach trips are shown by the model in Brighton and Hove, reflecting the introduction of a new coach service to Worthing. Kent also shows strong growth in passenger numbers and share of the total, reflecting the proposal to increase frequency on the coach service from Chatham, Maidstone and Sevenoaks the introduction of a new coach service to Tunbridge Wells and the new service to Romford, which would call at Dartford in the west of the county.

11.3.25 Overall, the modelling work shows that the enhancements as part of the SACs would lead to an improvement in bus and coach mode shares for air passengers from around 7.5% in the 2029 future baseline to 9% in the 2047 with Project scenario, and for employees from around 18% in the 2029 future baseline to around 21% for employees by 2047 with the Project, as shown in Table 11.3.5.

Table 11.3.4: Daily bus and coach trips by Local Authority/region

		Bus/Coach trips						
		2016	2029 future baseline	2029 with Project	2032 future baseline	2032 with Project	2047 future Baseline	2047 with Project
Local Bus	Crawley	1,923	2,470	2,929	2,528	3,164	2,731	3,313
	Mole Valley	7	23	26	23	30	24	32
	Reigate and Banstead	183	293	339	302	373	329	400
	Tandridge	12	15	21	16	22	17	23
	Mid Sussex	42	85	127	88	140	96	148
	Horsham	67	83	115	85	126	90	131
Coach	Brighton and Hove	215	378	443	403	560	481	651
	Rest of West Sussex	41	72	105	78	130	89	148
	Rest of Surrey	15	38	45	40	56	42	61
	East Sussex	46	100	225	105	261	113	286
	Kent	60	371	731	391	841	409	925
	London	1,243	1,711	1,955	1,788	2,363	1,948	2,602
	Hampshire	191	387	483	414	612	464	709
	Ox, Bucks, Berks	489	744	848	786	1,019	856	1,154
	Rest of UK	1,111	1,828	2,128	1,929	2,535	2,054	2,827
	TOTAL	**5,646**	**8,599**	**10,520**	**8,976**	**12,232**	**9,743**	**13,409**

Table 11.3.5: Bus/coach mode share for passengers and employees

	Bus and Coach mode shares	
	Passenger	Employee
Future baseline 2029	7.5%	17.9%
With Project 2029	8.7%	20.9%
Future baseline 2032	7.6%	18.0%
With Project 2032	8.9%	20.8%
Future baseline 2047	7.6%	18.6%
With Project 2047	9.0%	20.8%

11.4 Summary and conclusions

11.4.1 The bus and coach assessment indicates that additional peak period services and network changes would provide for increased patronage by both employees on local bus services and air passengers on regional bus and coach services. Additional mitigation in terms of additional services is not considered to be required for all locations, with many experiencing very small changes in patronage. Increased service frequencies provide improved amenity for non-airport users also, benefitting both local communities and businesses by improving connectivity.

11.4.2 The modelling work shows that the bus and coach interventions tested would support achieving at least the committed mode shares as set out in the SACs (**ES Appendix 5.4.1: Surface Access Commitments** (Doc Ref. 5.3)), within three years of the opening of the new northern runway.

11.4.3 The bus and coach interventions are identified in the SACs and GAL will provide financial support for a minimum of five years to enable these services to be implemented and operated, or others which result in an equivalent level of public transport accessibility. Through the current and previous ASAS, GAL has a good working relationship with operators and has established effective ways of working to deliver improved services. GAL will work with operators to develop the detail of the enhanced route network and the funding that is required to support its implementation. GAL will also regularly discuss progress in the Transport Forum Steering Group (TFSG) which includes the local highway and planning authorities, transport operators and agencies, business and passenger representatives and other interested parties.

12 Highway network: strategic modelling

12.1 Introduction

12.1.1 GAL is committed to securing a higher surface access mode share by sustainable modes, but it is recognised that highway access will remain critical for future access for passengers, staff, and freight, including those arriving by local bus and express coach.

12.1.2 Based on the information about current conditions, set out in Section 6, around 55% of all Gatwick passenger demand accessed the Airport in 2017/8 by car, either as a driver, car passenger or by taxi. Car journeys are split between those that park at the Airport (short stay or long stay, using on or off-airport parking, also including "meet and greet" or valet parking) and those that drop off or pick up ("kiss and fly" and taxi journeys). This proportion is gradually decreasing in favour of higher public transport access mode share.

12.1.3 To assess the impact of the Project, the highway network assessment is a comparison between the future baseline and with Project scenarios for a given year. This section covers modelling of the strategic highway network between London and Brighton including the M23 and M25. Surface access commitments within the Project are described in Section 2.2 and summarised in this chapter.

12.2 Current and future networks

Current network

12.2.1 Gatwick benefits from direct access to the national Strategic Road Network (SRN) via the M23 motorway which runs north-south adjacent to the Airport. Junction 9 of the M23 is the main access point with an onward link of motorway standard dual carriageway to Junction 9a, immediately adjacent to the entrance to the South Terminal. The off-peak journey time from Gatwick to the M25 via the M23 is around ten minutes. The M25, provides connections on the Strategic Road Network to the east and west.

12.2.2 The A23, which runs parallel to the M23, continues north beyond the M25 into London via Croydon and Brixton to the heart of the West End and the City. Croydon is between 30 and 40 minutes from the Airport by road in the off-peak and peak periods respectively.

12.2.3 South of Gatwick, the M23/A23 continues as a strategic highway corridor from London to Brighton on the South Coast. Brighton is between 30 and 45 minutes from the Airport by road in the off-peak and peak periods respectively. The A23 connects with the A272 and A27 east-west routes, placing the whole of the South Coast between Southampton and Folkestone within one hour and 20 minutes of the Airport.

12.2.4 The A23 runs north-south parallel to the M23 from South London through Redhill then through Horley and past Gatwick. It then bypasses Crawley and provides a connection to the south through Pease Pottage to Brighton.

12.2.5 The A264 connects Horsham to the south-west with Gatwick via a combination of potential routes including the A23, A2011 or M23 depending on the route chosen. To the east the A264 also connects Gatwick to East Grinstead via the A22.

12.2.6 The strategic and local highway networks are shown in Diagram 12.2.1 and Diagram 12.2.2, respectively.

Future baseline highway network

12.2.7 Data was collated from the following sources to identify highway improvement works which would be in place in the future baseline, in keeping with TAG guidance:

- SERTM Future Year transport schemes from National Highways
- Crawley Local Transport Model uncertainty log of infrastructure schemes
- Highway network improvements provided by WSCC
- Development-related transport mitigation identified through review of planning applications
- Local Plan Schemes
- Infrastructure Delivery Plans

12.2.8 The schemes were cross-checked against the National Highways road schemes website, information provided by local authorities and available public information. The major Road Investment Strategy (RIS) schemes were captured as well as other strategic schemes in the study area through discussions with stakeholders.

12.2.9 Table 12.2.1 shows the major highway schemes which are committed and included in the future baseline in the SATURN model. The list has been discussed with National Highways and Local Highway Authorities and more information can be found in **Transport Assessment Annex B – Strategic Transport Modelling Report** (Doc Ref. 7.4).

Table 12.2.1: Major highway schemes included in the future baseline scenarios

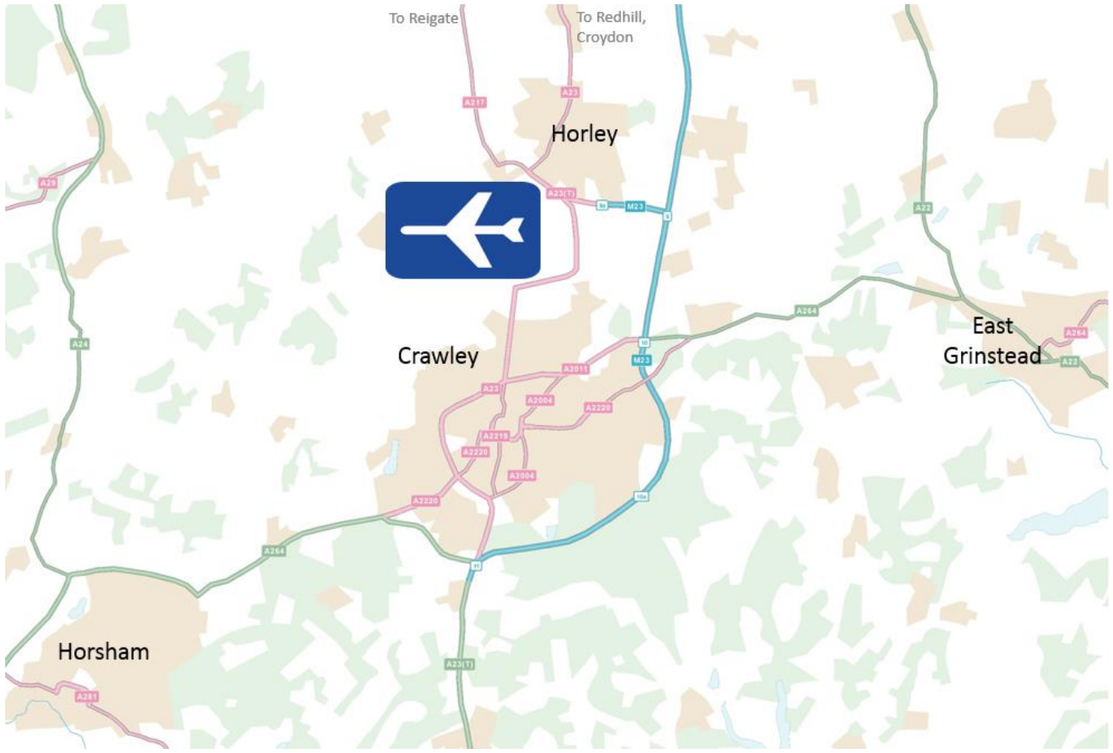
Scheme Name	Scheme Promoter	Opening Year
A2 Bean & Ebbsfleet Junction Improvement Scheme	National Highways	2022-2023
M23 Junctions 8-10: Smart Motorways	National Highways	Spring 2020
A27 East of Lewes	National Highways	2022
M25 Junction 10-16 Smart Motorway*	National Highways	2025
Lower Thames Crossing – new link	National Highways	Before 2029 (assumed)
M23 Junction 9, north bound slip road – Carriageway widening	Crawley Borough Council	Before 2026 (assumed)
M23 Junction 10 – Junction improvements, Signal, carriageway widening	Crawley Borough Council	2023
Radford Road approach to Gatwick Road	Crawley Borough Council	2023
Burgess Hill Northern Arc Land – Highways (A2300), bridges	WSCC	2029
M25 J8 Improvement Scheme	National Highways	December 2020

Source: Schemes confirmed with National Highways and Local Authorities

*A review of this scheme will be undertaken based on the Government's announcement in April 2023 that all new Smart Highways plans are to be cancelled.

Diagram 12.2.1: Highway network serving Gatwick Airport

Diagram 12.2.2: Local highway and road network



Highway network with the Project

12.2.10 To accommodate the proposed increase in passenger numbers, surface access improvements form part of the Project.

12.2.11 For the highway network, this will include the following and further detail is included in Section 2 of this report:

- South Terminal: new junction layout providing full grade separation;
- North Terminal: new junction layout including partial grade-separation, improving traffic flow. The Airport Way eastbound connection from North Terminal roundabout would be removed with eastbound traffic to travel via a new signal-controlled junction on the A23 London Road and an enhanced eastbound diverge connection onto Airport Way;
- enhancement of the eastbound M23 Gatwick Spur as part of the South Terminal roundabout improvements, should these not be completed in advance of the airport expansion; and
- improvements to Longbridge Roundabout where the A23 meets the A217.

12.2.12 For the purposes of the assessment these highway works are anticipated to be in place three years after the opening of the northern runway (ie 2032) and have been included in the with Project scenarios for the assessment years of 2032 and 2047.

12.3 Approach and methodology

Modelling approach

12.3.1 The overall modelling approach for the Project is set out in Section 5, and the strategic highway modelling work has been undertaken using SATURN. The SATURN highway assignment model developed for Gatwick uses National Highways' South East Regional Transport Model (SERTM), West Sussex's Crawley Local Transport Model (CLTM) and Transport for London's London Highway Assignment Model (LoHAM) and is known as the GHOST model (Gatwick's Holistic Overview of Strategic Transport). Diagram 12.3.3 shows the model coverage.

12.3.2 The base model year is 2016. Forecast years have been developed for Gatwick for the years 2029, 2032 and 2047 for a future baseline (without the Project) and with Project scenario. Airport demand has been taken from the air passenger and employee forecasts, in accordance with all other modelling.

12.3.3 Background traffic growth is based on work reviewing committed schemes, with trips included from data sourced from transport assessments, trip generation developed from TRICS® data, and TEMPro growth factors applied with adjustments where necessary. These adjustments remove any explicitly modelled development trips from the TEMPro background growth.

12.3.4 Future year networks have been updated in consultation with National Highways and Local Authorities to reflect the committed schemes for which funding has been secured. The background traffic growth and committed network schemes are therefore included in the future baseline and the with Project scenarios. Detailed information on these is included in Chapters 6 and 9 of **Transport Assessment Annex B – Strategic Transport Modelling Report** (Doc Ref. 7.4).

Calibration and validation process

12.3.5 The calibration and validation process was undertaken with the aim of refining the model to improve the fit with observed data and to meet the compliance criteria set out in TAG. Technical detail on the calibration and validation is process is provided in Chapter 5 of **Transport Assessment Annex B – Strategic Transport Modelling Report** (Doc Ref. 7.4) and a summary is provided in this section.

12.3.6 For the highway network, calibration and validation includes consideration of both traffic volumes and journey times. Network calibration was undertaken by reviewing modelled capacities against observed traffic flows, additional investigation of locations where the model indicated large delays and very slow speeds, and a review of modelled shortest path routes against route-finding algorithms in Google maps. Following a detailed network calibration and review of route choices, and refinements to the prior matrices, a matrix calibration process was undertaken. To determine the success of the matrix estimation process, the modelled flows were compared to the counts.

12.3.7 As set out in TAG, calibration and validation screenlines and cordons were developed using the traffic count data. The performance of the model at these locations was assessed using the absolute differences between modelled flows and observed counts and the Geoffrey E. Havers (GEH) statistic which are typically used as a measure of how well a model reflects observed data.

12.3.8 The screenline statistics and journey time information indicate that that the model meets the standard for calibration and validation which is required by TAG and provides a robust baseline on which to undertake the forecasting on.

12.3.9 For the rail modelling, validation was undertaken in sequential steps: ensuring the modelled supply (train services and capacities) and demand were realistic at a 24-hour level at the London cordon, then repeating for each of the five periods, and then focusing attention on rail passenger volumes at Gatwick Airport.

12.3.10 A number of metrics were adopted, and in summary, the two-way directional volumes differ from the counts by +1% for the AM peak, 0% for the interpeak, and 4% in the PM peak. The passenger volumes on arrival at and on departure from Gatwick Airport station are also a reasonably close match for observed data. This indicates that the model estimates passenger volumes that are a good fit with count data and that capacity and crowding conditions in the model are a reasonable reflection of reality.

12.3.11 For bus and coach, the validation indicated that modelled routes, frequencies, and journey times are in close accordance with observed data.

12.3.12 Throughout the development of the transport models, technical aspects have been discussed with the relevant stakeholders, including the Department for Transport (DfT), National Highways (NH), Surrey County Council (SCC), West Sussex County Council (WSCC), Network Rail (NR) and Transport for London (TfL). This has involved the sharing of model development technical notes and data collection/validation reports for the base year models. Stakeholders have had the opportunity to review this information and raise any concerns or requests for review, and concerns raised have been addressed through updates to the base model and through further dialogue.

Forecast year models

12.3.13 The forecast year models have been developed with airport passenger and employee forecasts to generate future year demand scenarios out to 2047. The base model was updated to create the forecast year models by overlaying passenger and employee demand for the Airport (in both future baseline and with Project scenarios) onto background non-airport trips in the model using the geographical distributions from CAA passenger data and Gatwick employee survey data.

12.3.14 Further detailed information is contained in Chapter 7 of **Transport Assessment Annex B – Strategic Transport Modelling Report** (Doc Ref. 7.4). shows the distribution of airport traffic (peak periods, 2047), which illustrates that most airport traffic is expected to dissipate on the strategic network (eg M25) and the extent of the strategic model is appropriate.

12.3.15 Diagram 12.3.2 illustrates that around 69% to 75% of airport-related traffic is expected to use the M23 Spur in the peak periods in 2047. Most of this traffic comes from the M23 to the north, ie most traffic comes from the M25 and London. Around 20% of road trips to Gatwick are from the south, also via the M23. The remaining airport-related road trips are distributed in smaller proportions across the more local highway network in all directions.

Assessment criteria

12.3.16 The **Transport Assessment Annex B – Strategic Transport Modelling Report** (Doc Ref. 7.4) contains a comprehensive assessment of the impact of the Project on the strategic highway network. This section provides a high-level overview of the assessment for the following network characteristics:

- **Journey Times** – These are expressed as end-to-end travel times on key routes across the Area of Detailed Modelling (AoDM). These include the SRN, routes in the vicinity of Gatwick, the periphery of Crawley and other key distributor roads. The routes analysed capture trips to and from Gatwick as well as other key strategic movements on the network. This is presented in the form of performance areas within the model.
- **Junctions (Magnitude of Impact for nodes)** – Changes in Volume over Capacity (V/C) ratio are examined for model nodes, and categorised into Low, Medium and High. All nodes with a V/C ratio of over 80% in the with Project scenario are included in the assessment. The assessment matrix is shown in Table 12.3.1. Nodes with a flow of less than 20 Passenger Car Units (PCUs) are excluded from this process. PCU is a measurement used for traffic modelling, with cars and light goods vehicle represented by 1 PCU and heavy goods vehicles represented by 2.5 PCUs, as per TAG guidance.

Table 12.3.1: Magnitude of Impact matrix for nodes

Criteria	Magnitude of impacts			
	Negligible	**Minor**	**Moderate**	**Major**
V/C ratio with Project	**80-85%**	**85 -90%**	**90 - 95%**	**95% or more**
<2 percentage point change in V/C ratio	Negligible	Negligible	Negligible	Negligible
2-5 percentage point change in V/C ratio	Low	Low	Low	Medium
Between 5-10 percentage point change in V/C ratio	Low	Low	Medium	High
>10 percentage point change in V/C ratio	Low	Medium	High	High

Study area

12.3.17 The extent of the AoDM is shown in Diagram 5.3.3. For the purposes of reporting, the AoDM is split into performance areas as shown in Diagram 12.3.4 which also shows the journey time (JT) routes which have been assessed. The performance areas are as follows:

- SRN: M25 (J5 to J10), M23, A23 & A27 (Lewes to Arundel);
- Performance Area A: Gatwick Airport, Crawley and Horley;
- Performance Area B: M25 to A272;
- Performance Area C: Inter-London; and
- Performance Area D: A272 – A27

Diagram 12.3.1: Airport traffic on the wider highway network, 2047 (peak periods)

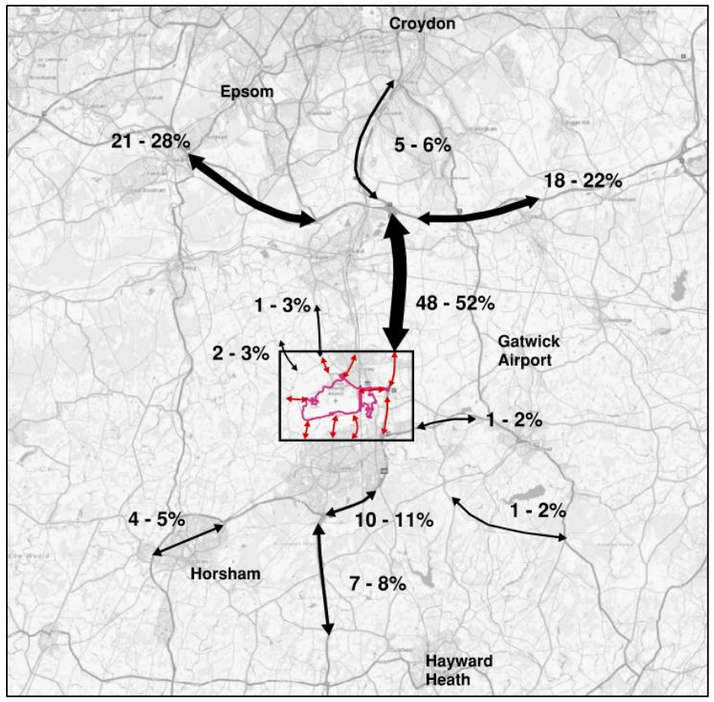


Diagram 12.3.2: Airport traffic on the local highway network, 2047 (peak periods)

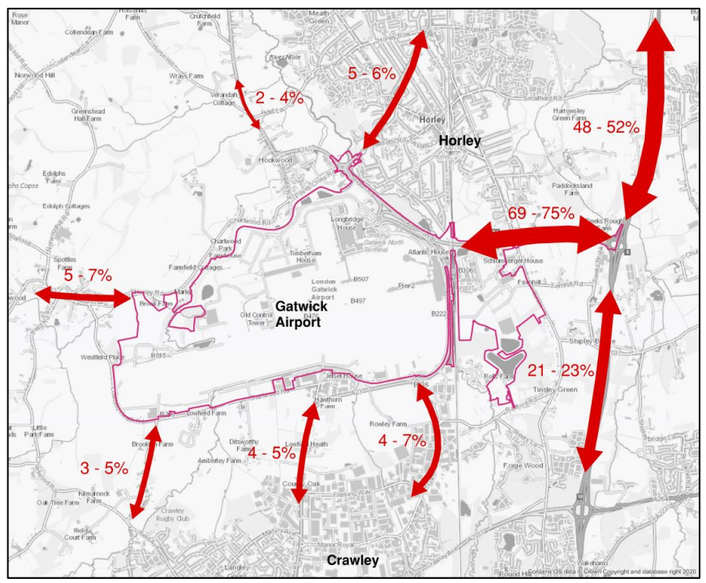
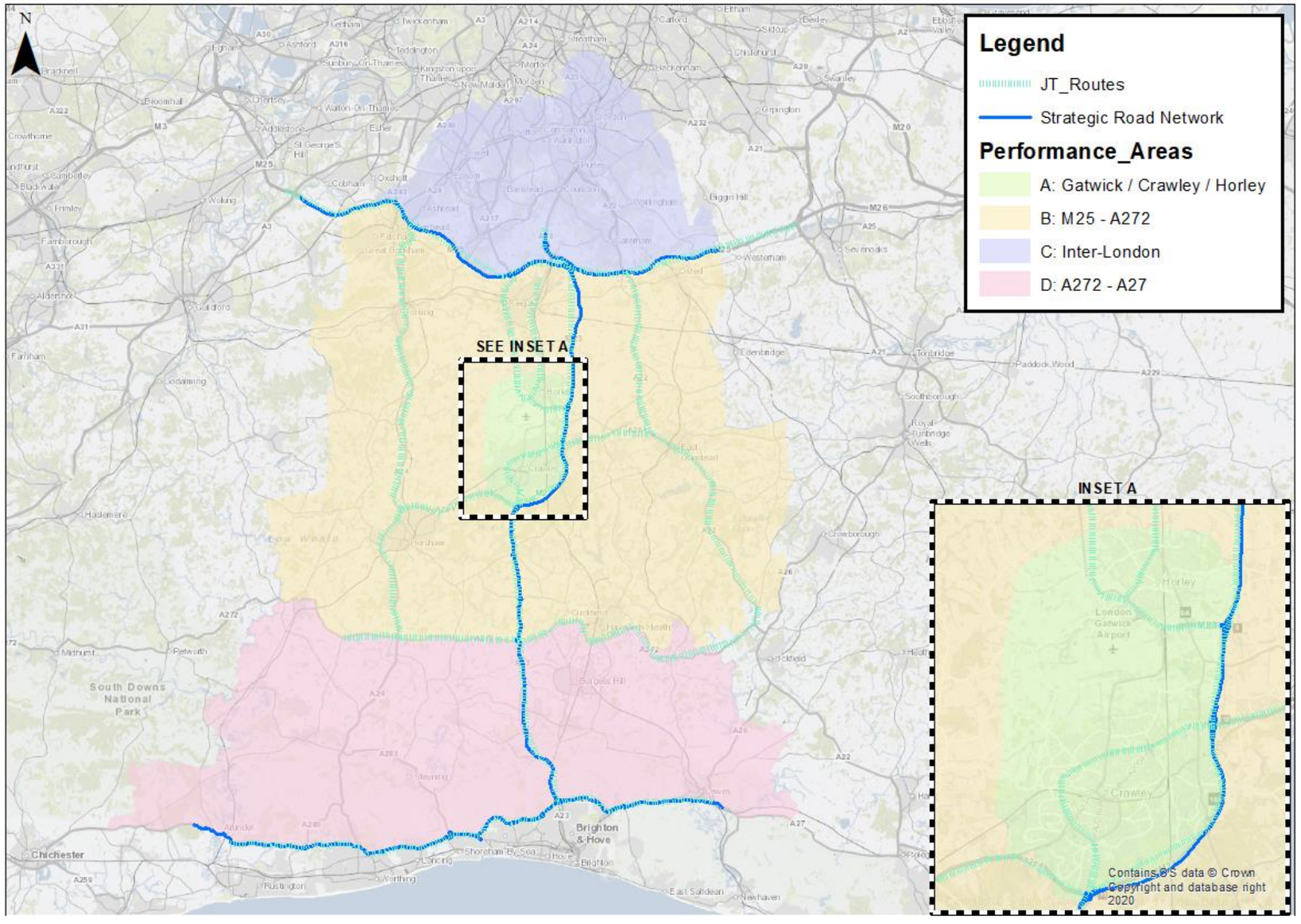


Diagram 12.3.3: Model network coverage in the vicinity of the Airport

Diagram 12.3.4: Highway model Performance Areas



Time periods

12.3.18 For the purpose of this study, the approach has been to model the road network during specific time periods when traffic levels and sensitivity to mode choice will vary.

12.3.19 The time periods modelled in the highway model are:

- AM Peak Hour 1 – representing the peak in flows on the Strategic Road Network (SRN) between 07:00 and 08:00;
- AM Peak Hour 2 – representing the peak in flows on the local road network between 08:00 and 09:00;
- Inter Peak (IP) Average Hour – representing an average hour flow between 09:00 and 16:00; and
- PM Average Hour – representing an average hour flow between 16:00 and 18:00.

12.4 Comparison of future baseline and Project scenarios

Changes in demand - overview

12.4.1 Modelled traffic volumes extracted for the four modelled time periods have been combined and expanded to represent Average Annual Daily Traffic (AADT) volumes. These represent average Monday to Sunday 24-hour traffic volumes.

12.4.2 Comparisons of AADT flows for the future baseline and with Project scenarios provide an overview of the general scale of change in demand which are expected as a result of the Project. This exercise has been carried out for all modelled links. This analysis also helps to distinguish which corridors are affected, and the way in which the highway model responds in the with Project scenario.

12.4.3 The assessment across all years shows a similar pattern and therefore, as a summary, the comparison between the 2047 future baseline and with Project scenarios is shown in Diagram 12.4.1: .

12.4.4 The modelling shows that the key corridor affected by the development of the Airport is the M23 in both directions. Changes are also observed on the M25 east and west of junction 7.

12.4.5 The diagram shows the other key corridors for access to the southwest via the A264 and A24 and across to East Grinstead on the A264 and A22.

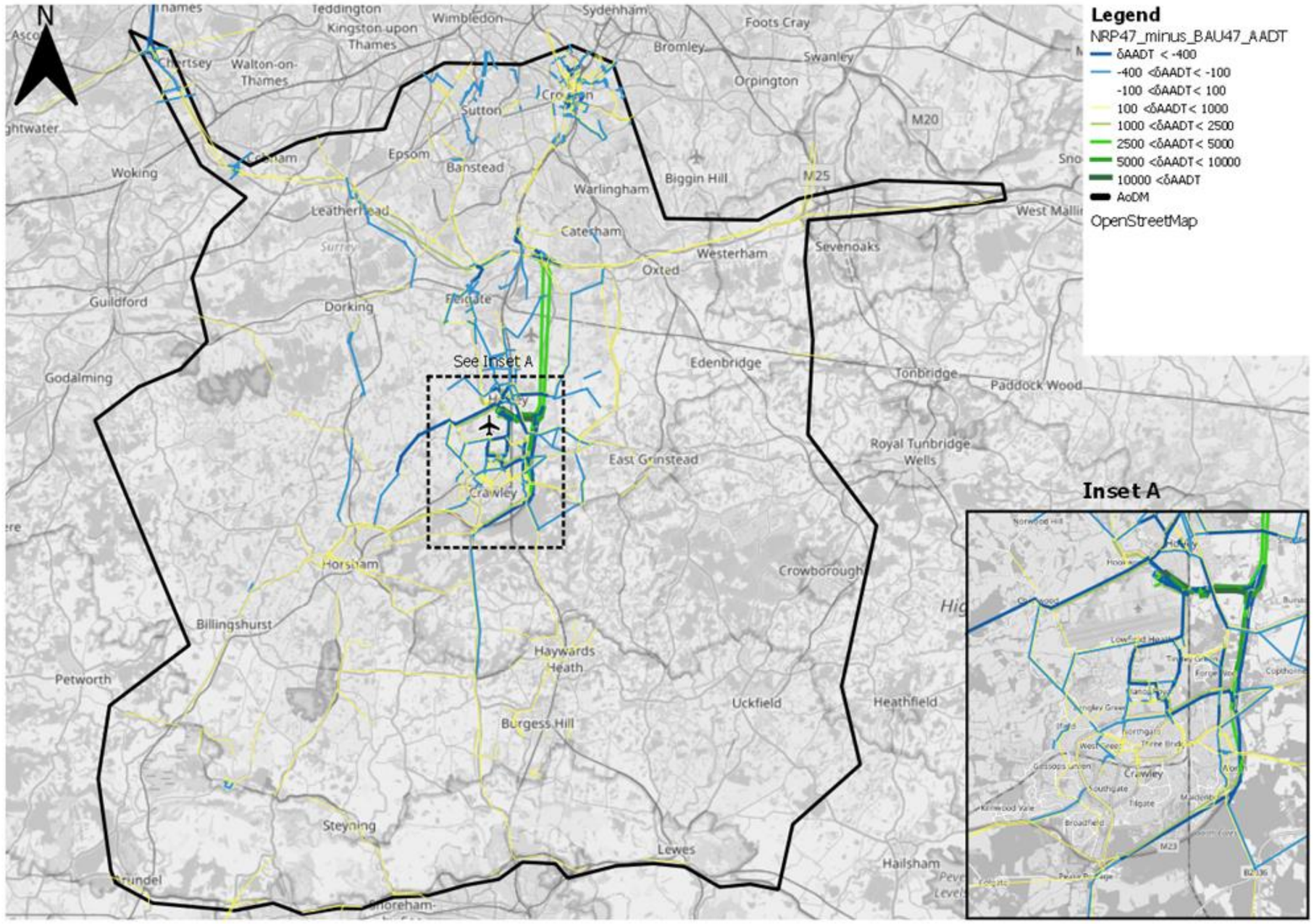
12.4.6 When looking at the specific peak period distribution from SATURN in closer proximity to the Airport, as per Diagram 12.3.2, this shows that up to 75% of airport traffic comes via the M23 and then accesses the Airport via the M23 Spur between Junction 9 and 9a.

12.4.7 The diagram also shows increases and decreases in traffic flows in localised areas away from the Airport, which can be produced by ‘model noise’. Every effort has been made to ensure the model networks reflect the expected future network state, with the coding of junctions being appropriate and traffic loading from zones being reasonable. However, where high levels of congestion are predicted within such models a localised effect known as ‘model noise’ can occur. This results in traffic demand switching between routes in successive iterations (of a model run), and when compared against a corresponding scenario, may indicate effects that do not appear logical in the context of the test. This can indicate lower levels of model convergence in specific localised areas, which can make the model results subject to higher levels of uncertainty.

12.4.8 Within the Gatwick model, some localised ‘model noise’ has been identified in two particular areas – Croydon and Steyning. These locations have been reviewed in detail and it is clear that airport traffic represents a very small proportion of traffic in these areas (less than 1%). The large changes in traffic flows between the with Project scenarios in these areas, and the associated impacts, are due to background traffic switching between routes with very similar journey times within the model, when in practice this is unlikely to happen, for instance because the alternative route is unsuitable or is not the signed route. These effects arising from model noise are not considered likely to occur in practice as a result of the Project.

12.4.9 Given the above concentration of flows on highways and junctions in close proximity to the Airport, an additional assessment of junction capacity has been undertaken on the local network in VISSIM as described in Chapter 13.

Diagram 12.4.1: Change in AADT (2047) – with Project compared to future baseline



12.5 Effects of the Project on the wider highway network

12.5.1 This section details the performance of the highway model in relation to the future baseline and with Project. It considers the four modelled time periods rather than the AADT volumes described in section 12.4 and therefore provides additional detail on the likely impacts of the Project in each of those time periods, which include the weekday morning and evening peak periods.

12.5.2 The information covers the three assessment years of 2029, 2032 and 2047. 2029 represents summer period in the first year that the new runway opens, for the purposes of this assessment. 2032 represents the summer period after the third anniversary of dual runway operations commencing. 2047 represents the design year, 15 years after the highway works are assumed to be complete, and this 15-year assessment period complies with National Highways requirements for the assessment of new highway schemes.

Journey times

12.5.3 Journey time assessment has been undertaken for the AoDM. Journey time routes were chosen to represent the SRN within the modelled area. All motorways, trunk roads and A roads were considered to form part of the network of routes adopted, as well as the major local routes in the vicinity of the Airport, and routes through Crawley and Horley.

12.5.4 A total of 21 two-directional routes were created, which were further split into partial routes, with the aim for each sub-route to be between 3km-15km in length and less than 40 minutes travel time, as specified in TAG Unit M3.1. A total of 94 partial routes were created. The journey time routes are shown in Diagram 12.5.1.

12.5.5 Detailed data on journey times by peak periods and assessment years are contained in the Strategic Modelling Report (Chapter 12 of **Transport Assessment Annex B – Strategic Transport Modelling Report** (Doc Ref. 7.4)). A summary of the key results is provided in this section for the five performance areas.

Diagram 12.5.1: Journey time routes

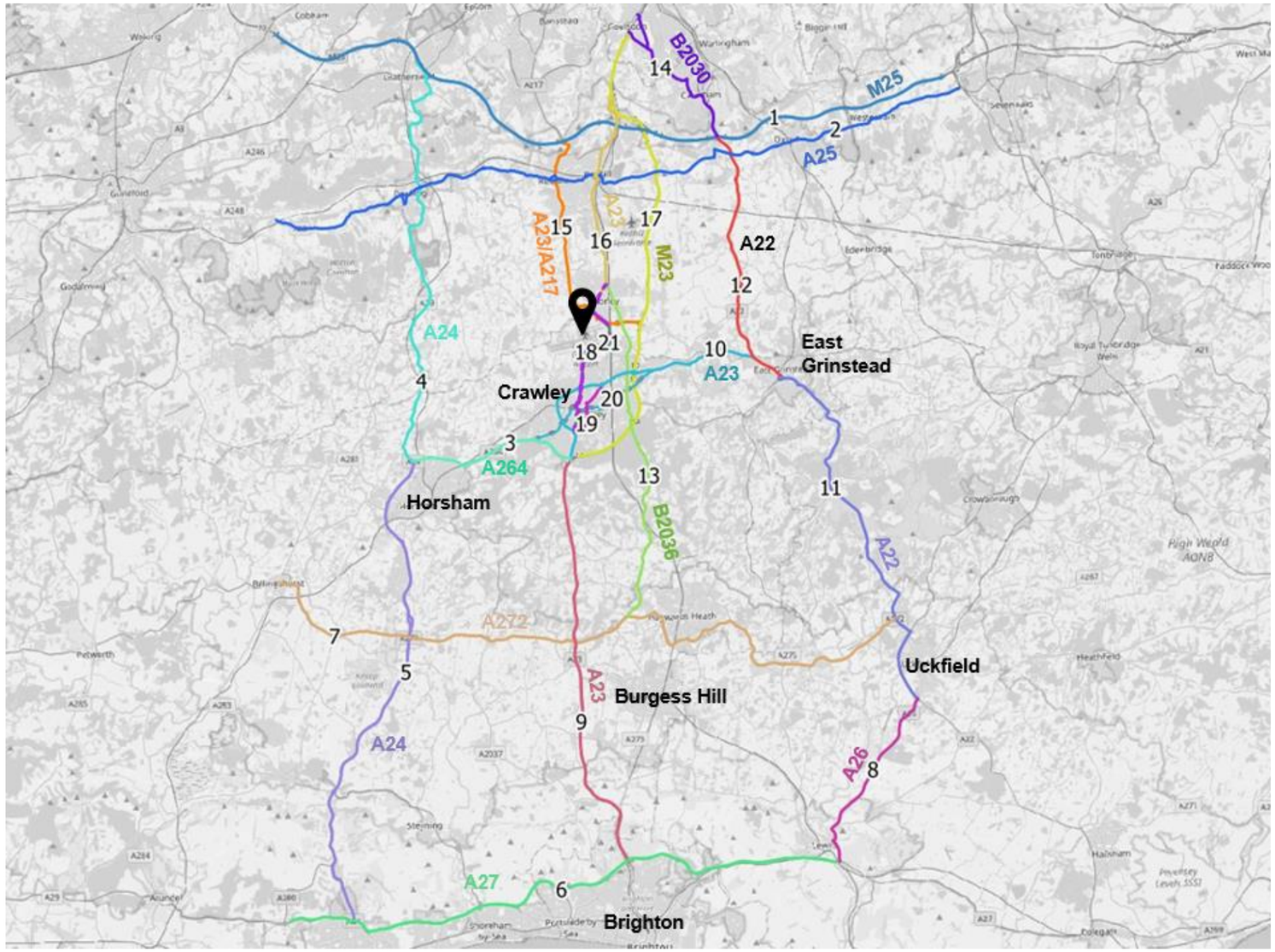


Table 12.5.1: Journey time route and corresponding performance area

Route ID	Performance Area	Road Name
1	SRN	M25: J5-J10
2	B	A25: Gomshall – A21
3	B	A264: A23-A24
4	B	A24: A264-M25 J9
5	B	A24: A27-A264
6	D	A27: A280-A26
7	B/D	A272: High Street, Billingshurst – A22
8	D	A26: A27-A22
9	B/D	A23: A27-M23
10	A/B	A23: M23 J11-A22
11	B	A22: A26 – Station Road, East Grinstead
12	B	A22: Station Road, East Grinstead – M25 J6
13	A/B	B2036: A272-A23
14	C	B2030: M25 J6-A23
15	A/B	A23/A217: M25 J9-M25 J8
16	A/B	A23: Longbridge Roundabout – M23 J7
17	SRN	M23: J11 – Coulsdon
18	A	Crawley: Brighton Road – A23/Airport
19	A	Crawley: Southgate Avenue – Northgate Avenue
20	A	Crawley: Horsham Road – Copthorne Way
21	A	Crawley: Brighton Road – Horley

Strategic Road Network (SRN)

12.5.6 Diagram 12.5.2 shows the journey times on the SRN for the future baseline and with Project scenarios, for 2029, 2032 and 2047.

Future baseline

12.5.7 The journey time changes across the modelled time periods in the future baseline years from 2029 to 2047 are as follows:

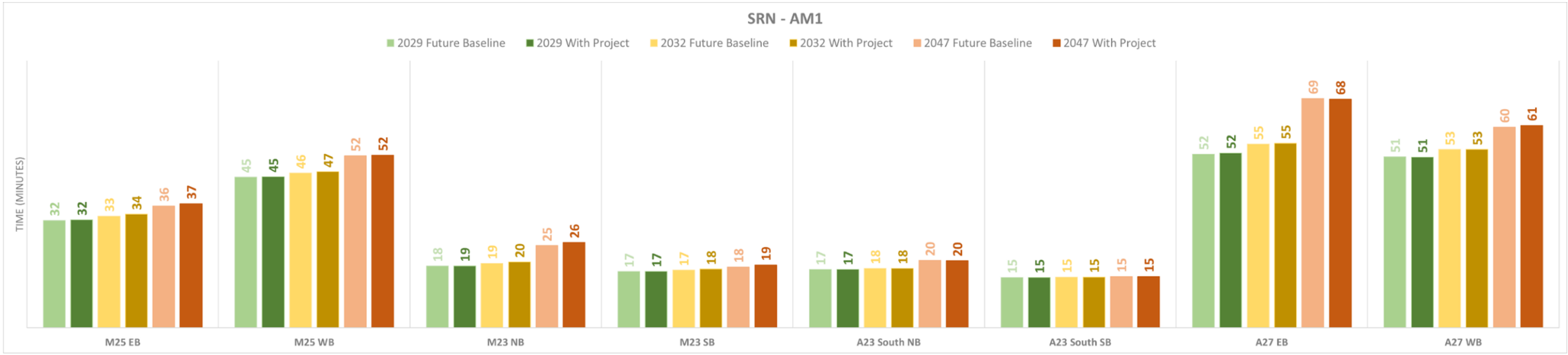
- **M25 from J5 to J10, westbound and eastbound –** There is an overall increase in journey times (up to six minutes eastbound and up to nine minutes westbound) from 2029 to 2047.
- **M23 northbound and southbound –** There is an overall increase in northbound journey times (up to seven minutes) from 2029 to 2047 in the future baseline, and a limited change of around one minute southbound. The increase in journey time over the years is more significant during AM peaks and less significant during the IP and PM peaks (up to two minutes).
- **A23 northbound and southbound** – There is a small overall increase in journey times (up to three minutes) from 2029 to 2047 in the future baseline.
- **A27 Lewes to Arundel westbound and eastbound** – Between 2029 and 2047 in the future baseline, there is an overall increase in journey times of 17 to 26 minutes travelling eastbound in the morning peak periods, with smaller increases of around four minutes in the interpeak and evening peak. Travelling westbound, journey times would increase by nine to 13 minutes in the morning peak periods and by five to six minutes in the interpeak and evening peak.

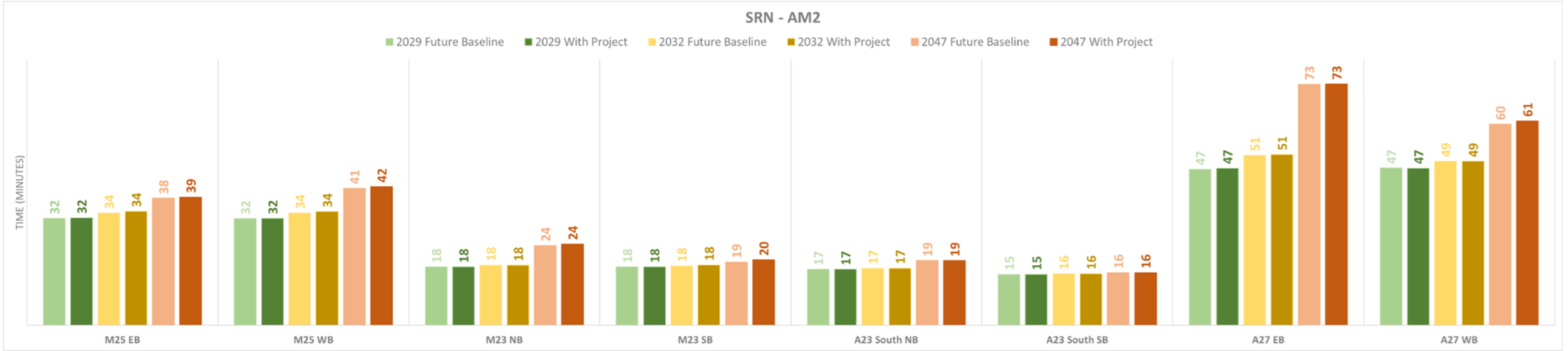
With Project

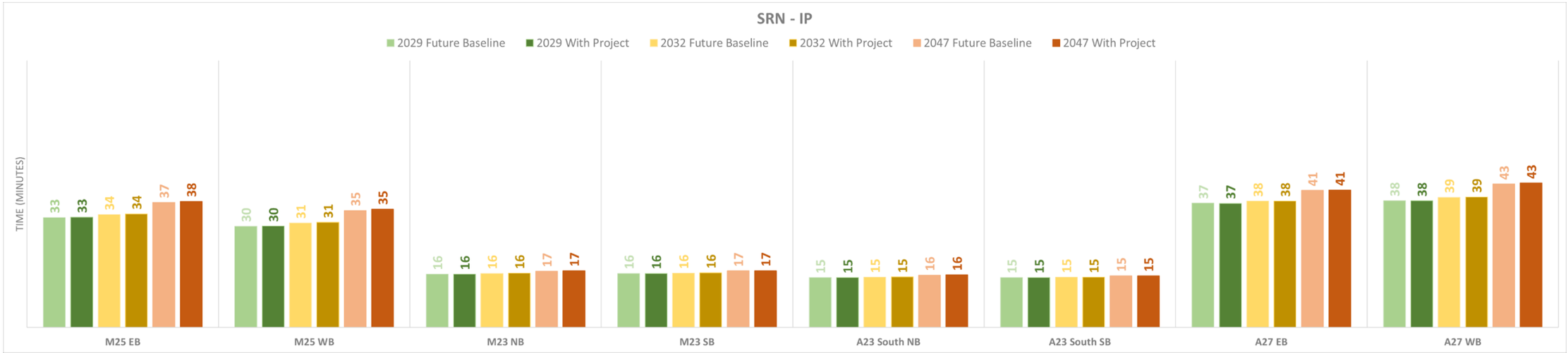
12.5.8 The key points in the comparison between future baseline and with Project scenarios across the assessment years are as follows:

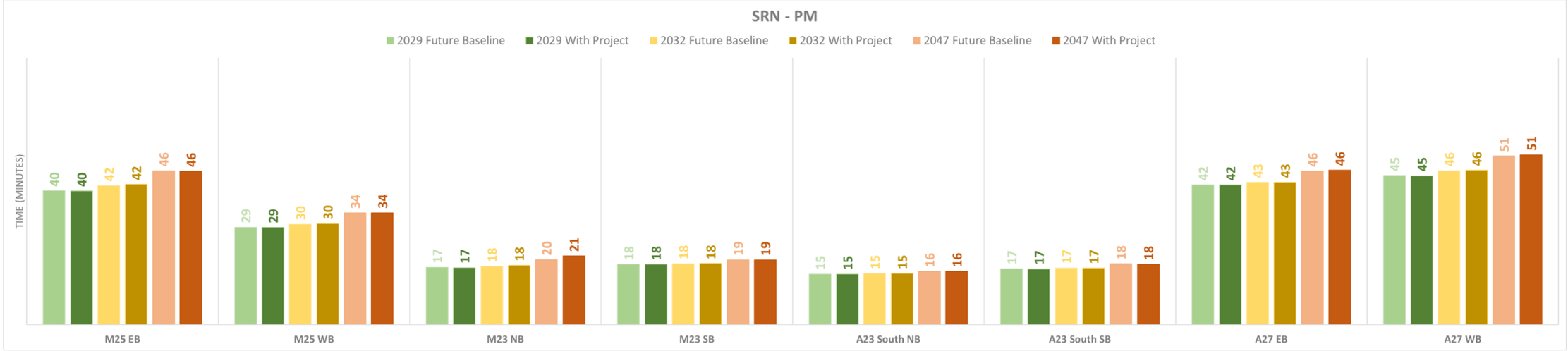
- **M25 from J5 to J10, westbound and eastbound –** There is an increase of no more than one minute for the with Project scenarios compared with the future baseline for all years.
- **M23 northbound and southbound –** There is an increase of no more than one minute for the with Project scenarios compared with the future baseline for all years.
- **A23 northbound and southbound** – There is an increase of no more than one minute for the with Project scenarios compared with the future baseline for all years.
- **A27 Lewes to Arundel westbound and eastbound** – The with Project scenarios show changes between a reduction of two minutes and an increase of two minutes, compared to the future baseline, across the various modelled periods and assessment years.

Diagram 12.5.2 Highway journey times – primary SRN






SRN - IP
2029 Future Baseline
2029 With Project
2032 Future Baseline
2032 With Project
2047 Future Baseline
2047 With Project
TIME (MINUTES)
33 33 34 34 37 38
30 30 31 31 35 35
16 16 16 16 17 17
16 16 16 16 17 17
15 15 15 15 16 16
15 15 15 15 15 15
37 37 38 38 41 41
38 38 39 39 43 43
M25 EB
M25 WB
M23 NB
M23 SB
A23 South NB
A23 South SB
A27 EB
A27 WB


SRN - PM
2029 Future Baseline
2029 With Project
2032 Future Baseline
2032 With Project
2047 Future Baseline
2047 With Project
TIME (MINUTES)
40 40 42 42 46 46
29 29 30 30 34 34
17 17 18 18 20 21
18 18 18 18 19 19
15 15 15 15 16 16
17 17 17 17 18 18
42 42 43 43 46 46
45 45 46 46 51 51
M25 EB
M25 WB
M23 NB
M23 SB
A23 South NB
A23 South SB
A27 EB
A27 WB

Performance area A

12.5.9 The key results from the comparison between future baseline and with Project scenarios are as follows and are shown on Diagram 12.5.3.

Future baseline

12.5.10 The journey time changes across the modelled time periods in the future baseline years from 2029 to 2047 are as follows:

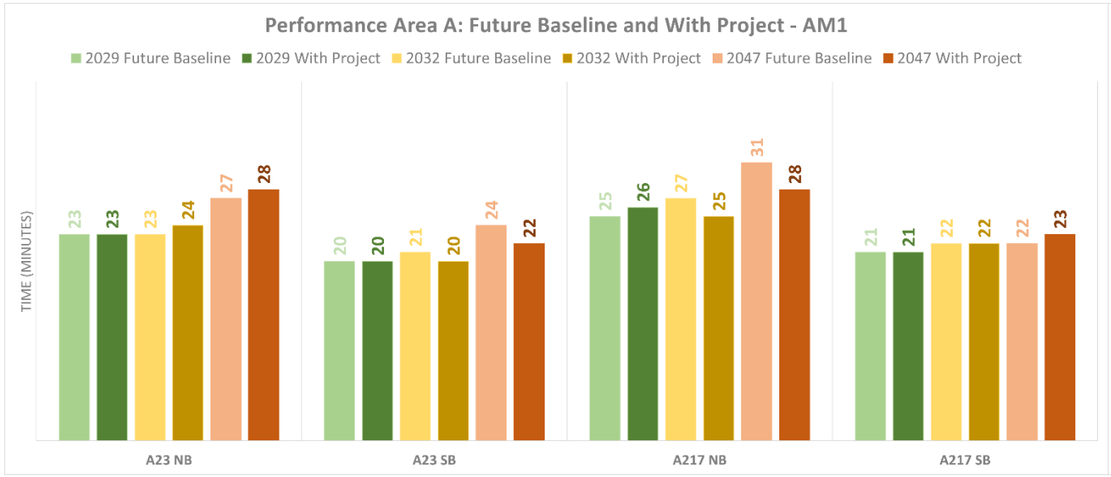
- **A23 from Longbridge Roundabout to A23 (south of M25, near Merstham)** – In the future baseline, northbound journey times increase by one to six minutes in the period to 2047, from around 20-25 minutes in 2029, depending on the time of day. Southbound journey times would increase by a similar amount.
- **A217 from M23 Spur via A217 to M25 J8** – Northbound journey times would increase by up to eight minutes in the morning peaks and two to three minutes in the interpeak and evening peak, over the period to 2047, from around 25 to 30 minutes in 2029. Southbound journey times would increase by one to three minutes by 2047.

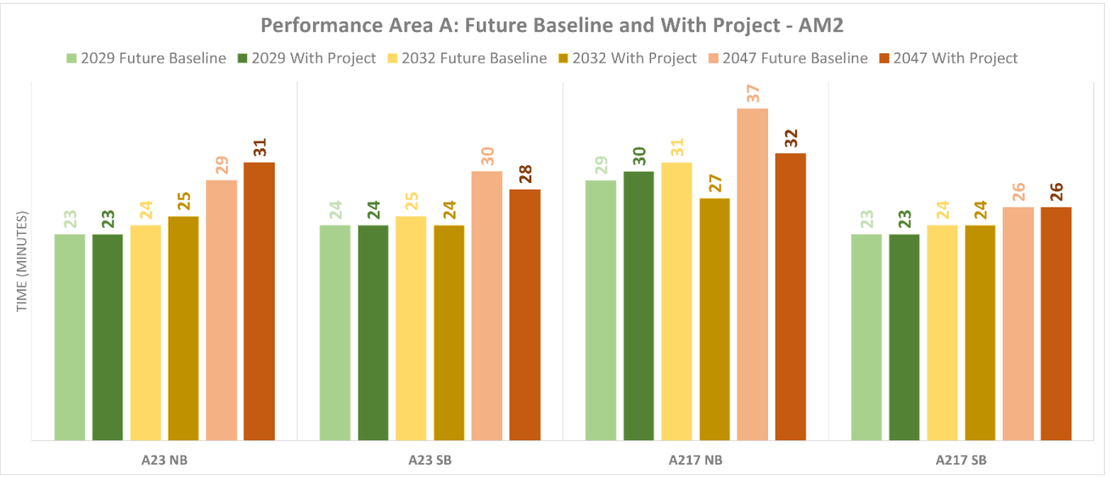
With Project

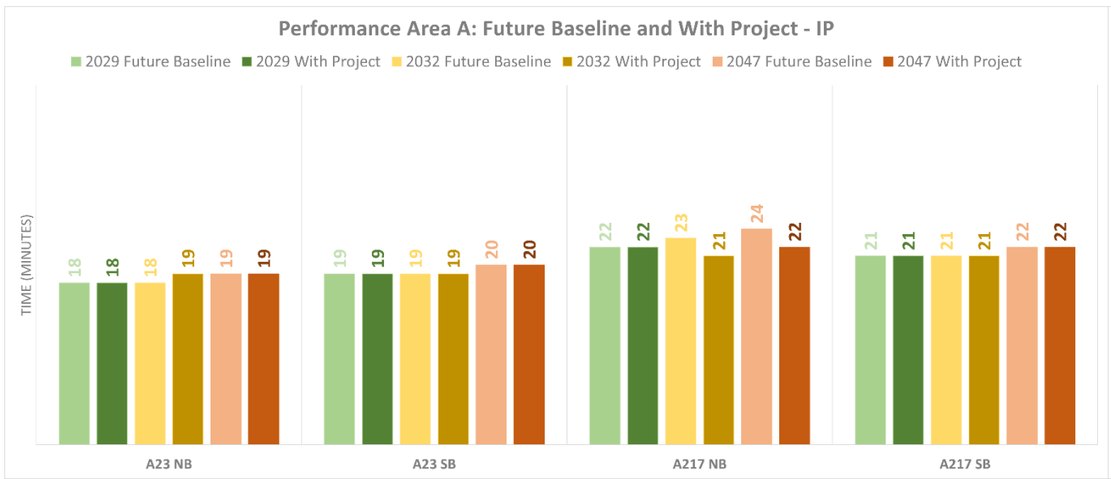
12.5.11 The key points in the comparison between future baseline and with Project scenarios across the assessment years are as follows:

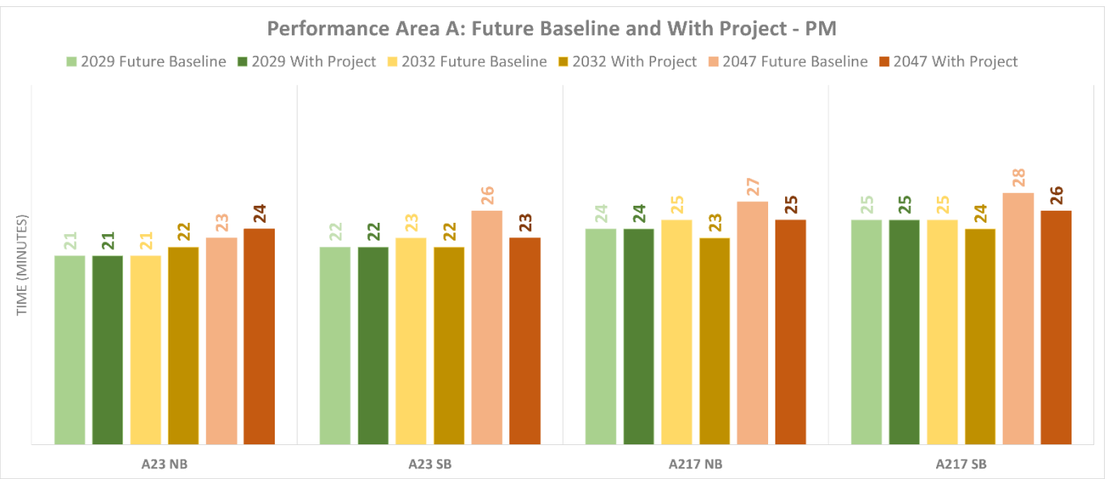
- **A23 from Longbridge Roundabout to A23 (south of M25, near Merstham) –** With the Project, northbound journey times would increase by up to a further two minutes in all years and southbound journey times would decrease by up to three minutes by 2047.
- **A217 from M23 Spur via A217 to M25 J8 –** Northbound journey times would decrease by up to five minutes by 2047, while southbound journey times would experience changes ranging between a two-minute decrease and a one minute increase by 2047.

Diagram 12.5.3 Highway journey times – Performance Area A









Performance area B

12.5.12 Journey times on routes in Performance Area B are shown on Diagram 12.5.4.

Future baseline

12.5.13 The journey time changes across the modelled time periods in future baseline years from 2029 to 2047 are as follows:

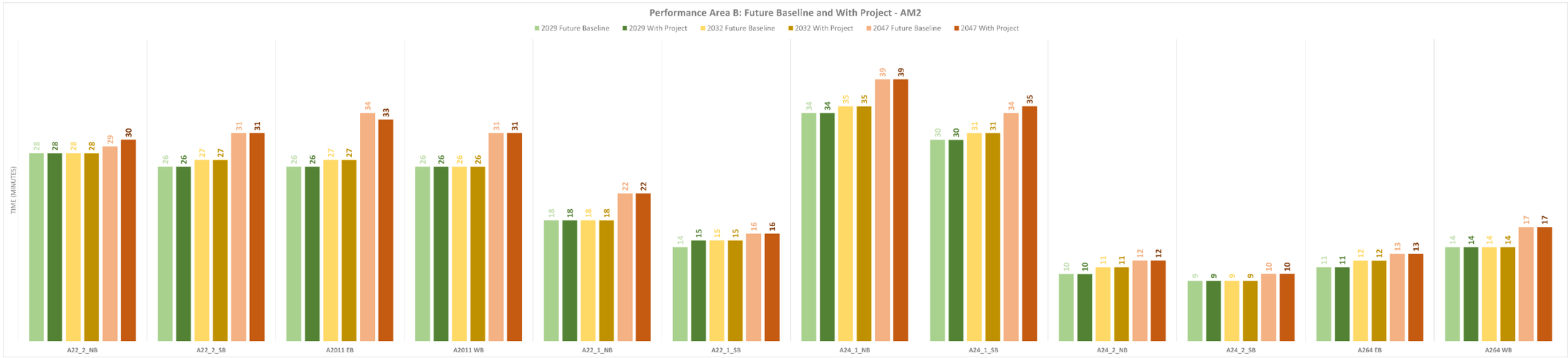
- **A22 [1] from M25 J6 to East Grinstead** – Northbound and southbound journey times of around 14 to 18 minutes in 2029 are expected to increase by up to four minutes by 2047.
- **A22 [2] from East Grinstead to Maresfield** – Northbound journey times of 24 to 28 minutes in 2029 would increase by up to two minutes by 2047, Southbound journey times of 23 to 26 minutes in 2029 would increase by up to five minutes by 2047, with the greatest increase in the morning peak period.
- **A2011 from M23 J11 to East Grinstead via Crawley** – In the future baseline, eastbound journey times of 20 to 26 minutes in 2029 would increase by two to eight minutes by 2047, with the greatest increases expected in the morning peak periods. Westbound journey times of 20 to 26 minutes in 2029 would increase by up to six minutes by 2047.
- **A24 [1] from near M25 J9 (Leatherhead) to north Horsham** – Northbound journey times of 27 to 35 minutes in 2029 would increase by up to five minutes in the morning peak period by 2047, with smaller increases expected at other times. Southbound journey times of 29 to 34 minutes in 2029 would increase by three to four minutes by 2047.
- **A24 [2] from north Horsham to A272/A24 near West Grinstead** – In the future baseline, journey times of nine to ten minutes in both directions in 2029 would increase by up to two minutes by 2047.
- **A264 from north Horsham to M23 J11** – Eastbound journey times of nine to 13 minutes in 2029 would increase by up to two minutes by 2047. Westbound journey times of 12 to 14 minutes in 2029 would increase by up to three minutes by 2047.

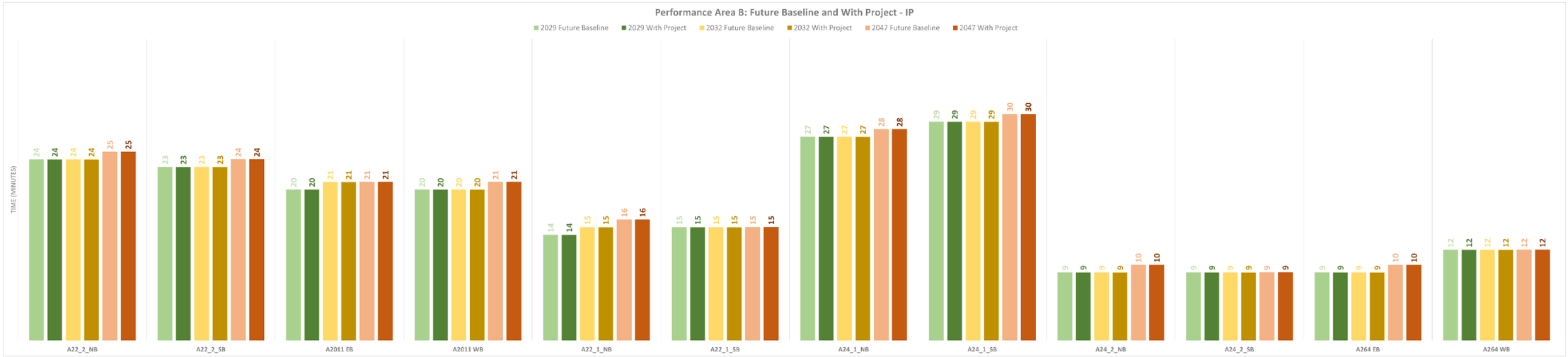
With Project

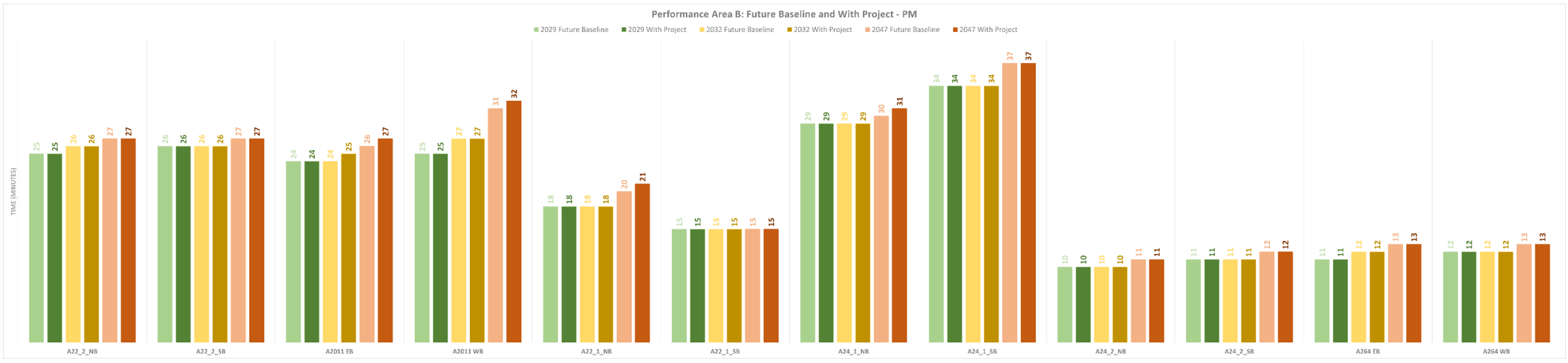
12.5.14 The key points in the comparison between future baseline and with Project scenarios across the assessment years are as follows:

- **A22 [1] from M25 J6 to East Grinstead** – With the Project, there would be little further change in journey times in either direction, with the greatest change being around one minute for the northbound journey in the evening peak period.
- **A22 [2] from East Grinstead to Maresfield** – Northbound journey times would increase by up to one further minute when compared to future baseline; southbound journey times would not change from those seen in the future baseline.
- **A2011 from M23 J11 to East Grinstead via Crawley** – Eastbound and westbound journey times in the evening peak period would increase by a further minute when compared to future baseline, with little change expected in other time periods.
- **A24 [1] from near M25 J9 (Leatherhead) to north Horsham** – Northbound and southbound journey times would change by around one minute when compared to future baseline.
- **A24 [2] from north Horsham to A272/A24 near West Grinstead** – The Project would not result in further change to journey times by 2047.
- **A264 from north Horsham to M23 J11** – With the Project, journey times would increase by up to one further minute in each direction, although by 2047 journey times would return to those seen in the future baseline in that year.

Diagram 12.5.4 Highway journey times – Performance Area B




Performance Area B: Future Baseline and With Project - IP
2029 Future Baseline
2029 With Project
2032 Future Baseline
2032 With Project
2047 Future Baseline
2047 With Project
TIME (MINUTES)
A22_2_NB
A22_2_SB
A2011 EB
A2011 WB
A22_1_NB
A22_1_SB
A24_1_NB
A24_1_SB
A24_2_NB
A24_2_SB
A264 EB
A264 WB


Performance Area B: Future Baseline and With Project - PM
2029 Future Baseline
2029 With Project
2032 Future Baseline
2032 With Project
2047 Future Baseline
2047 With Project
TIME (MINUTES)
A22_2_NB
A22_2_SB
A2011 EB
A2011 WB
A22_1_NB
A22_1_SB
A24_1_NB
A24_1_SB
A24_2_NB
A24_2_SB
A264 EB
A264 WB

Performance area C

12.5.15 The comparison between future baseline and with Project scenarios journey times are shown on Diagram 12.5.5.

Future baseline

12.5.16 The journey time changes across the modelled time periods in the future baseline years from 2029 to 2047 are as follows:

- **A22 from M25 junction 6 to B273 Norbury** – In the future baseline, northbound journey times of 36 to 48 minutes in 2029 would increase by up to 11 minutes by 2047, with the greatest increases seen in the morning peak period. Southbound journey times of 37 to 47 minutes in 2029 would increase by between 11 and 17 minutes in the morning peak period by 2047 and between three and six minutes in the interpeak and evening peak period.
- **A23 from M25 junction 7 to B273 Norbury** – Northbound journey times of 35 to 46 minutes in 2029 would increase by nine to 11 minutes in the morning peak period and three to five minutes in the interpeak and evening peak periods by 2047. Southbound jourmney times of 37 and 46 minutes in 2029 would increase by between ten and 15 minutes in the morning peak periods by 2047, and six to nine minutes at other times.
- **A24 from Leatherhead to A217 crossroads in Sutton** – Journey times in the northbound direction of 22 to 28 minutes in 2029 would increase by up to four minutes by 2047. Southbound journey times of 23 to 27 minutes in 2029 would increase by six to nine minutes in the morning peak periods and by two to three minutes at other times, by 2047.
- **A232 from A217 crossroads in Sutton to West Wickham** – Eastbound journey times would range between 47 minutes in the interpeak, 63 minutes in the evening peak and 73 minutes in the morning peak in 2029. These would increase by three, nine and 57 minutes respectively by 2047. Westbound journey times in 2029 are 41 minutes in the interpeak, 53 minutes in the evening peak and up to 74 minutes in the morning peaks. These would increase by three, 11 and 44 miinutes respectively by 2047. The larger increases in journey time in both directions reflect the increasingly congested nature of this part of the network in the morning peaks as time progresses.

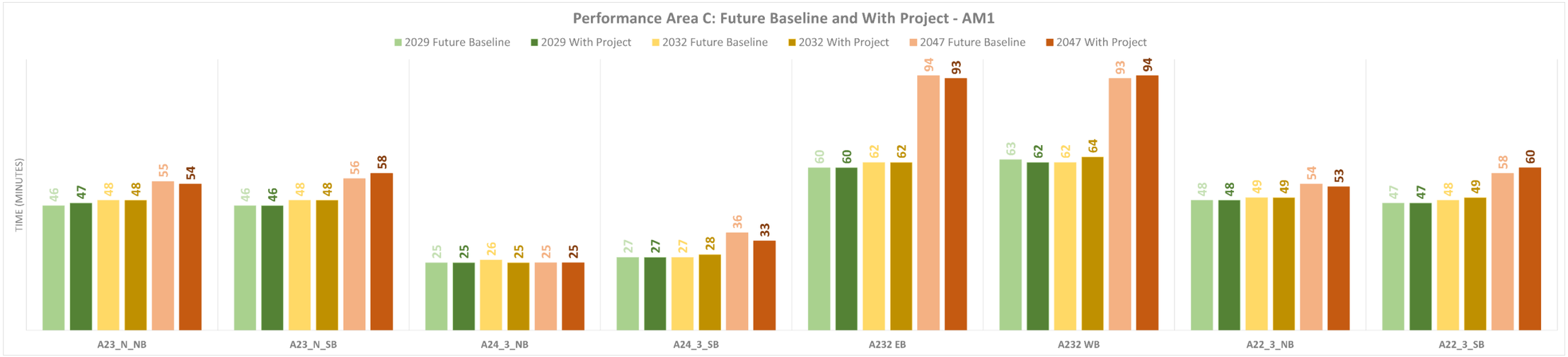
12.5.17 It should be noted that the A24 route through Cheam and the A232 route between Sutton and West Wickham pass through areas of the highway model which are more susecptible to ‘model noise’ (see paragraphs 12.4.7 and 12.4.8). This means that the changes in journey time indicated in the future baseline in particular may be overstated.

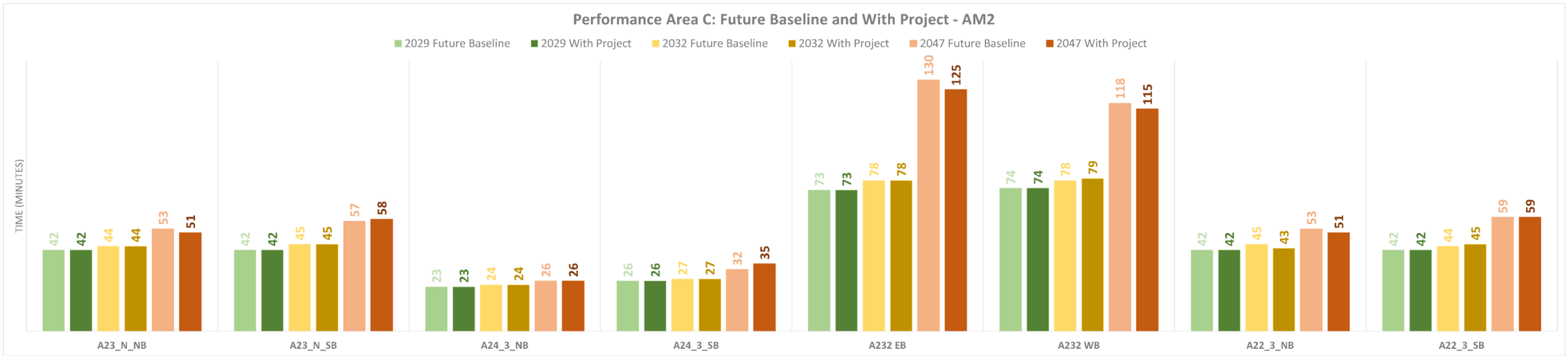
With Project

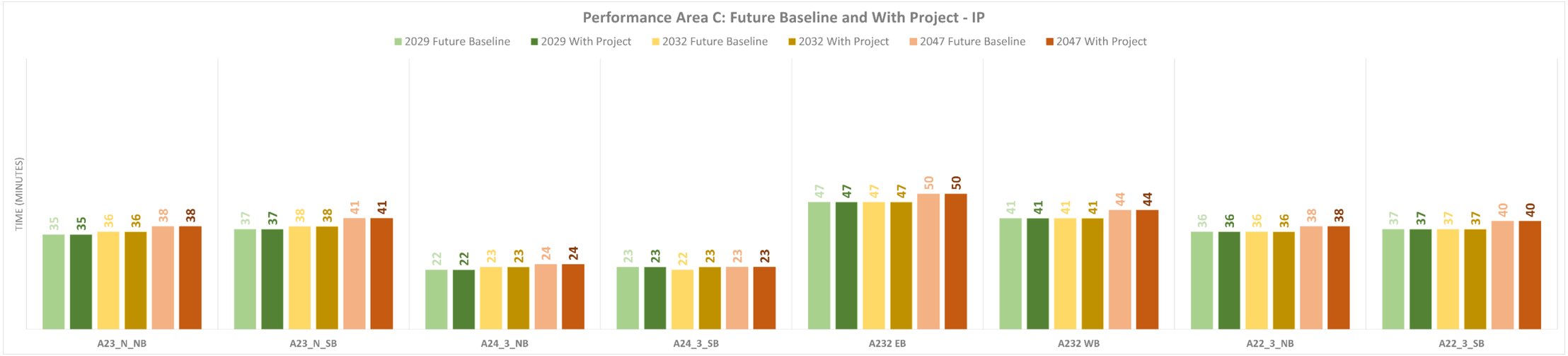
12.5.18 The key points in the comparison between future baseline and with Project scenarios across the assessment years are as follows:

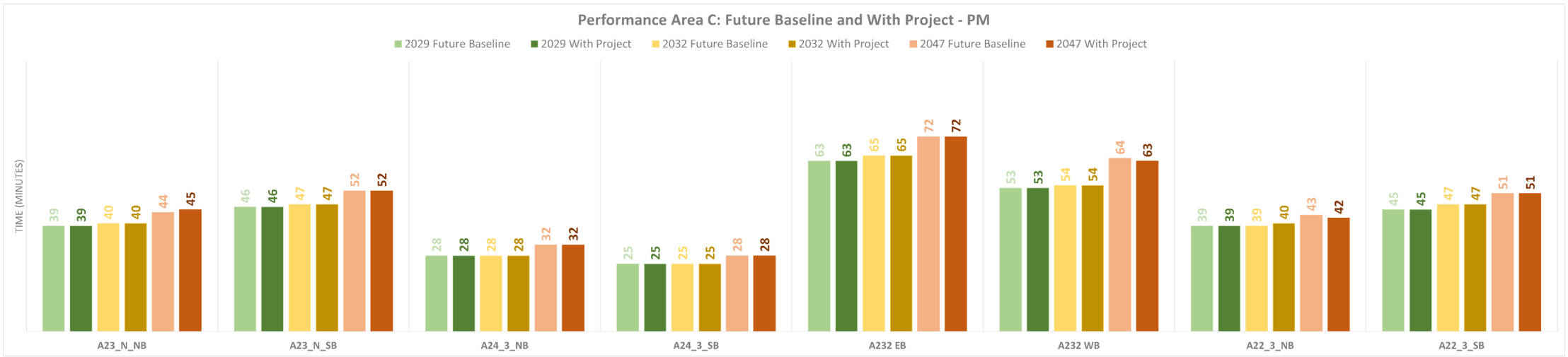
- **A22 from M25 junction 6 to B273 Norbury** – Northbound journey times would decrease by up to three minutes by 2047 and the further change in southbound journey times would range between a decrease of one minute and an increase of two minutes by 2047, compared to the future baseline.
- **A23 from M25 junction 7 to B273 Norbury** – Further change in northbound journey times would range from a decrease of two minutes to an increase of one minute by 2047. Southbound journey times would increase by up to a further two minutes by 2047, compared to the future baseline.
- **A24 from Leatherhead to A217 crossroads in Sutton** – Northbound journey times would increase by up to a further two minutes by 2047. Southbound journey time changes would range from a decrease of three minutes to an increase of three minutes by 2047, compared to the future baseline.
- **A232 from A217 crossroads in Sutton to West Wickham** – With the Project, changes in eastbound journey time would either be unchanged or would decrease by up to five minutes by 2047. Eastbound journey times would see a similar pattern, with changes of between a decrease of three minutes and an increase of one minute.

Diagram 12.5.5 Highway journey times – Performance Area C






Performance Area C: Future Baseline and With Project - IP
2029 Future Baseline
2029 With Project
2032 Future Baseline
2032 With Project
2047 Future Baseline
2047 With Project
TIME (MINUTES)
35 35 36 36 38 38
37 37 38 38 41 41
22 22 23 23 24 24
23 23 22 23 23 23
47 47 47 47 50 50
41 41 41 41 44 44
36 36 36 36 38 38
37 37 37 37 40 40
A23_N_NB
A23_N_SB
A24_3_NB
A24_3_SB
A232 EB
A232 WB
A22_3_NB
A22_3_SB


Performance Area C: Future Baseline and With Project - PM
2029 Future Baseline
2029 With Project
2032 Future Baseline
2032 With Project
2047 Future Baseline
2047 With Project
TIME (MINUTES)
39 39 40 40 44 45
46 46 47 47 52 52
28 28 28 28 32 32
25 25 25 25 28 28
63 63 65 65 72 72
53 53 54 54 64 63
39 39 39 40 43 42
45 45 47 47 51 51
A23_N_NB
A23_N_SB
A24_3_NB
A24_3_SB
A232 EB
A232 WB
A22_3_NB
A22_3_SB

Performance area D

12.5.19 The comparison of the future baseline and with Project scenarios journey times are shown on Diagram 12.5.6.

Future baseline

12.5.20 The journey time changes across the modelled time periods in the future baseline years from 2029 to 2047 are as follows:

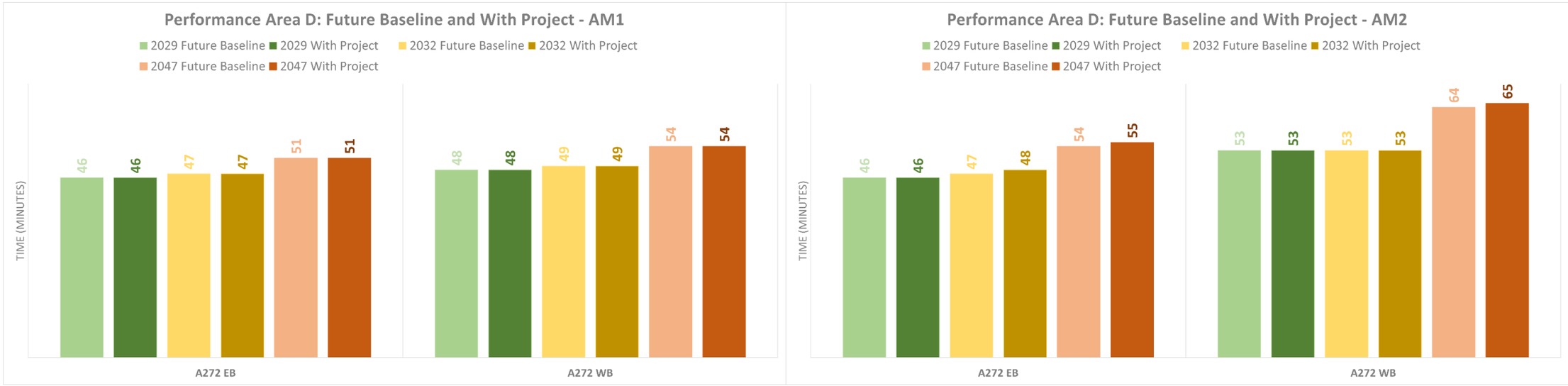
- **A272 from Coolham to near Uckfield** – In the future baseline, journey times of between 42 and 48 minutes in the eastbound direction in 2029 would increase by up to six minutes by 2047. Westbound journey times of between 46 and 53 minutes in 2029 would increase by up to 11 minutes by 2047.

With Project

12.5.21 The key point in the comparison between future baseline and with Project scenarios across the assessment years are as follows:

- **A272 from Coolham to near Uckfield** – With the Project, eastbound and westbound journey times would increase by up to a further one minute by 2047.

Diagram 12.5.6 Highway journey times – Performance Area D



Summary

12.5.22 The journey time analysis covers a relatively wide area of the highway network and provides an overview of the changes that are expected as a result of general growth without the Project, against which the impact of the Project has been compared.

12.5.23 The analysis shows that between 2029 and 2047 in the future baseline, journey times are expected to increase across the highway network. This takes account of committed developments and transport infrastructure schemes but does not include future mitigations and improvements that might need to come forward as a result of development proposals across the modelled area but which are not sufficiently certain to be included in the future baseline models.

12.5.24 On some routes the journey time increases in the future baseline are expected to be particularly significant; but these are forecast to occur without the Project.

12.5.25 The assessment also tests the journey times that would be expected with the Project, which takes account of the interventions and mode shares set out in the Surface Access Commitments (SACs) (**ES Appendix 5.4.1: Surface Access Commitments** (Doc Ref. 5.3)) and the highway works proposed in the vicinity of the Airport. The analysis shows that the journey time changes resulting from the Project are not expected to be significant in any location. The greatest increases in journey time would be two minutes in any of the modelled years and there are routes on which journey times are expected to decrease as a result of the Project.

12.5.26 The analysis tends to reflect the fact that the majority of airport-related traffic uses the strategic road network to travel to and from the Airport, with remaining traffic distributed across other routes and therefore representing small changes in demand in those locations.

12.5.27 Across the key routes in the wider network, the Project is therefore unlikely to have significant impacts on the journey times that would prevail in the future baseline case, either on the SRN or on other local routes as a result of the Project.

12.5.28 The impact of the Project on the operation of the highway network close to the Airport, where the highway works for the Project are proposed, has been assessed using the VISSIM model which provides a more detailed assessment of local network performance and is described in Chapter 13.

Junctions - magnitude of impact for nodes

12.5.29 Detailed data on the magnitude of impact (as set out in Table 12.3.1) for nodes by peak periods, assessment years and performance areas are contained in **Transport Assessment Annex B – Strategic Transport Modelling Report** (Doc Ref. 7.4). A separate review of each node with medium and high magnitude impacts, including location, peak hour traffic flows and the level of airport traffic, has been undertaken to identify potential significant effects. This assessment is contained in **Transport Assessment Annex E – Highway Junction Review** (Doc Ref. 7.4).

12.5.30 Diagram 12.5.7 to Diagram 12.5.9 indicate the locations of the junctions which have been identified with low, medium and high magnitudes of impact in 2029, 2032 and 2047. This is based on a comparison between future baseline and with Project for each assessment year to identify the impacts arising from the introduction of the Project.

12.5.31 The review of junctions indicates that in some locations there is some ‘model noise’ and reassignment of background traffic taking place within the model (as set out in paragraphs 12.4.7 and 12.4.8). This reassignment is the result of similar journey times being achieved along various routes between the same origin and destination. These routes are usually relatively short and model noise occurs when the model assigns background traffic along different routes between the future baseline and with Project scenarios, even when there is no material change in traffic flows or network operation. As such, some of the impact is the outcome of the modelling process and not related to the Project or airport traffic.

12.5.32 Table 12.5.2 to Table 12.5.4 provide a summary of the review for each junction.

Diagram 12.5.7: 2029 junctions (medium and high impact)

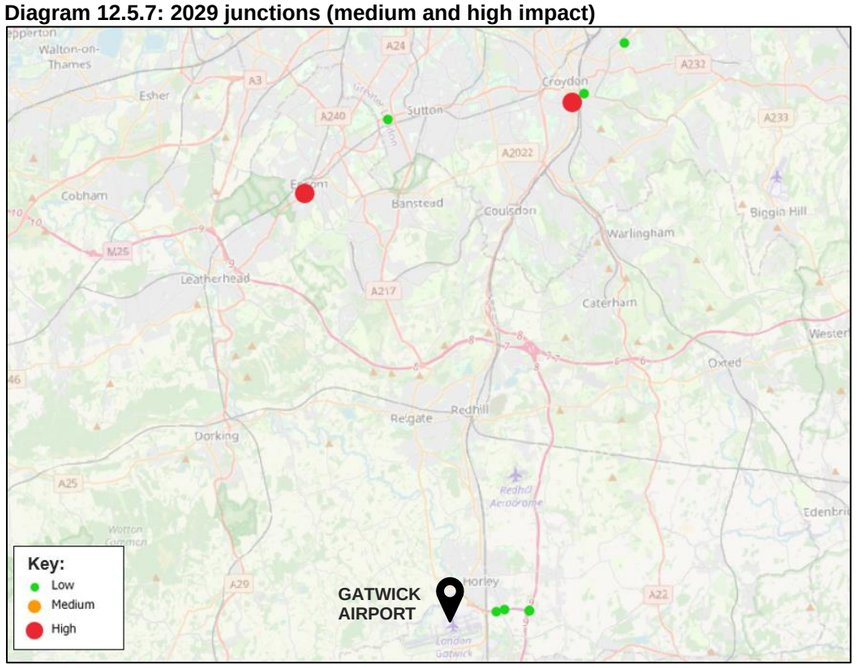


Diagram 12.5.8: 2032 junctions (medium and high impact)

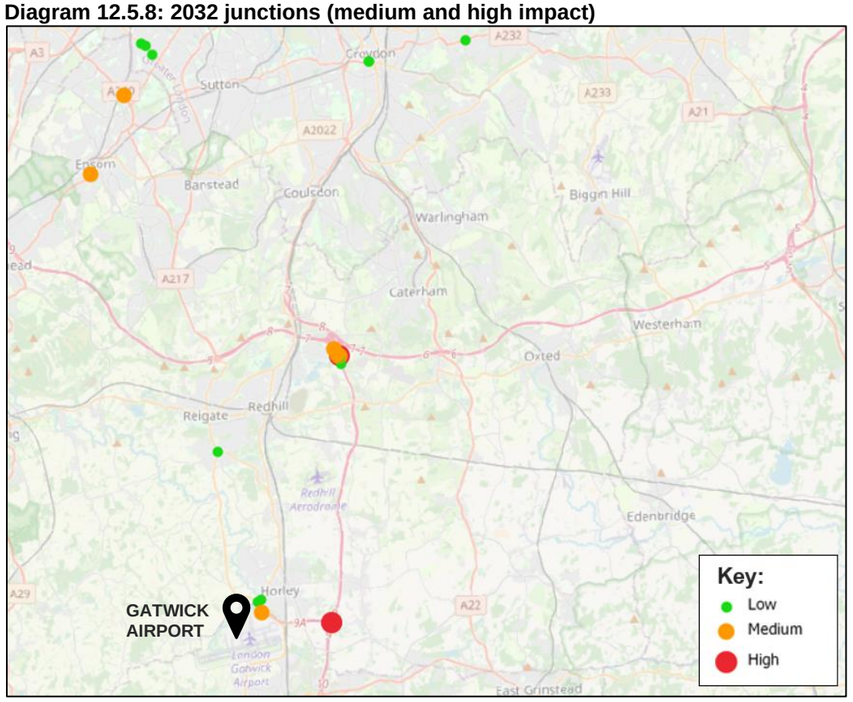


Diagram 12.5.9: 2047 junctions (medium and high impact)

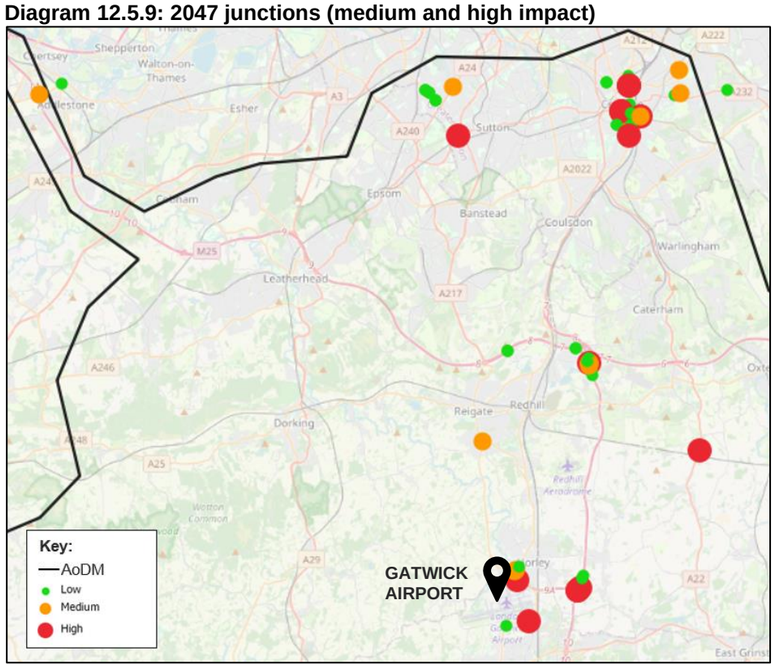


Table 12.5.2: Strategic modelling junction assessment (future baseline against with Project), 2029

Node	Magnitude of Impact	Name	Assessment	Mitigation
55025	High	South Croydon/Bartlett Street, Croydon	This junction is shown to be operating well within capacity in the future baseline. The impact from the Project is identified in the AM2 peak where there is a reduction in traffic (-96 vehicles) but an increase in V/C ratio (from 17% to 109%). From reviewing the model, this appears to be due to model noise and localised reassignment of background traffic from the adjacent junction to the west (V/C ratio increases from 61% in future baseline to 76% with the Project at that junction), which results in queuing that affects the operation of this junction. The proportion of airport traffic at this junction is very small (around 1%) and the number of additional airport trips at this junction as a result of the Project is negligible (-3 to +2 vehicles across the peak periods). For the other peak periods the junction operates with ample capacity (V/C ratio around 15% with Project).	No mitigation is required.
53192	High	South Street/Woodcote Road/Dorking Road, Epsom	This junction is shown to be operating close to capacity in the future baseline, in the morning and evening peak periods (V/C ratio ranging from 91% to 99%). The impact from the Project is identified in the AM1 peak where there is an increase in traffic of 159 vehicles. This is due to model noise and reassignment of background traffic, and there is no similar increase in the other time periods. The junction is operating near to capacity with the Project, with V/C ratio at AM1 peak with Project (97%). This is lower than PM peak for the future baseline without Project (99%). The proportion of airport traffic at this junction is very small (less than 1%) and the number of additional airport trips as a result of the Project is negligible (-3 to +2 vehicles across the peak periods).	No mitigation is required.

Table 12.5.3: Strategic modelling junction assessment (future baseline against with Project), 2032

Node	Magnitude of Impact	Name	Assessment	Mitigation
15214	Medium	M23/M25 junction (merges/diverges)	This complex of merges and diverges is shown to be operating within capacity in the future baseline, with V/C ratios varying from 63% in the inter-peak period to 100% in the AM1 time period. A separate more detailed review of the whole junction has been undertaken against DMRB criteria, to consider the performance of the merges and diverges at this junction. No capacity issues are expected in the with Project scenario, which shows V/C ratios increasing by just two to three percentage points. Further consideration for this junction is undertaken under the 2047 assessment year.	No mitigation is required.
19607	Medium	M23/M25		
1377	High	M23/M25		
1378	Medium	M23/M25		
73465	Medium	Gatwick/Perimeter Road North	This is an internal junction within the GAL road network, which is shown to be operating within capacity in the future baseline. The junction is expected to experience an increase in traffic with the Project. The medium impact from the Project is identified for the AM1 peak where the junction would still be operating within capacity with the Project (V/C ratio of 86%).	No mitigation is required.
16393	High	M23 Junction 9 roundabout	This junction is included within the VISSIM microsimulation model (see Chapter 13), and its operation has been considered in more detail through the use of that model. This shows some reductions in speeds with the Project, compared to the future baseline, but no significant capacity issues have been identified.	No mitigation is required.
16388	Medium			

Table 12.5.4: Strategic modelling junction assessment (future baseline against with Project), 2047

Node	Magnitude of Impact	Name	Assessment	Mitigation
10137	High	A22/Harcourt Way	This node in the model does not represent an actual junction, but is a zone connector, which is a location at which all the traffic from the existing residential area is assumed to be loaded onto the network in one location. In practice, this traffic would use a number of junctions which have not been included given the strategic nature of the model.	No mitigation is required.
55049	High	Brighton Road/Jarvis Road, Croydon	This junction is shown to be operating close to capacity in the morning and evening peak periods in the future baseline, with V/C ratios of between 88% and 96%. The impact from the Project is identified in the AM2 peak where there is an increase in traffic of around 200 trips, which appears to be due to model noise and reassignment of background traffic as a similar increase does not appear in other time periods. The proportion of airport traffic at this junction is very small (less than 1%) and the number of additional airport trips as a result of the Project is negligible (up to 6 vehicles an hour). The junction would continue to operate at capacity with the Project, with the V/C ration in the AM2 peak with the Project (96.7%) being very similar to performance in the AM1 peak in future baseline (96.2%).	No mitigation is required.
54438	High	Bedford Park/Tavistock Road, Croydon	This junction is shown to be operating within capacity in all time periods in the future baseline, with V/C ratios of between 63% and 88%. The models show an increase in traffic with the Project in the AM1 and AM2 periods, which appears to be due to model noise and reassignment of background traffic. The consequence of the increase in traffic with the Project is that the model indicates it would operate over capacity in the AM1 and AM2 peak periods with the Project (V/C increases from around 86% to 105%). The proportion of airport traffic at this junction is very small (around 0.5% which can be considered to be within daily variation in traffic) and the number of additional airport trips as a result of the Project is negligible (up to three vehicles an hour).	No mitigation is required.
54708	High	Lower Coombe Street/Southbridge Road, Croydon	This junction is shown to be operating within capacity in all time periods in the future baseline. An increase in traffic is shown in the AM1 and AM2 time periods with the Project, amounting to between 542 and 813 trips. However, this is considered to be the result of model noise and reassignment of background traffic, given that the proportion of airport traffic at this junction is very small (less than 1%) and the number of additional airport trips as a result of the Project is negligible (up to 10 vehicles an hour). With the Project, the model indicates that the junction would still operate within capacity (V/C ratio of 95%).	No mitigation is required.
54710	High	Coombe Road/South Park Hill Road, Croydon	This junction is shown to be operating within capacity in the morning peak period and close to capacity in the interpeak and evening peak period in the future baseline. The model shows increases in traffic in the morning time periods with the Project which appear to be due to model noise and reassignment of background traffic, given that the proportion of airport traffic at this junction is very small (less than 1%) and the number of additional airport trips as a result of the Project is negligible (up to 8 vehicles an hour). The junction would continue to operate within but close to capacity with the Project (maximum V/C ratio of 98.5% in any time period).	No mitigation is required.
54778	Medium	Selsdon Road/St Peter's Road/Croham Road, Croydon	This junction is shown to be operating within capacity in the morning and interpeak time periods, and at capacity in the evening time period (V/C of 99%) in the future baseline. The impact from the Project is identified in the AM1 peak where there is a small increase in traffic (+59 trips). The proportion of airport traffic at this junction is very small (less than 1%) and the number of additional airport trips as a result of the Project is negligible (up to four vehicles an hour). With the Project, the junction would operate closer to capacity in the AM1 peak (V/C of 91%) than it would in the future baseline, but the performance in the evening peak period would not be affected (V/C of 98% with Project compared to 99% in the future baseline).	No mitigation is required.
54135	Medium	Addiscombe Road pedestrian crossing	This node is a pedestrian crossing and is shown to be operating within capacity in the future baseline in the morning and interpeak periods, and close to capacity (V/C ratio of 97%) in the evening peak period. The impact from the Project is identified in the AM1 peak where an increase of around 110 trips is considered to be due to model noise and reassignment of background traffic. The proportion of airport traffic at this junction is very small (less than 1%) and the number of additional airport trips as a result of the Project is negligible (-1 to +2 vehicles across the peak periods). With the Project the junction would operate close to capacity in the AM1 peak (V/C of 94%), although that would be slightly better than equivalent performance in the PM peak in the future baseline (V/C of 97%).	No mitigation is required.
54840	Medium	Lower Addiscombe Road/Spring Lane, Croydon	This junction is identified as operating within capacity in the future baseline, with V/C ratio of 86% or less. The impact is identified in the AM2 peak. With the Project there is a reduction in traffic but an increase in V/C, which is due to differences in the flows approaching the junction from different directions. The proportion of airport traffic at this junction is very small (less than 1%) and the number of additional airport trips as a result of the Project is negligible (up to +2 vehicles an hour) The junction would continue to operate within capacity with the Project (maximum V/C of 91%).	No mitigation is required.
53948	High	Ewell Road/High Street/The Broadway/Station Way	This junction is shown to be operating above capacity in the AM1 and PM time periods in the future baseline (V/C ratios of 104% to 105%) and close to capacity in the AM2 period (V/C of 96%). The impact from the Project is identified in the AM2 peak where there is an increase in traffic that appears to be due to model noise and reassignment of background	No mitigation is required.

Node	Magnitude of Impact	Name	Assessment	Mitigation
			traffic. With the Project, the junction is showing as operating over capacity in the AM2 peak (V/C increases from 96% to 102%) but also to experience slightly improved conditions in the AM1 peak (V/C reduces from 104% to 99%) as a result of an unexpected decrease in traffic, which tends to support the conclusion that changes shown in this location are the result of model noise. The proportion of airport traffic at this junction is very small (less than 0.5%) and the number of additional airport trips as a result of the Project is negligible (up to +2 vehicles an hour).	
53906	Medium	London Road/Gander Green Lane/Spire St Anthony's Hospital Access	This junction is shown as operating close to capacity in the morning time periods in the future baseline (V/C ratios of 97%) in the future baseline. The impact from the Project is identified in the AM1 peak, where there is a very small increase in trips (+41 vehicles) but the V/C ratio changes by more than two percentage points. The proportion of airport traffic at this junction is very small (less than 0.5%) and the number of additional airport trips as a result of the Project is negligible (up to +2 vehicles an hour). The junction would continue to operate close to capacity with the Project (V/C of 99%).	No mitigation is required.
12722	Medium	M25 J9 roundabout (Addlestone)	In the future baseline this junction, which is one entry to a signalised roundabout, is shown to operate close to capacity in the morning time periods (V/C ratios of between 96% and 98%) and at capacity in the PM peak period (V/C of 101%). The impact from the Project is identified for the AM1 peak where there is a small increase in traffic (+32 vehicles, of which +21 is the result of the Project) leading to more than a two percentage point increase in V/C ratio. The proportion of airport traffic at this junction is very small (less than 1% which can be considered to be within daily variation in traffic). With the Project the junction would continue to operate close to capacity in the morning peak periods (V/C ratios of 96% to 98%) and at capacity in the evening peak period (V/C of 101%, unchanged from the future baseline). The junction is operating close to capacity and there is very low airport traffic at this junction.	No mitigation is required.
1377	High	M23/M25 junction (merges/diverges)	This complex of merges and diverges is shown to be operating within capacity in the future baseline, with V/C ratios varying from 70% in the inter-peak period to 98% in the AM1 time period. The with Project scenario shows V/C ratios increasing by up to six percentage points, reaching maximum values of 104% in certain locations. However, a separate more detailed review of the whole junction has been undertaken against DMRB criteria, to consider the performance of the merges and diverges at this junction, which suggests that although the merge/diverge complex will perform close to capacity, no additional issues are expected compared to the future baseline. The merges and diverges are expected to be operating increasingly close to capacity over time in the future baseline, and conditions would worsen slightly with the Project. Each location would operate at capacity in only one of the modelled time periods. In practice, the Project will not result in a material change in performance. This is illustrated by the journey time assessments for the M23 (northbound and eastbound) and M25 (eastbound and westbound) routes, as set out in Diagram 12.5.2. These show that for 2047, the Project results in either no change or one minute increase on each of the four routes, when considering the four time periods assessed. Merge and diverge capacity can only be increased in steps, rather than in small increments, and the degree of impact at the location resulting from the Project does not merit a large step-change in capacity and the associated scale of highway works. The impact of this junction has been presented to National Highways and they recognise that "*it would appear disproportionate to expect the developer of Gatwick NRP to redesign the entire interchange to cope with a relatively small increase in traffic figures over those which would naturally occur*". Further consultation with National Highways is ongoing.	No mitigation is proposed.
1378	Medium	M23/ M25		
19886	Medium	M23/ M25		
14812	Medium	Woodhatch Road/Dovers Green Road/Cockshot Hill	This junction is shown as operating close to capacity in the AM1 and PM periods (V/C ratios of 96% to 99%) and at capacity in the AM2 time period (V/C ratio of 106%). The impact from the Project is identified in the PM peak, where the increase in vehicles is 96. The proportion of airport traffic at this junction is very small (less than 1% which can be considered to be within daily variation in traffic) and the number of additional airport trips as a result of the Project is negligible (up to +11 vehicles an hour). The change in V/C ratio in the PM peak would be around four percentage points, reaching a ratio of 100%, but with reduced V/C ratios occurring in other time periods with the Project.	No mitigation is required.
76209	Medium	Woodroyd Avenue/Brighton Road, Horley	This junction is indicated as operating within or approaching capacity in the future baseline (maximum V/C ratio of 91% in the PM peak). The traffic flows and operation of this junction are affected by the highway improvement scheme which forms part of the Project. With the Project, the junction would continue to operate within capacity (maximum V/C of 93% with Project).	No mitigation is required.
16769	Medium	Brighton Road/London Road, Horley	This junction is identified as operating within capacity in the future baseline (maximum V/C ratio of 90% in the PM peak). The traffic flows and operation of this junction are affected by the highway improvement scheme which forms	No mitigation is required.

Node	Magnitude of Impact	Name	Assessment	Mitigation
			part of the Project. With the Project, the junction would continue to operate within capacity (maximum V/C of 92% with Project).	
73465	High	Perimeter Road North/Longbridge Way/Northgate Road	This node in the model does not represent an actual junction, but is a zone connector, which is a location at which all the traffic from the surrounding area is assumed to be loaded onto the network in one location.	No mitigation is required.
16388	Medium	M23 Junction 9 roundabout	This junction is within the VISSIM micro-simulation model (see Chapter 13) and its operation has been considered in more detail through the use of that model. This shows some reductions in speeds with the Project, compared to the future baseline, but no significant capacity issues have been identified.	No mitigation is required.
16393	High			
1380	High			
15080	High	A23/Gatwick Road/Perimeter Road East	This junction is shown as operating close to capacity in the future baseline, with V/C ratios of around 98% in all time periods. The impact from the Project is identified for the PM peak, where the increase in traffic results in the junction operating over capacity (V/C changing from 97% in the future baseline to 103% with the Project). This junction is part of the VISSIM model and performance has been assessed using that model, as set out in Chapter 13. The VISSIM model shows some reduction in average speeds with the Project, compared to the future baseline, but no significant capacity issues. Further details on this junction are included in **Transport Assessment Annex E – Highway Junction Review** (Doc Ref. 7.4).	No mitigation is required.

12.6 Summary and conclusions

12.6.1 The strategic modelling work has been developed to cover a substantial area of south and east England, including the areas where the Project may have an impact on highway capacity.

12.6.2 The strategic highway model has gone through a series of updates and refinements as part of the calibration and validation, in accordance with guidance in TAG, to feed into the assessment of the strategic impacts of the Project. Stakeholders have been provided with information about the process, and detailed technical reports covering the calibration and validation of the model and the process of producing forecast year models, and a series of technical workshops has been held to reach agreement that the model is suitable for the purposes of this assessment.

12.6.3 The assessment has focused on the key metrics of journey times and magnitude of impact for nodes, which provide a consistent basis on which to review the impact of the Project. The model provides information on the performance of the highway network in each of the future baseline years, allowing for background traffic growth, committed developments, and committed network changes but does not include the Project. It also provides information on the performance of the network in the with Project scenarios. The comparison between future baseline and with Project scenarios indicates the impact of the Project.

12.6.4 Further review has been carried out into nodes where impacts have been indicated, which has provided more detailed information on the performance of these junctions without and with the Project. In some cases, this has identified the apparent impact of the Project as being a consequence of ‘model noise’ (known volatility in the highway model which is unlikely to occur in practice).

12.6.5 Overall, the modelling work shows that the additional traffic demand associated with the Project, taking into account the highway improvement works which form part of the Project, can be accommodated on the wider highway network and no significant impacts are identified.

12.6.6 Given the above, GAL is not proposing any mitigation for the wider and strategic highway network.

12.6.7 More detailed analysis has been undertaken for the local highway network in the vicinity of the Airport, including that which would be affected by the proposed highway works which form part of the Project. That analysis uses the VISSIM microsimulation model and is discussed in Chapter 13.

13 Highway network: local modelling

13.1 Introduction

13.1.1 Microsimulation VISSIM modelling has been undertaken on the local highway network for the 2032 and 2047 with and without Project scenarios. VISSIM modelling can provide a more detailed assessment of local highway network performance and can be used to inform the design of highway proposals.

13.1.2 The VISSIM model uses dynamic assignment, specifying origin-destination matrices for each type of vehicle for each fifteen minutes of the modelled period. This allows vehicles to choose routes within the micro-simulation model network, where choice exists, and provides a more detailed assessment of the local highway network when compared against the strategic highway model. The strategic model outputs are used to inform the future year forecast demand which is an input to VISSIM, and more detailed information on the methodology and outputs is included in **Transport Assessment Annex C – VISSIM Forecasting Report** (Doc Ref. 7.4).

13.2 Current and future network

Current network

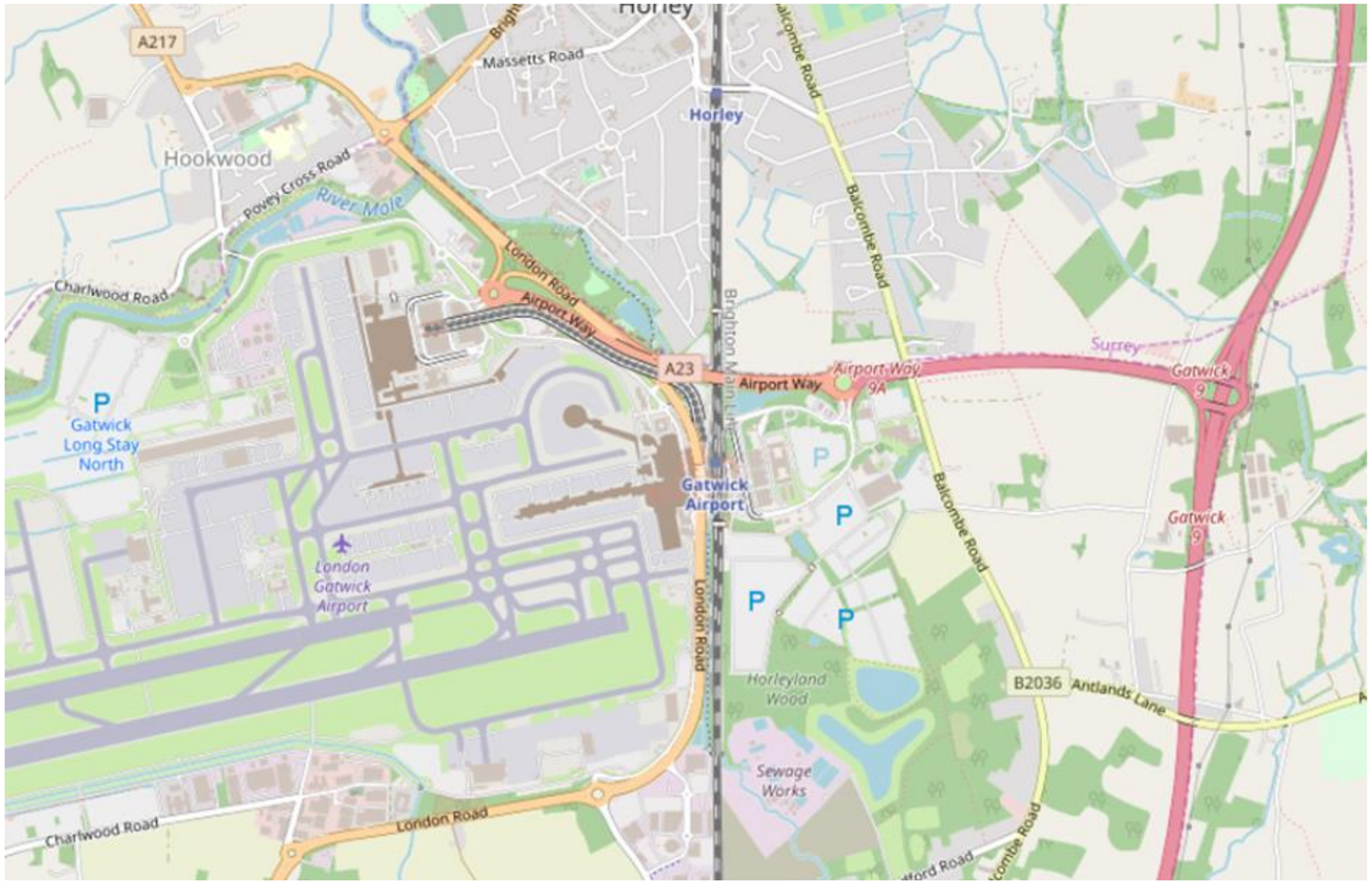
13.2.1 The signed route for access from the motorway to the Airport is via the M23 Spur between Junction 9 and 9a, with direct access to both South Terminal and North Terminal. This is the preferred 'gateway' for access to Gatwick by road and is consistent with the current wayfinding strategy. The corridor between M23 Junction 9 and Longbridge Roundabout, including South and North Terminal Roundabouts, is therefore fundamental to the successful operation of the Airport.

13.2.2 The A23 represents an important north-south strategic route as well as providing local access. It has an important local role connecting Crawley to the south to Horley to the north of Gatwick. Crawley is the largest nearby town and its centre lies approximately 4 km south of Gatwick's South Terminal.

13.2.3 Some traffic from south of the Airport can access the Airport via Junction 10 of the M23 as an alternative route. Currently, this is not as attractive to passengers as this is a longer route in distance and time. However, some delivery and logistics movements related to the Airport may still access the Airport from the south.

13.2.4 Diagram 13.2.1 shows the road network in the area around Gatwick including connection to the M23 motorway.

Diagram 13.2.1: Highway network in the vicinity of the Airport including the M23 spur



Source: Open Street Map

Future network

13.2.5 The following highway network improvements are included in the future baseline networks in the VISSIM modelling work, which is undertaken for 2032 and 2047.

National Highways Smart Motorways scheme

13.2.6 Smart Motorways involve increasing the number of lanes for additional traffic capacity, along with technology enabled methods for monitoring congestion, changing speed limits, activating warning signs and closing lanes.

13.2.7 The Smart Motorway on the 18 km (11 mile) section of the M23, between Junctions 8 and 10, was completed in 2020 and includes the following features which are relevant and have been included in the future baseline VISSIM model.

- Increasing the number of running lanes on the M23 from three to four in each direction.
- All on and off ramps, from the M23 to J9, being widened to allow two separate lanes connecting into the mainline.
- The traffic signals on Junction 9, at the intersection with the M23 northbound off ramp, were removed. A new bypass lane provides a free-flowing left turn movement towards Gatwick.
- Additional capacity on the M23 spur by increasing it to three lanes in the westbound direction between Junction 9 and South Terminal Roundabout.

Capital Investment Plan (CIP) improvements

13.2.8 As part of the Capital Investment Plan (CIP) improvements, modelling of demand from 53 to 55 mppa through the Airport shows the need for signalisation and local widening at both terminal roundabouts to cater for short-term increases in Airport and background demand.

13.2.9 The works are described in the current ASAS and they have been included in the future baseline. The works are designed to deal with peak period delays when the conflict between general traffic heading to and from the motorway and vehicles leaving the two terminal areas is greatest. The principles of the improvements are as follows:

- Signalisation of North Terminal and South Terminal roundabouts with queue detection to optimise capacity and manage delay.
- Increase in circulating capacity at North Terminal Roundabout, improving conditions for general traffic.
- Widening on approaches and exit lanes to increase capacity.
- Revisions to lane marking and signs to maintain safety.

13.2.10 The works are shown on Diagram 13.3.1 and Diagram 13.3.2.

13.2.11 GAL has budgeted for the CIP works and committed for the works to be completed by 2029.

13.3 Project network

13.3.1 To accommodate the proposed increase in passenger numbers, surface access improvements form part of the Project. The improvements include the following and further information is included in Chapter 2 of this report:

- South Terminal: new junction layout providing full grade separation.
- North Terminal: new junction layout including partial grade-separation, improving traffic flow. The Airport Way eastbound connection from North Terminal roundabout would be removed with eastbound traffic to travel via a new signal-controlled junction on the A23 London Road and an enhanced eastbound diverge connection onto Airport Way.
- enhancement of the eastbound M23 Gatwick Spur as part of the South Terminal roundabout improvements, should these not be completed in advance of the airport expansion.

Diagram 13.3.1: CIP improvement works to South Terminal Roundabout (future baseline)

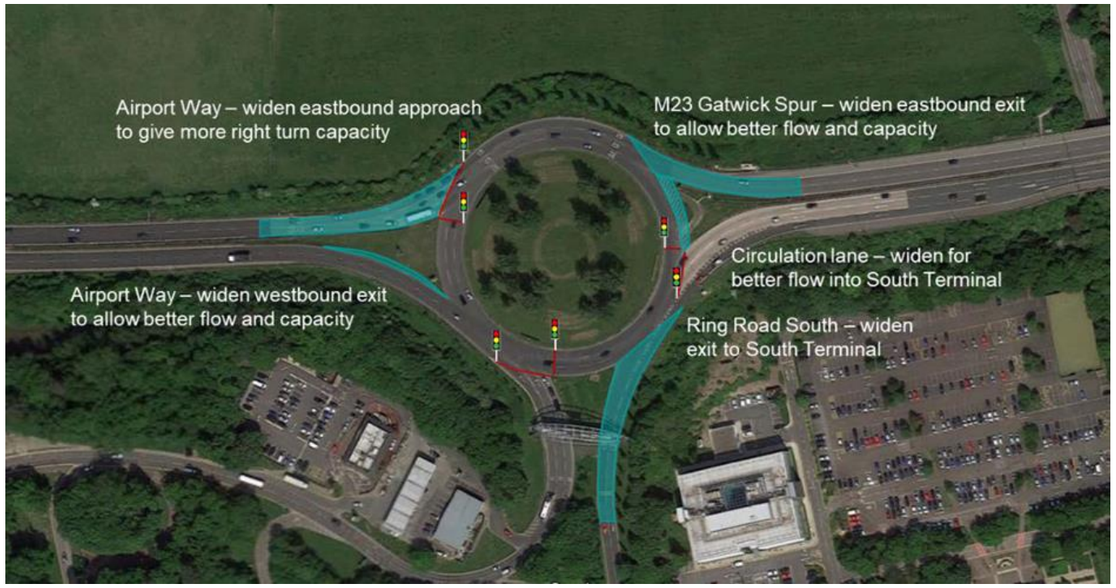
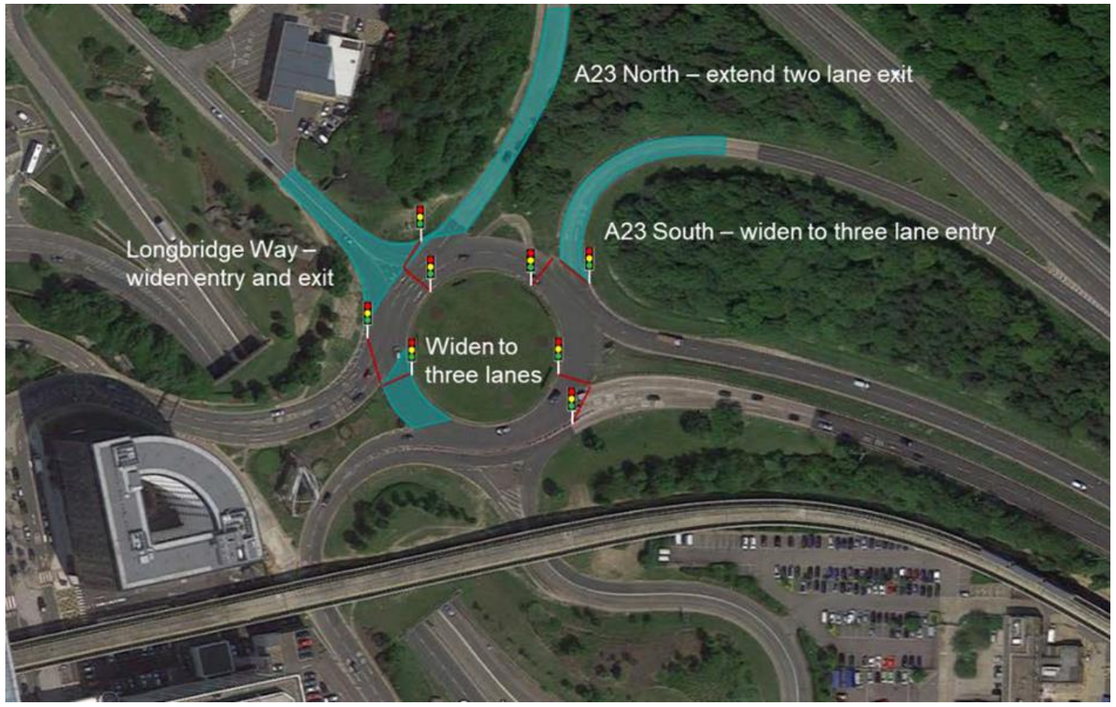


Diagram 13.3.2: CIP improvement works to North Terminal Roundabout (future baseline)



13.4 Approach and methodology

Modelling approach

Vissim models

13.4.1 For the purposes of assessing the DCO, an abbreviated version of the GAL Corridor model, a 24-hour model to test flows, congestion and mitigation on the highway network around Gatwick, has been used.

13.4.2 The model used for the DCO covers the AM and PM peak periods for 2032 and 2047. The 2032 model represents the summer period after the third anniversary of the northern runway opening (which is assumed to be in 2029) and includes the highway works which form part of the Project; the 2047 scenario represents the summer period 15 years after.

13.4.3 The models test highway performance and congestion effects of growth at the Airport both in the future baseline and with Project scenarios. The validation and performance of both the 24 hour and abbreviated base models has been shared with the relevant highway authorities and accepted as suitable for assessing the effects of the Project.

13.4.4 The Microsimulation Modelling Report is contained in **Transport Assessment Annex C – VISSIM Forecasting Report** (Doc Ref. 7.4) and provides more detailed technical information.

Corridor model

13.4.5 The Corridor model includes south Horley from the junction at Woodroyd Avenue and A23 Brighton Road, south through Longbridge Roundabout, east through North and South Terminal Roundabouts, along the M23 Spur to Junction 9 of the M23. The model also extends south down the A23 London Road into North Crawley, including roads connecting to the Manor Royal estate, as shown in Diagram 13.4.1.

13.4.6 In 2016, the Corridor model was recalibrated based on an extensive data collection exercise and is considered a robust base to take forward for analysis of impacts related to future growth at Gatwick. For the purposes of this assessment, the Corridor Model is being used to test highway link and junction performance around the Airport to confirm the findings of the strategic highway modelling which is the primary highway assessment tool.

Assessment criteria

13.4.7 The VISSIM model simulates the operation of the network dynamically over a chosen period of time, including a period before and after the period of immediate interest in order to ensure that network operation is represented appropriately. The model allows a number of performance metrics to be extracted, across a series of time ‘slices’ during the simulated time period, or at specific times in that period. The VISSIM model does not produce the direct equivalent of the V/C ratios which can be drawn from the strategic model, but it does allow other information on network performance to be considered. This includes speed plots (the speed of vehicles at different places on the road network at a given time) which indicate how well traffic is flowing and where congestion may be likely, journey times (the time taken to travel from one selected point in the network to another) and other statistics including the volume of traffic entering and leaving the model at different locations. **Transport Assessment Annex C – VISSIM Forecasting Report** (Doc Ref. 7.4) provides a full assessment of the performance of the network in the future baseline and with Project scenarios. This chapter provides an overview of the modelled results by reviewing the speed plots. These provide an indication of likely queuing levels and therefore also a representation of forecast congestion.

Study area

13.4.8 The extent of the VISSIM model is described in Chapter 5 and is shown in Diagram 13.4.1. Based on the distribution of airport traffic shown in Diagram 12.3.2, the extent of the VISSIM model has been developed to cover the immediate area where most significant changes occur on the highway network and in terms of traffic flows, and therefore appropriate for assessing the impact of the Project.

Time periods

13.4.9 The VISSIM model considers 2032 and 2047 without and with the Project and uses data from the SATURN model. **Transport Assessment Annex C – VISSIM Forecasting Report** (Doc Ref. 7.4) sets out the relationship between the SATURN and VISSIM time periods and matrices in detail. The VISSIM model used to assess the Project focuses on the AM and PM time periods, and loads the matrices for 06:00 to 10:00 and 15:00 to19:00, consistent with the warm-up, analysis and cool-down periods for each peak.

Diagram 13.4.1: VISSIM corridor model extents

13.5 Comparison of future baseline and with project scenarios

13.5.1 The VISSIM model used covers the AM and PM peak periods for 2032 and 2047. This section sets out the VISSIM modelling work for the with and without Project scenarios undertaken for these assessment years.

Assessment year 2032

13.5.2 Plots are provided for average vehicle speeds across the network in km/hr for each half hour of each peak period (07:00-09:00 for the AM and 16:00-18:00 for the PM).

13.5.3 The plots are presented in Diagram 13.5.1 to Diagram 13.5.4 for the AM peak and Diagram 13.5.5 to Diagram 13.5.8 for the PM peak, for future baseline and with Project. These provide an overview of the network operation, with the slowest speeds showing where queuing is more likely to occur.

Future baseline

13.5.4 For the AM peak, the average speed plots for the future baseline show that there is slower-moving traffic on the M23 Spur westbound approach to South Terminal Roundabout, indicating that there is limited spare capacity available in this part of the network. These slower speeds extend approximately half the length of the M23 spur. Busier conditions are also shown at Longbridge Roundabout, and queueing is evident where traffic leaves the South Terminal complex onto South Terminal Roundabout.

13.5.5 The PM peak model shows very similar operation to the AM peak, slow-moving traffic on the westbound M23 Spur approaching South Terminal Roundabout and busy conditions at Longbridge Roundabout. As for the AM peak, queues are seen leaving the South Terminal complex. This reflects the AM peak model outputs which indicate that spare capacity is becoming limited in some areas of the network.

13.5.6 In the southern section of the VISSIM network, the junctions operate effectively and average speed plots are provided in **Transport Assessment Annex C – VISSIM Forecasting Report** (Doc Ref. 7.4). At the start of the bus lane on the A23 northbound, just north of the junction with Beehive Ring Road, two traffic lanes merge down to one and this merge does not perform well under the predicted traffic flows. The resultant queueing extends to Lowfield Heath roundabout but clears during the assessment period of the model. Further detailed analysis is provided in **Transport Assessment Annex C – VISSIM Forecasting Report** (Doc Ref. 7.4).

13.5.7 The VISSIM model outputs confirm that in the 2032 future baseline the level of congestion is becoming more extensive, increasing the potential for wider impacts on the highway network and the operation of the forecourts and indicating that there would be insufficient capacity to accommodate Project demand without the highway works.

With Project

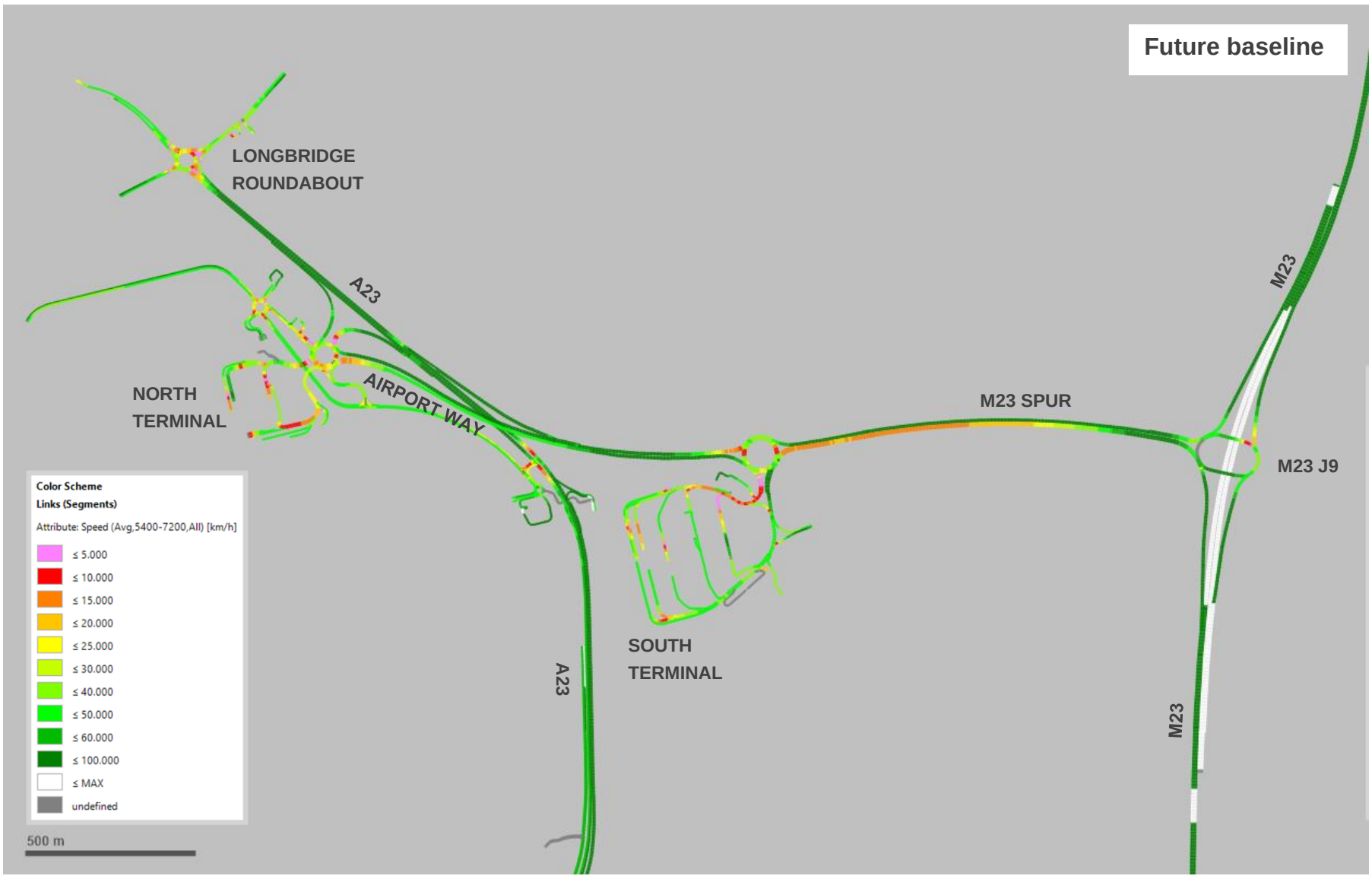
13.5.8 The with Project scenario for 2032 includes the highway improvement works and the additional demand generated by the Project.

13.5.9 For the AM peak, the plots show that the highway works can accommodate the proposed growth, with no significant queuing or congestion indicated at any location. The M23 Spur performs better than in the future baseline and there is considerably less queuing on the exit from the South Terminal complex. Conditions at Longbridge Roundabout are similar to those seen in the future baseline and it should be noted that extra capacity is provided at this junction for active modes within the highway works. Although the A23 London Road shows slightly slower speeds than in the future baseline, this reflects a change of speed limit which is part of the highway proposals. This shows that the highway works reduce the potential congestion impacts of the higher demand from the Project.

13.5.10 The model also shows some slowing of vehicle speeds in and around the North Terminal junction, but this is predominantly as a result of vehicles waiting at the new traffic signal junction with the A23 London Road, instead of having to travel north to Longbridge Roundabout to make a U-turn to return to the M23.

13.5.11 The average speed plots for the PM peak show very similar operation to the AM peak period, with improvements shown such as on the M23 Spur. The highway works mean that the network is shown by the modelling to be operating with more spare capacity in 2032, compared to the future baseline for the same year. The issues identified on the A23 northbound near Beehive Ring Road are improved as a result of the increase in capacity provided by the Project, with much less delay seen in the 2032 PM peak compared to the future baseline. Further details are provided in **Transport**

Diagram 13.5.1: 2032 future baseline and with Project – average speeds, AM peak 07:00-07:30



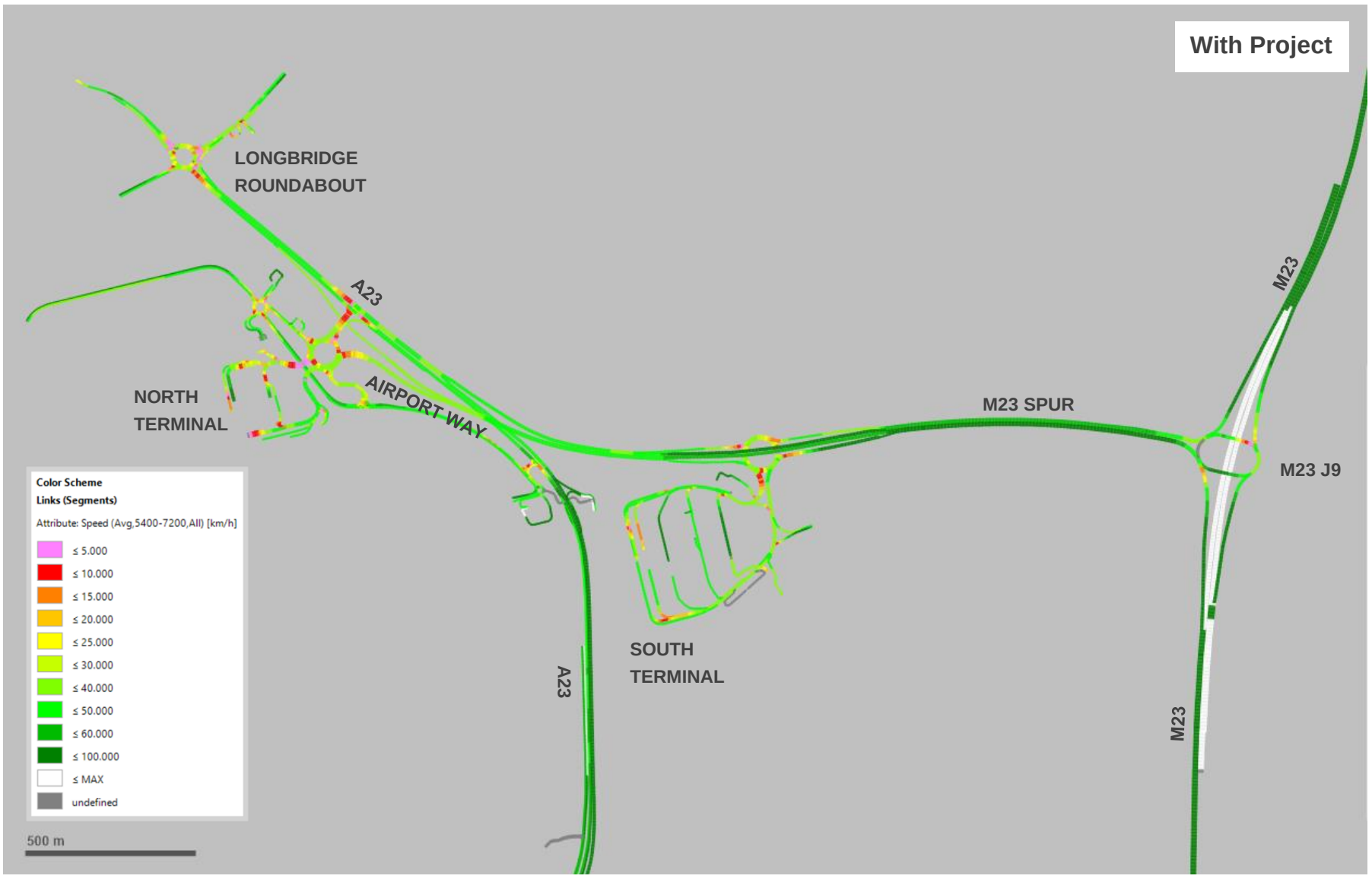
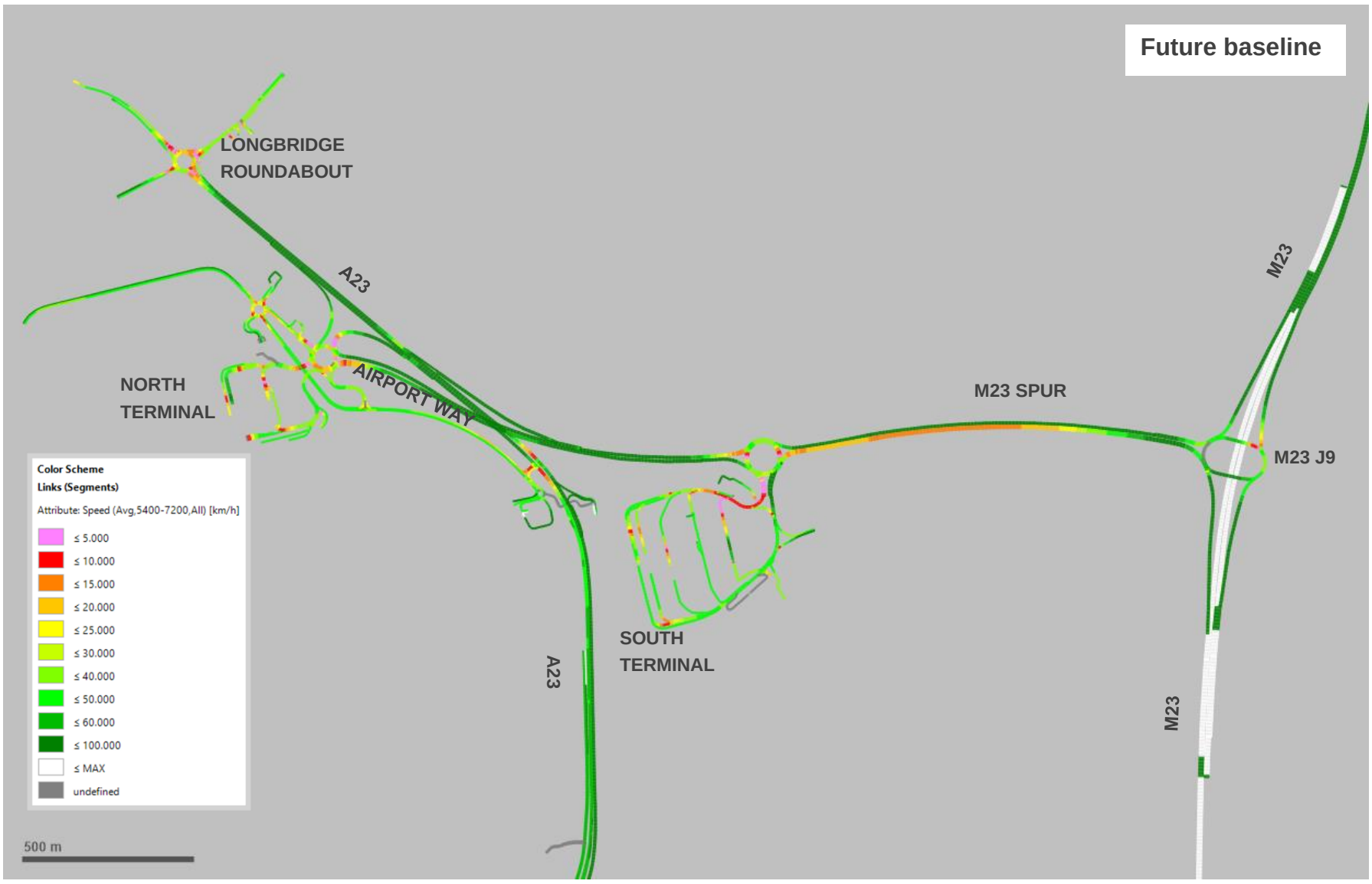


Diagram 13.5.2: 2032 future baseline and with Project – average speeds, AM peak 07:30-08:00



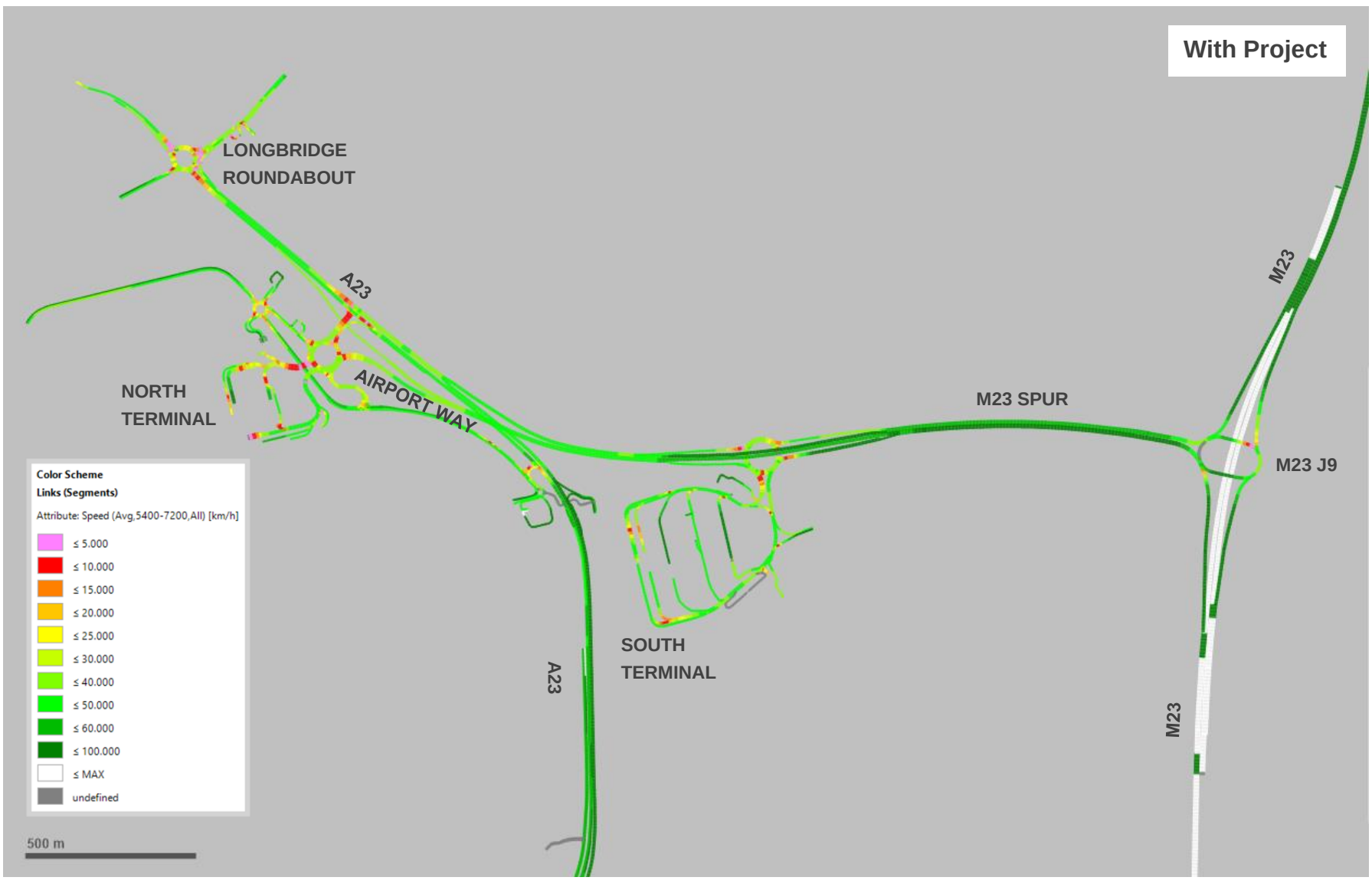


Diagram 13.5.3: 2032 future baseline and with Project – average speeds, AM peak 08:00-08:30

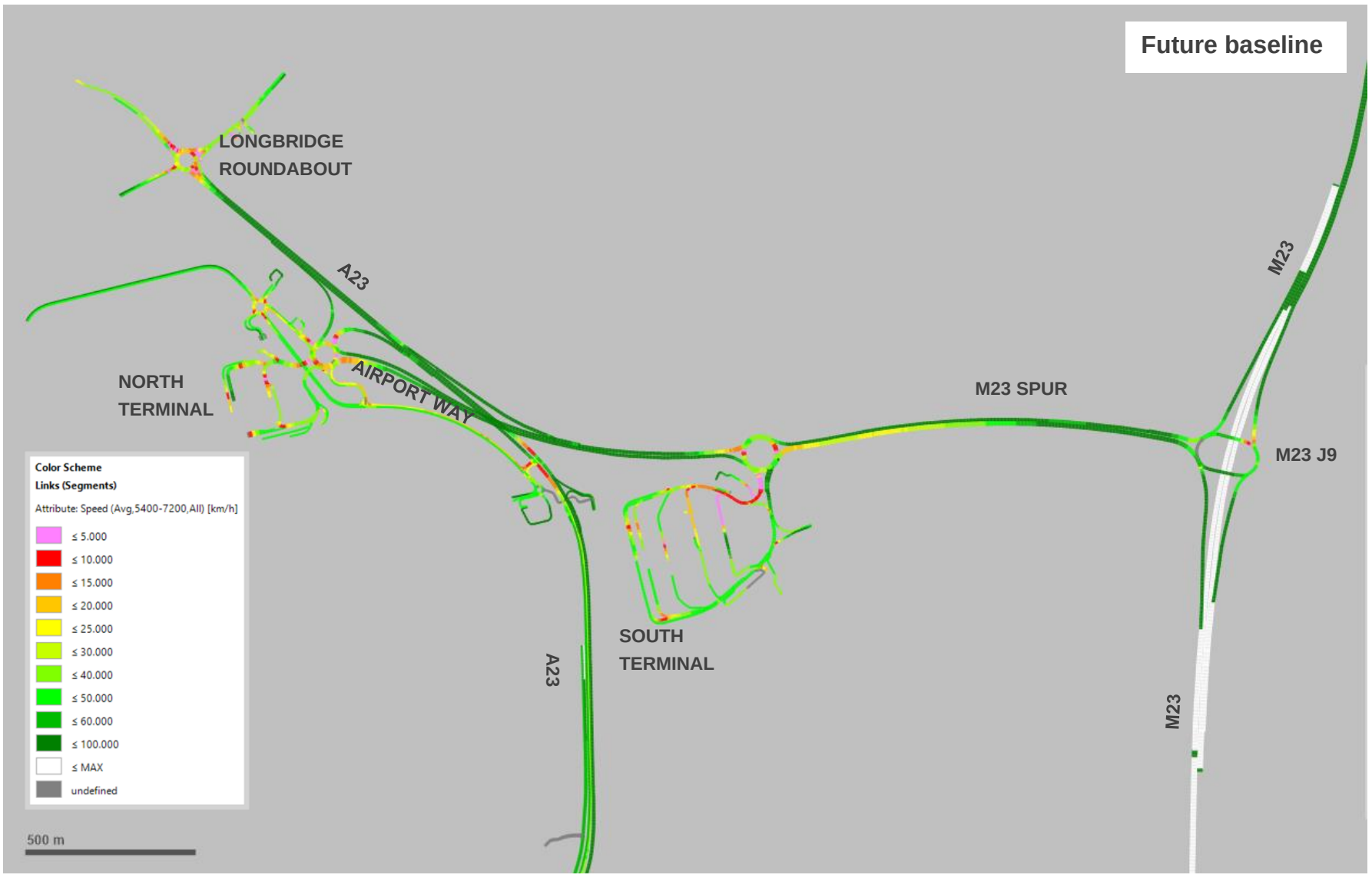


Diagram 13.5.4: 2032 future baseline and with Project – average speeds, AM peak 08:30-09:00

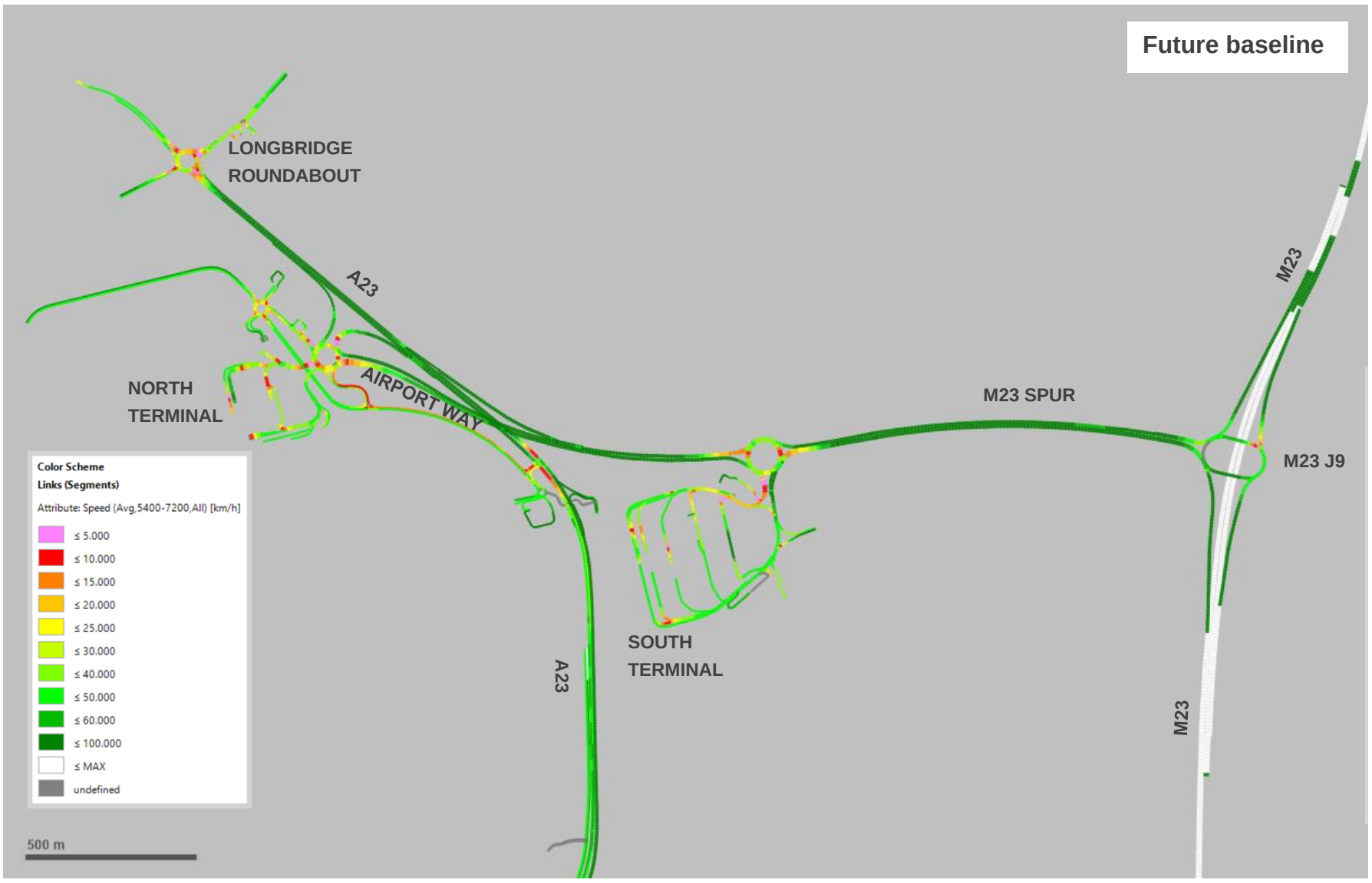


Diagram 13.5.5: 2032 future baseline and with Project – average speeds, PM peak 16:00-16:30

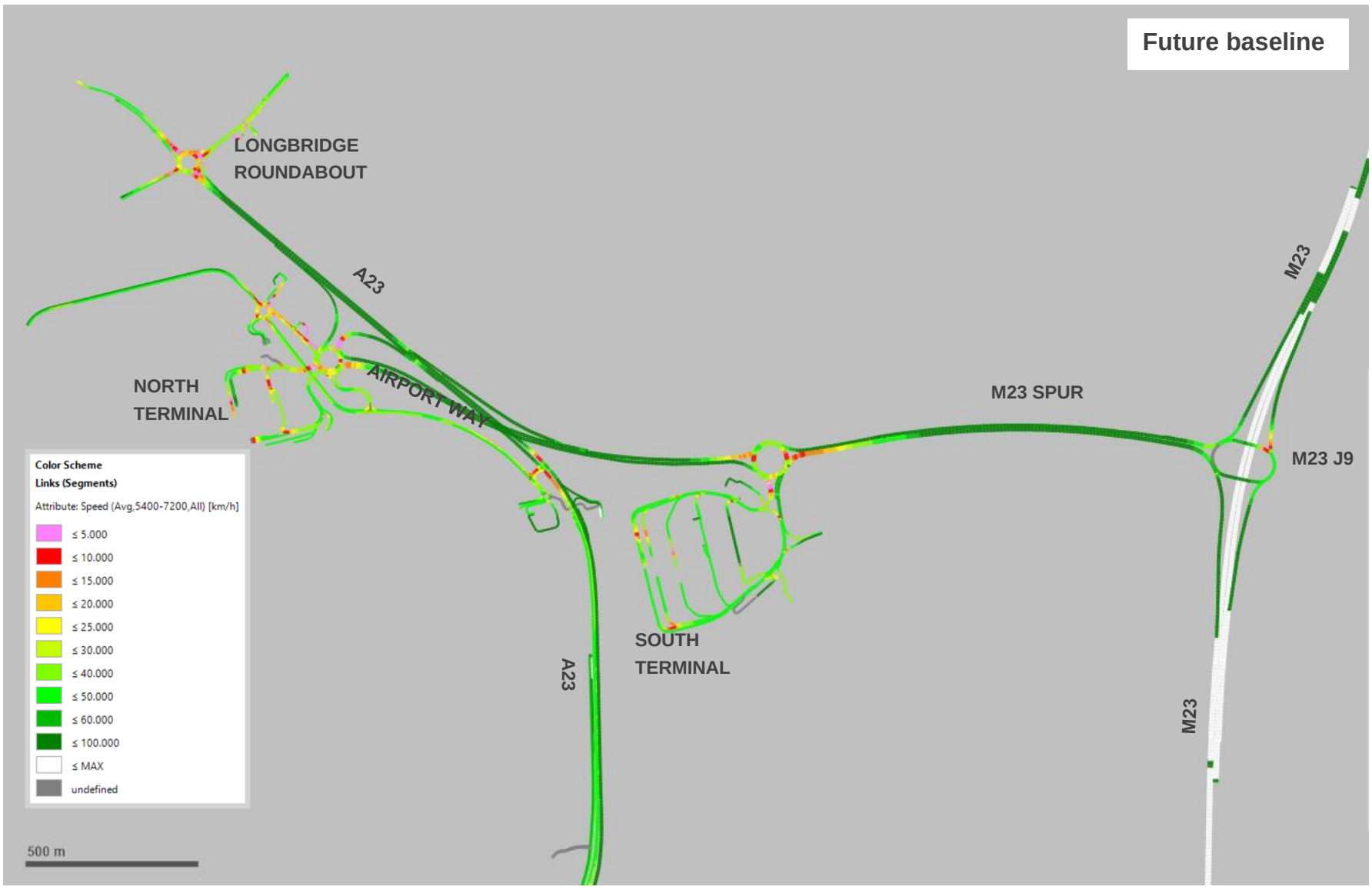


Diagram 13.5.6: 2032 future baseline and with Project – average speeds, PM peak 16:30-17:00

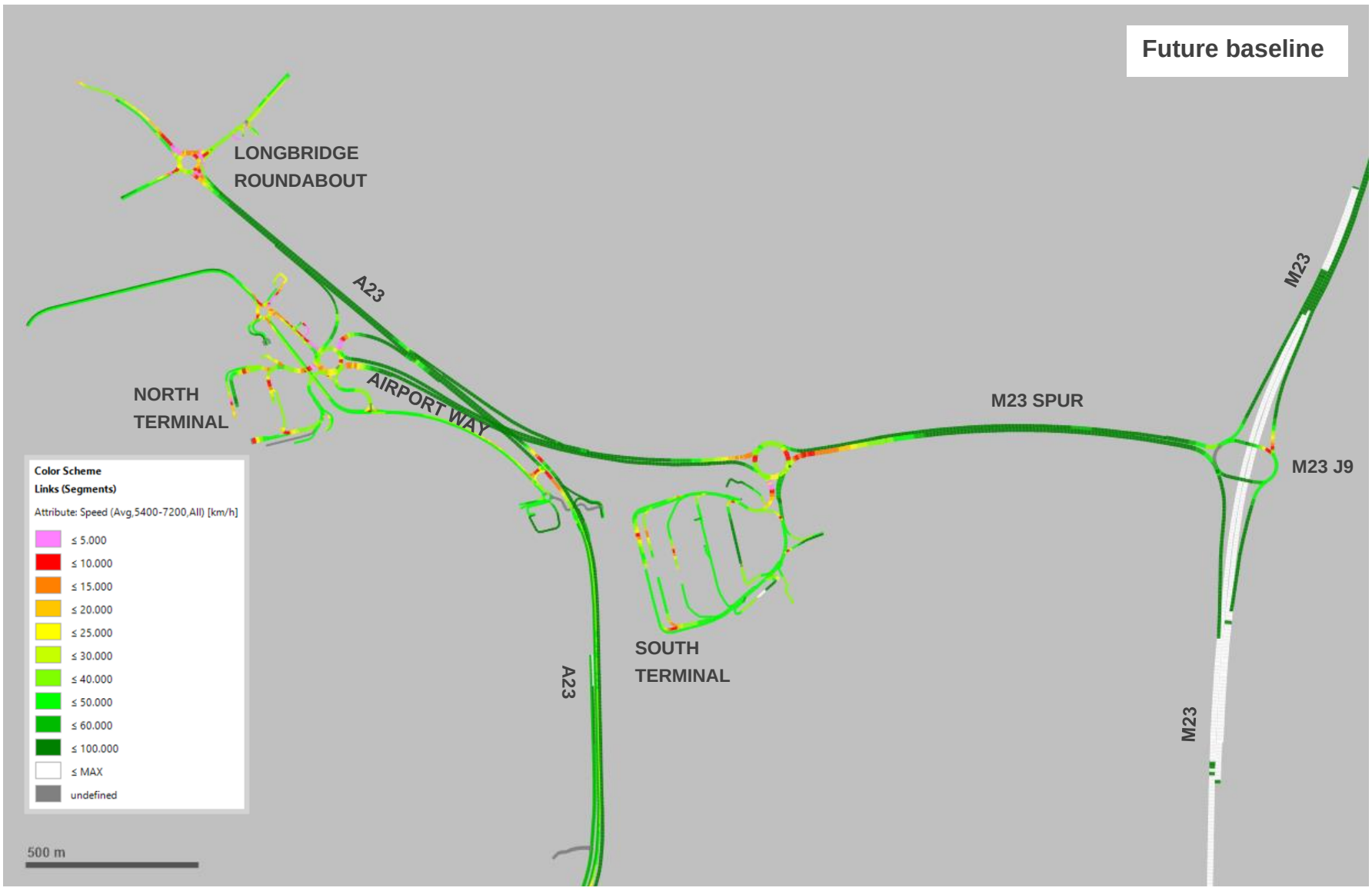


Diagram 13.5.7: 2032 future baseline and with Project – average speeds, PM peak 17:00-17:30

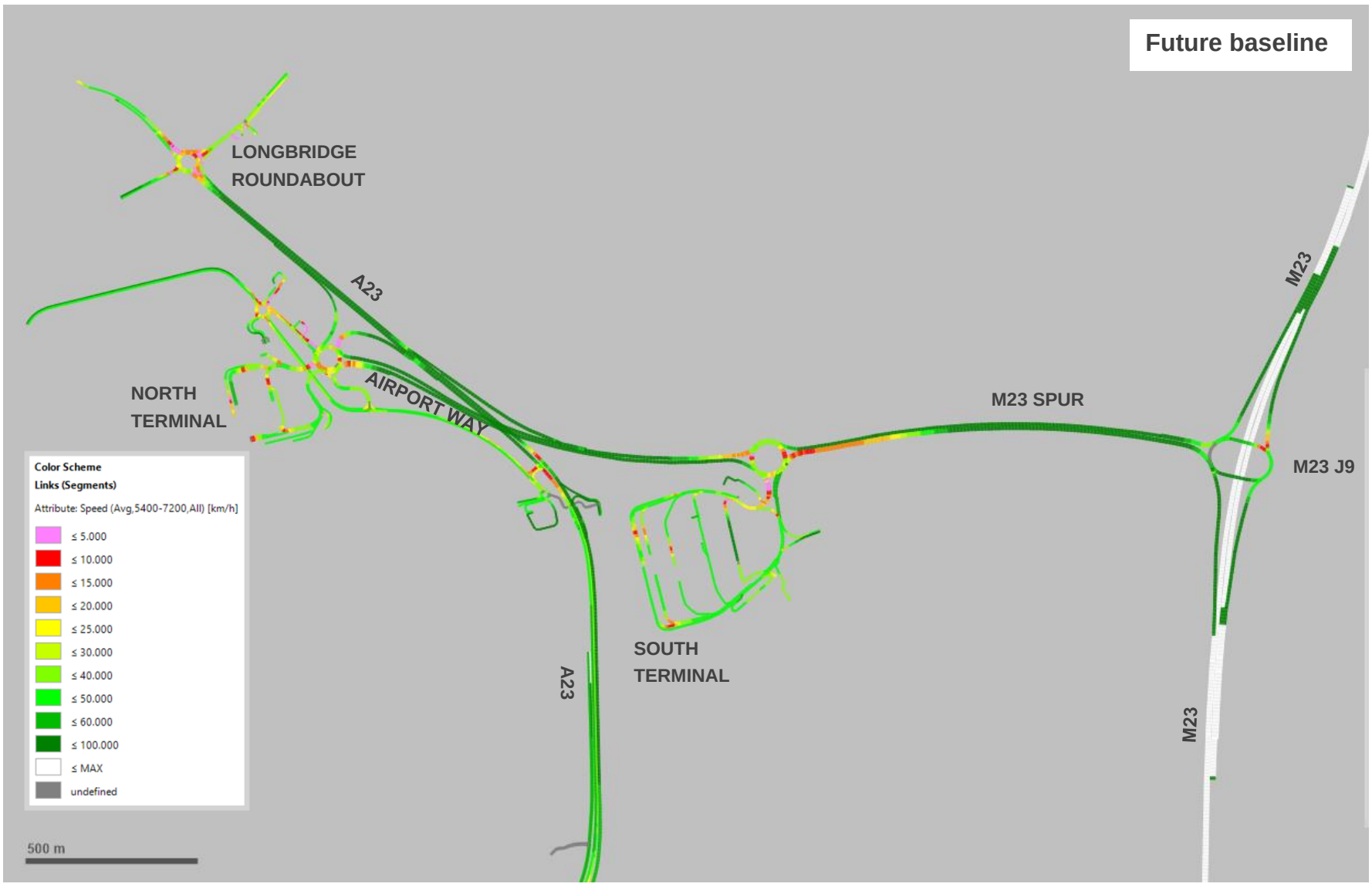
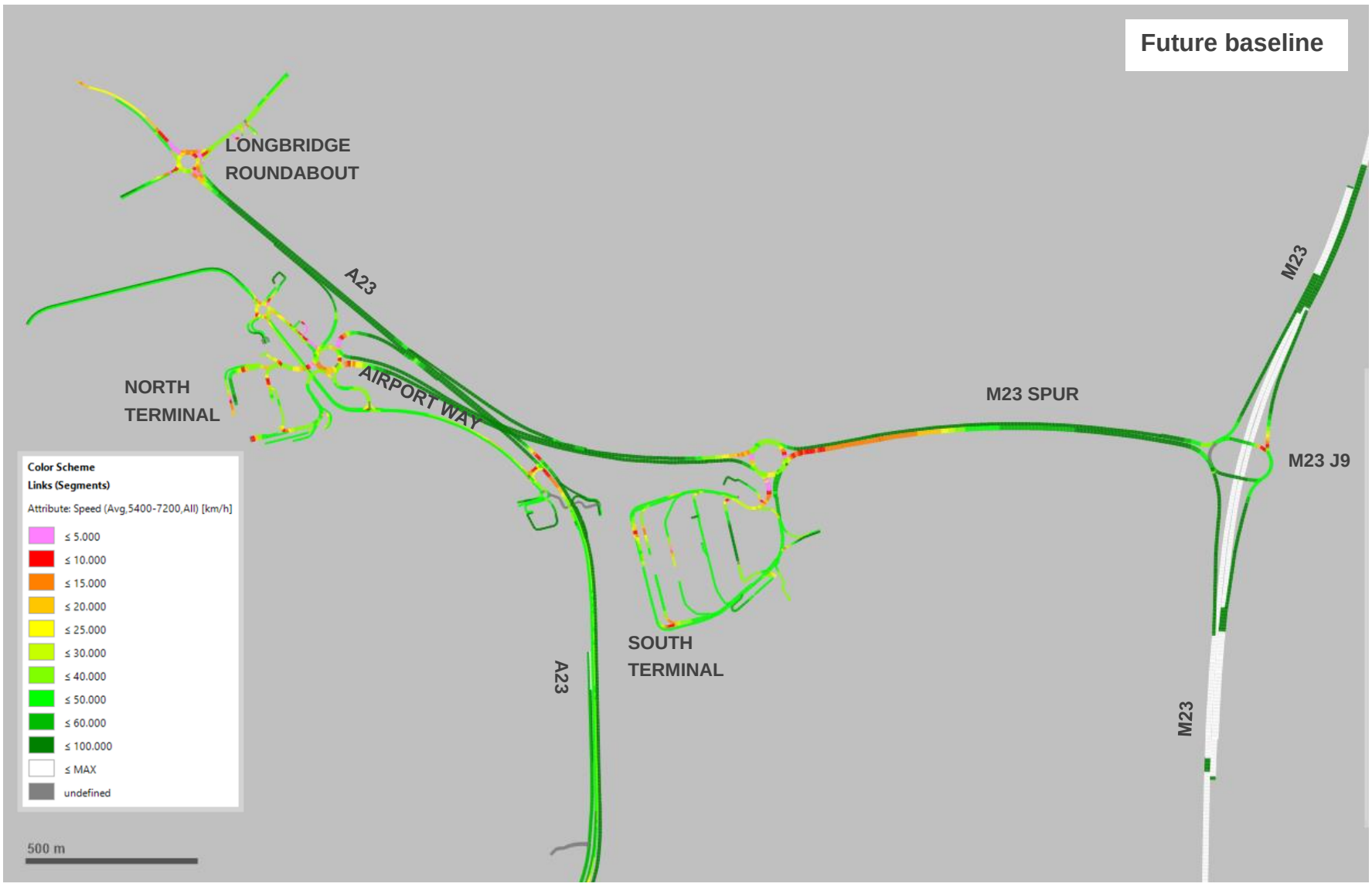


Diagram 13.5.8: 2032 future baseline and with Project – average speeds, PM peak 17:30-18:00



Assessment year 2047

13.5.12 Plots showing average vehicle speeds for the 2047 future baseline and with Project are presented in Diagram 13.5.9 to Diagram 13.5.12 to the AM peak and Diagram 13.5.13 to Diagram 13.5.16 for the PM peak.

Future baseline

13.5.13 When considering the plots against the 2032 future baseline, the AM peak in the 2047 future baseline shows increased congestion on the A217 and Povey Cross Road approaches to Longbridge Roundabout as well as westbound along the M23 Spur approaching South Terminal Roundabout. M23 Junction 9 shows similar operational performance as is seen in the 2032 future baseline. Queuing is also apparent within and leaving the South Terminal complex, and on the entry to the North Terminal complex, showing further deterioration in conditions from that seen in the 2032 future baseline.

13.5.14 The PM peak in 2047 shows significant queuing and delay for traffic on the A217 and Povey Cross Road approaching Longbridge Roundabout. Conditions on the M23 Spur westbound are also congested by the end of the PM peak period. Queuing is also indicated through the South Terminal road complex and exiting to South Terminal Roundabout, and in an around North Terminal. The congestion seen in the 2032 future baseline around the A23 northbound merge near Beehive Ring Road remains in 2047, with queueing for a longer period in the PM peak. This average speed plots for this section of the highway are provided in **Transport Assessment Annex C – VISSIM Forecasting Report** (Doc Ref. 7.4).

13.5.15 The VISSIM outputs for the 2047 future baseline indicate a network which has very limited capacity to accommodate additional demand by this time, leading to poorer overall performance and significant congestion at key locations, both within the Airport network and on the strategic and local network.

With Project

13.5.16 When considering the plots against the 2032 with Project scenario, there is some increased queueing and delay, predominantly around North Terminal Roundabout and the new junction with the A23 London Road. This does not affect adjacent junctions and clears during the modelled period. M23 Junction 9 shows a very similar level of operation as seen in the future baseline assessments.

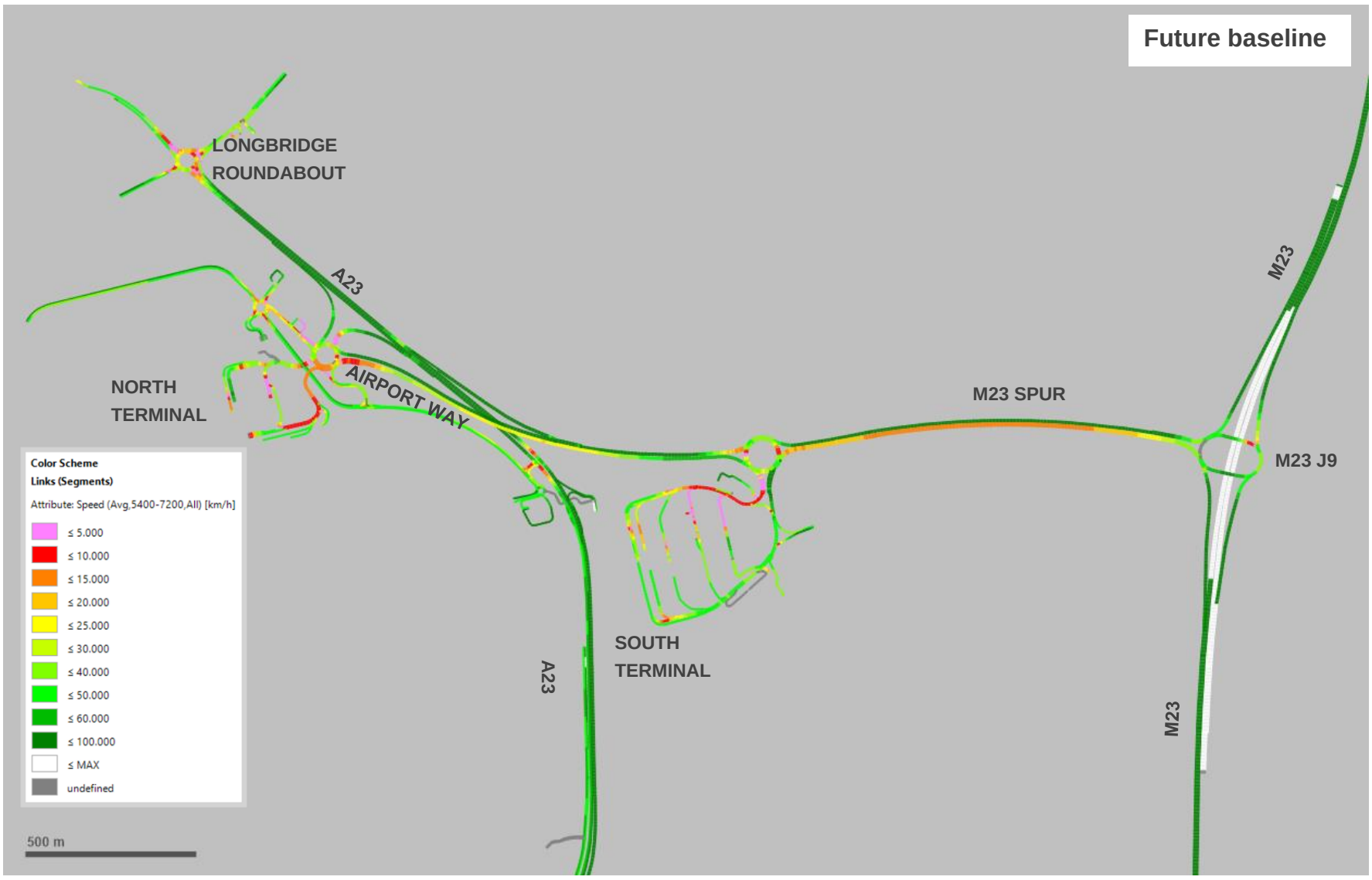
13.5.17 Comparison against the 2047 future baseline scenario indicates that, overall, the network would operate considerably better with the Project and the associated highway works, with reduced congestion at Longbridge Roundabout and at North and South Terminals. Conditions on the M23 Spur would also be much improved, with limited queuing for traffic leaving the Spur to access South Terminal Roundabout.

13.5.18 In the PM peak, the results are very similar to the AM peak but with slower speeds at the A217 and Povey Cross Road approaches to Longbridge Roundabout than are seen in the morning. However, the model assumes that pedestrian and cycle crossings at Longbridge Roundabout are called every cycle, reflecting the aspiration to increase active travel use compared to existing levels of walking and cycling, and may therefore be underestimating the capacity that may be available at this location with the proposed highway works.

13.5.19 As with the AM peak, M23 Junction 9 continues to operate well, with minimal queueing and no impact on the M23 mainline traffic. Congestion on the M23 Spur is removed as a result of the highway works for the Project, despite the increased demand that the Project would create. The A23 northbound merge near Beehive Ring Road shows increased delay compared to 2032 with the Project, but much better performance than seen in the 2047 future baseline scenario. Further details are provided in **Transport Assessment Annex C – VISSIM Forecasting Report** (Doc Ref. 7.4).

13.5.20 The 2047 plots show that the additional demand generated by the Project can be adequately accommodated by the highway works which form part of the Project, leading to improved overall network performance compared to the future baseline scenario.

Diagram 13.5.9: 2047 future baseline and with Project – average speeds, AM peak 07:00-07:30



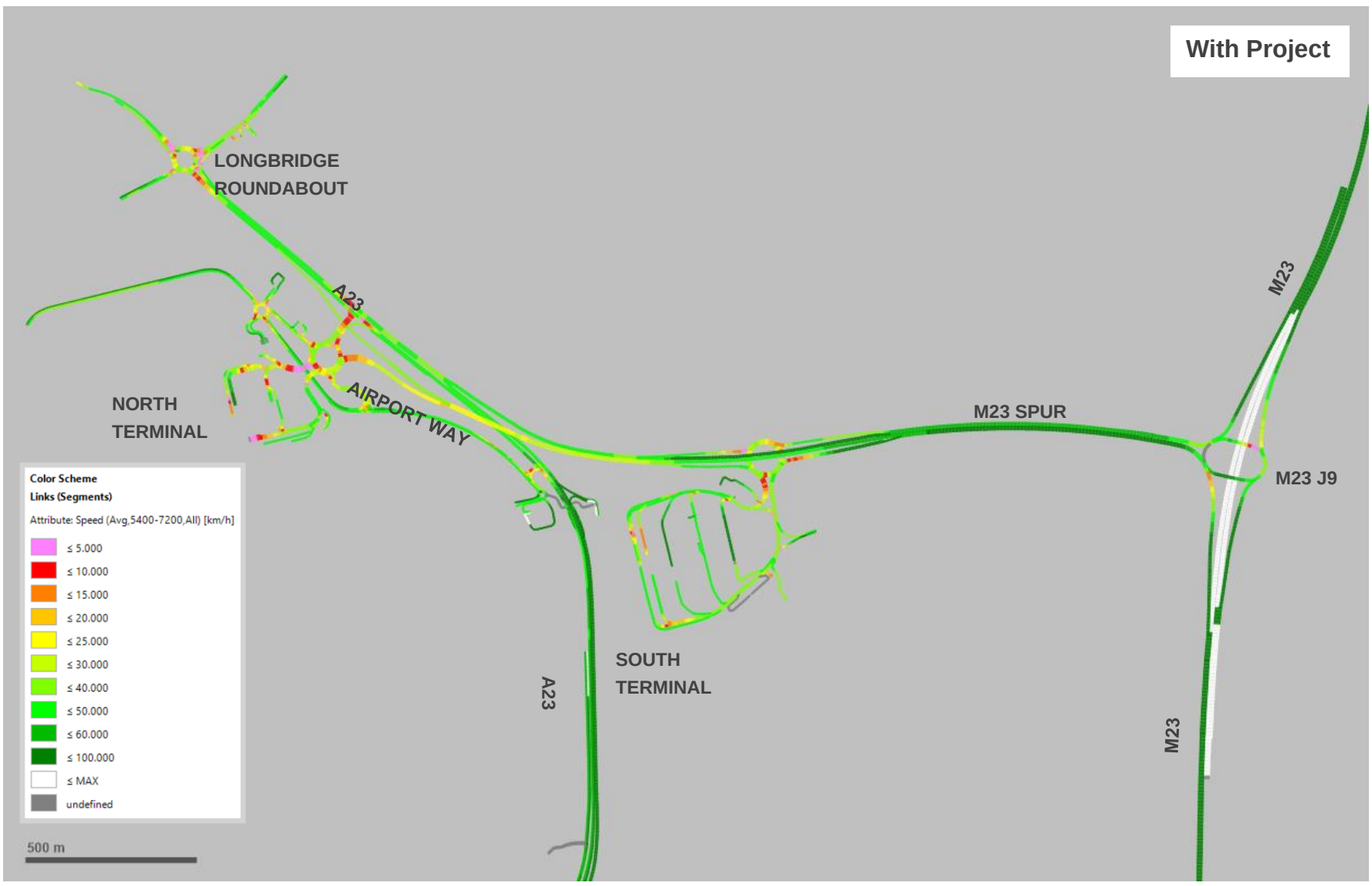
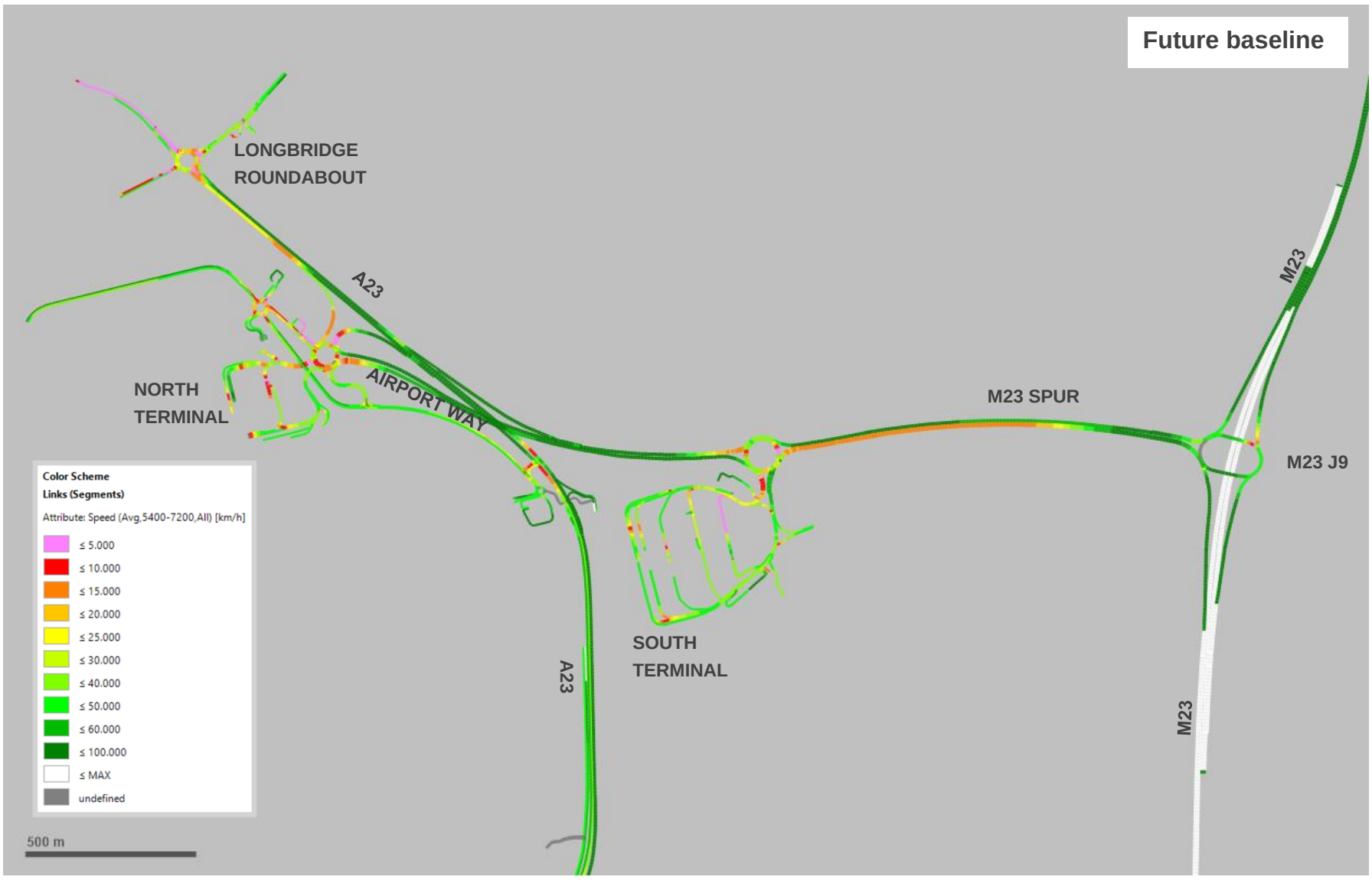


Diagram 13.5.10: 2047 future baseline and with Project – average speeds, AM peak 07:30-08:00

Diagram 13.5.11: 2047 future baseline and with Project – average speeds, AM peak 08:00-08:30



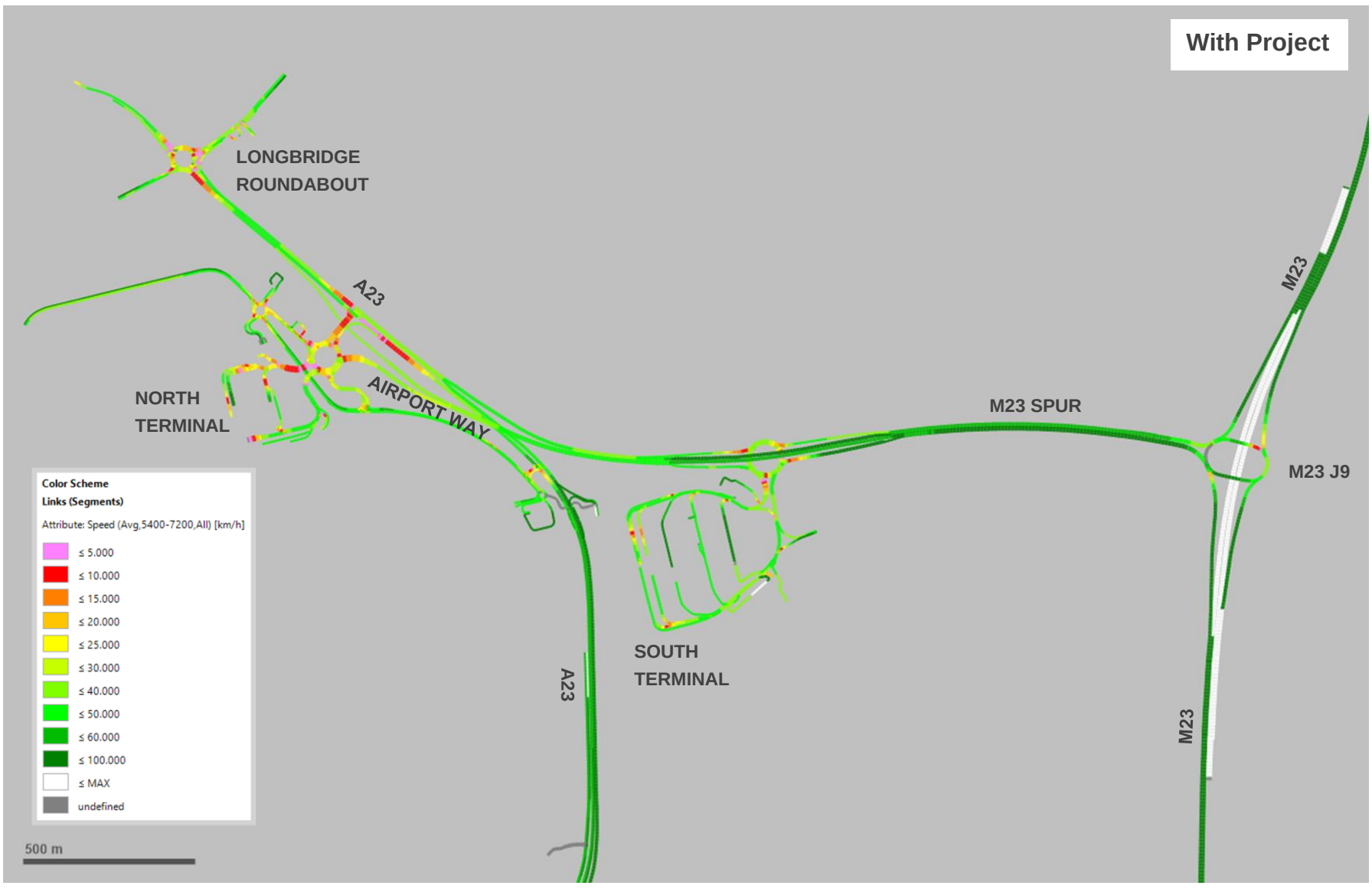
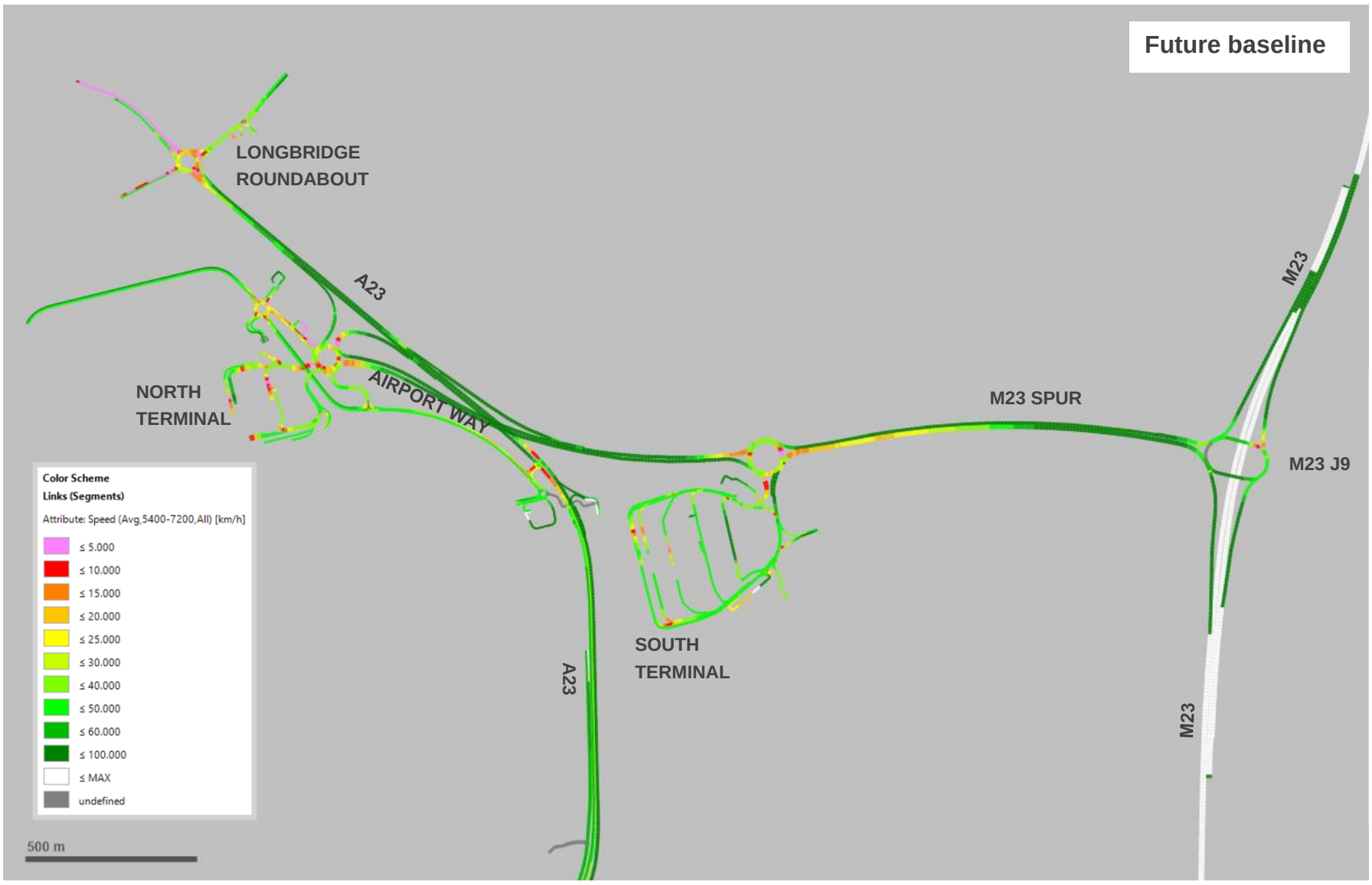


Diagram 13.5.12: 2047 future baseline and with Project – average speeds, AM peak 08:30-09:00



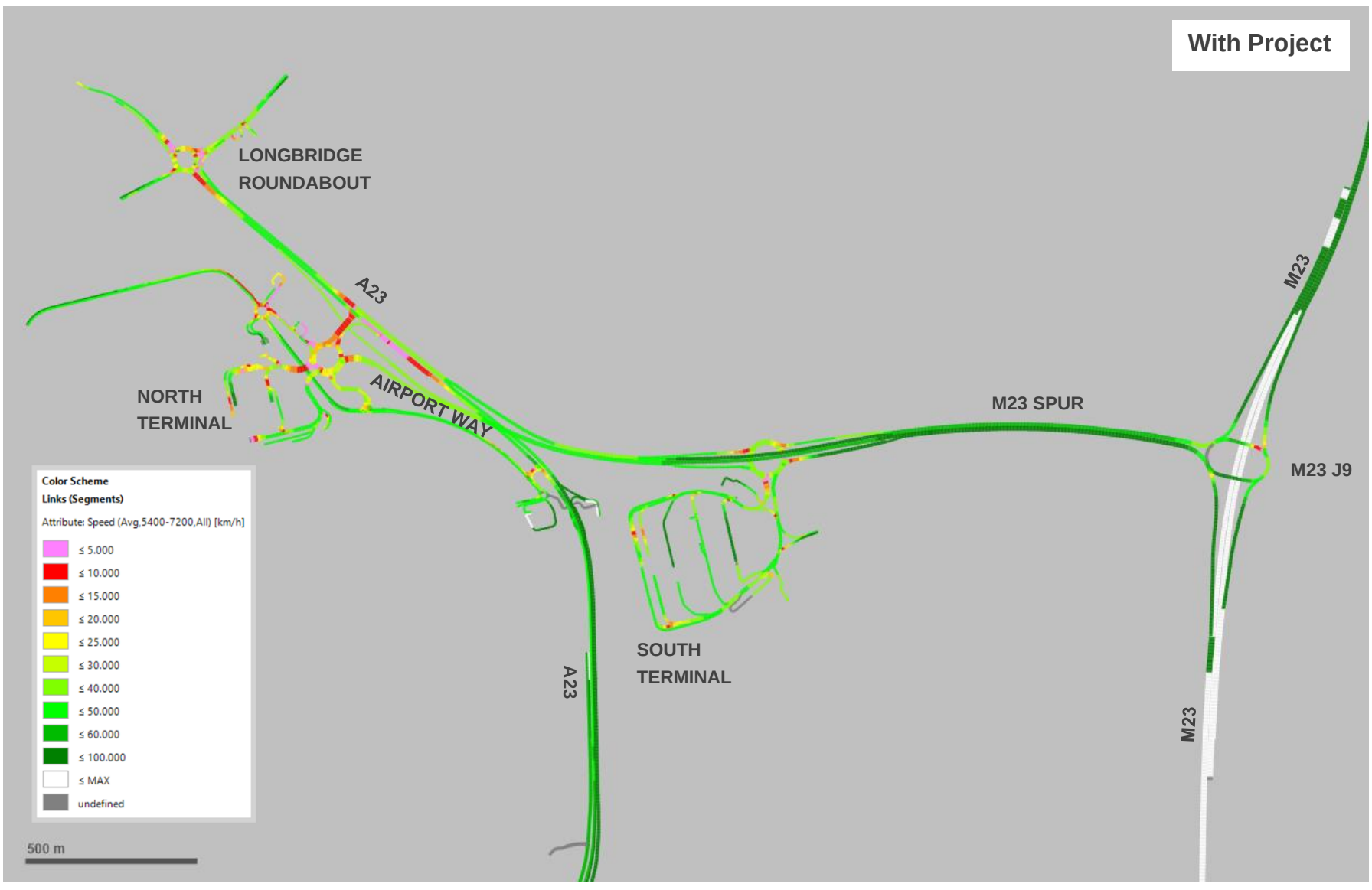


Diagram 13.5.13: 2047 future baseline and with Project – average speeds, PM peak 16:00-16:30

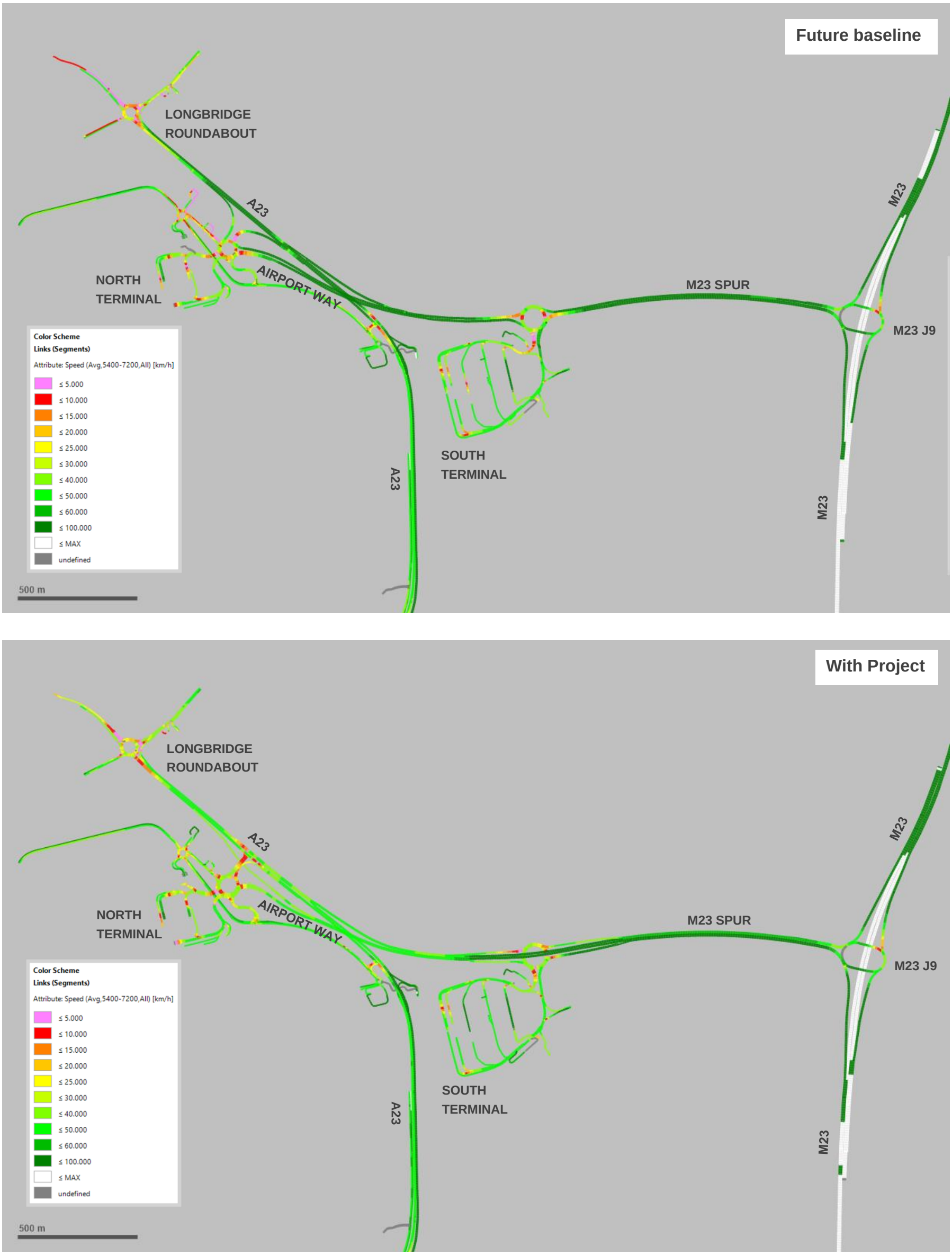


Diagram 13.5.14: 2047 future baseline and with Project – average speeds, PM peak 16:30-17:00

Diagram 13.5.15: 2047 future baseline and with Project – average speeds, PM peak 17:00-17:30

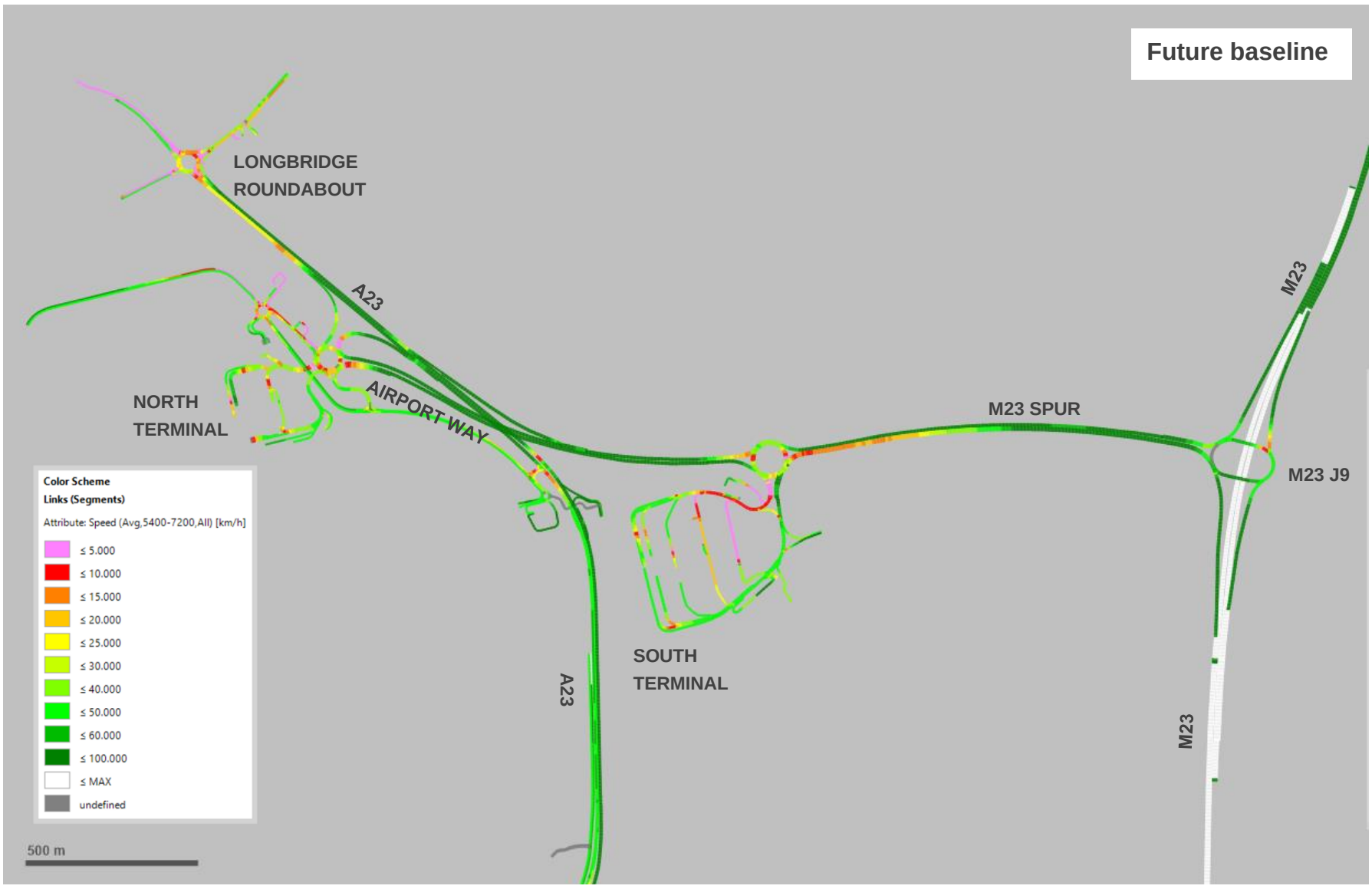
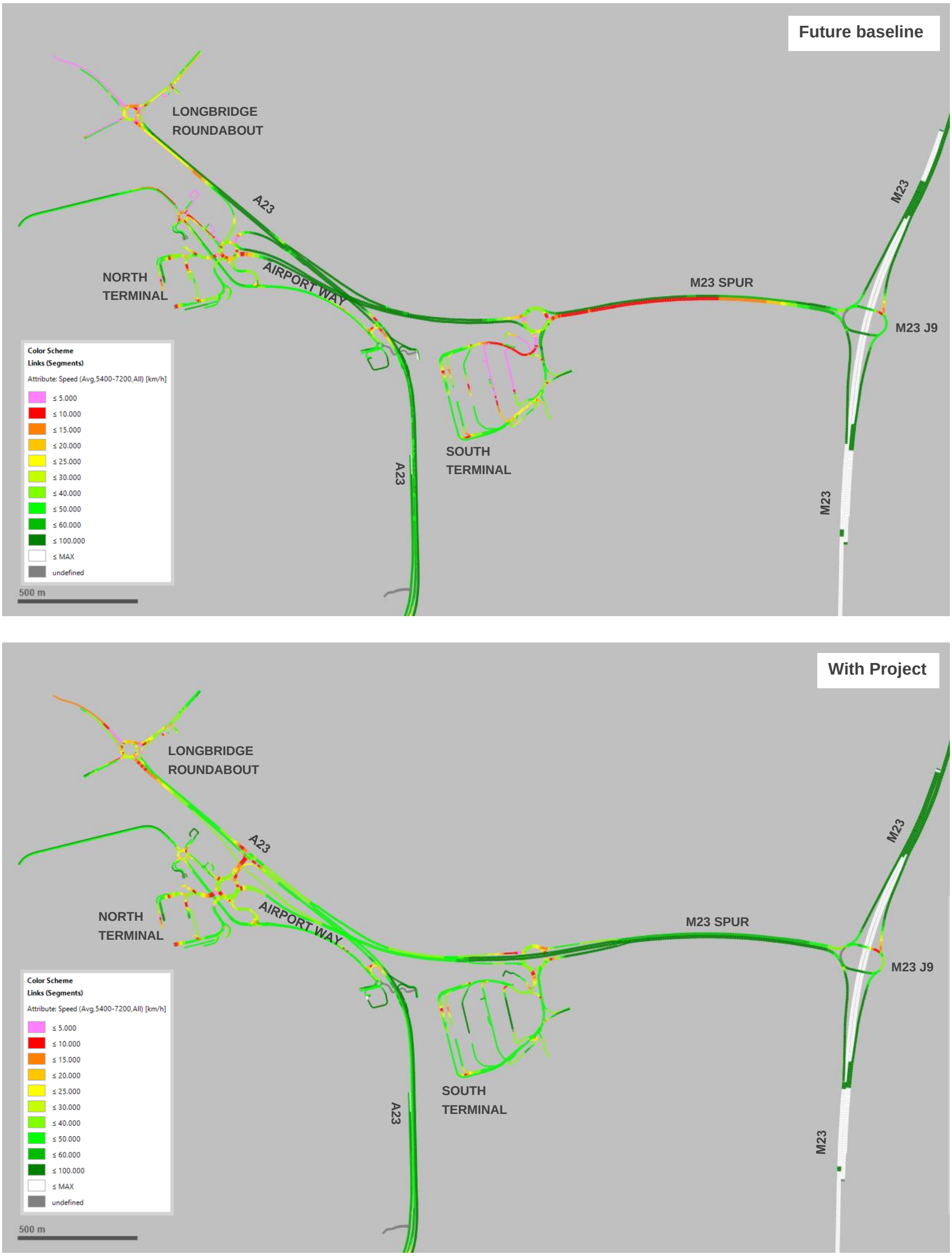


Diagram 13.5.16: 2047 future baseline and with Project – average speeds, PM peak 17:30-18:00



13.6 Summary and conclusions

Modelling results

13.6.1 VISSIM modelling has been undertaken for the highway network in the vicinity of the Airport with and without the Project. The network has been assessed for the AM and PM peak periods in 2032 and 2047. The Microsimulation Modelling Report in **Transport Assessment Annex C – VISSIM Forecasting Report** (Doc Ref. 7.4) provides more detailed information.

13.6.2 The model outputs for the future baseline in 2032 show that some congestion is expected on the network, with slow moving traffic on the M23 Spur approaching South Terminal Roundabout in both the morning and evening peak periods and queues on the exit from the South Terminal complex onto South Terminal Roundabout. By 2047 in the future baseline, congestion in these locations will have increased further, with congestion becoming more widespread, including on the entry to North Terminal and at Longbridge Roundabout.

13.6.3 The future baseline scenarios indicate that without the Project, the network would operate close to capacity in several locations. The inclusion of the highway works as part of the Project prevents unacceptable highway conditions arising.

13.6.4 The highway works forming part of the Project will be complete and operational three years after commencement of dual runway operations in line with this assessment.

13.6.5 In the with Project scenarios, which includes the additional Project demand and the proposed highway works, the VISSIM model outputs show improved performance on the network compared to the equivalent future baseline scenario. This includes locations such as the M23 Spur, where congestion would largely be removed, South and North Terminals where queues would be substantially reduced, and Longbridge Roundabout where conditions would be improved compared to those expected in the future baseline. This would be achieved in addition to the extra capacity provided for active modes within the highway works. Although some parts of the network would remain busy, with the proposed highway improvements, the overall operation of the highway network would remain acceptable, even with the additional demand from the Project and without further mitigation.

14 Active travel: walking and cycling

14.1 Introduction

14.1.1 GAL aims to make active travel an attractive and realistic choice for short journeys to and from the airport by developing and promoting accessible, safe, and well-planned active travel opportunities. Although less than 0.5% of air passengers travel to the Airport on foot or by bicycle, these modes are important for employee travel. A significant proportion of staff live within walking and cycling distance of the airport and 3% of staff at the Airport regularly walk or cycle to work. However, the current ASAS recognises that the high proportion of shift workers at Gatwick Airport means walking or cycling may not be an attractive option for staff at some hours.

14.1.2 GAL is committed to improving facilities for all employees and encouraging modal shift away from car-based transport. GAL has demonstrated this commitment through several completed projects, investing over £1.6 million on cycle and pedestrian enhancements between 2018 and 2020 and further investment is budgeted in the current Capital Investment Plan.

14.1.3 This chapter provides an overview of the active travel patterns at Gatwick Airport, and the current and future (with and without Project) walking and cycling network.

14.2 Active travel patterns at Gatwick airport

14.2.1 The attractiveness of walking and cycling to work is influenced by several factors, including distance, safety, the quality of available routes, and the level of amenities and incentives provided on-site (such as showers and lockers).

14.2.2 The latest available employee survey data from GAL has been analysed to map trip-end patterns to better understand the home locations of employees currently using active travel. GIS methods provide the basis for understanding the catchment area for walking and cycling.

14.2.3 Based on the staff survey, approximately 3% of employees walk or cycle to work (about 1% and 2% respectively) on an average day. It is estimated that the average travel time for walk-to-work trips is approximately 25 minutes, or about a 2.5 km walk at an average walking speed. The average travel time for cycling is 22 minutes, which at an average speed of 19 km/hr (or 12 mph) indicates a primary catchment of approximately 6 km to 8 km. This implies that walking trips are primarily generated from the immediate vicinity surrounding the Airport, while cycling trips occur from locations slightly further afield.

14.2.4 Geographic analysis of the employee survey data supports these insights. Data mapped in

14.2.5 Diagram **14.2.1** and Diagram 14.2.2 shows walking and cycling trips into Gatwick by staff, assuming 13,000 staff on site on a typical work day.

14.2.6 Over 100 employees from the staff survey walk to work at Gatwick, the vast majority of whom – over 70% – live in Horley. While some employees walk from areas in Crawley and towns in Mole Valley to the west of Gatwick, such as Charlwood, most residential area for walking, especially considering the limited number of entry points into the Airport and the busyness of highways around the Airport.

14.2.7 Cycling has a wider catchment area. Over 200 employees from the survey reported cycling to work, just under half coming from Horley and surrounding communities. An additional 32% come from Crawley, which reflects the fact that, while most people find the walk from Crawley too far, it is within a 30-minute cycle of the Airport. Small numbers of employees at Gatwick cycle from further areas, such as Horsham, communities in Mid-Sussex and from the north.

14.2.8 Although the overall mode shares for active travel are low when considering all airport employees, they are substantial in the areas immediately surrounding the Airport and present a significant opportunity. In central Horley, more than one third of employees walk or cycle to work; in Greenfields to the northwest, this figure is over 20%, and in north-east Horley, it is 15%. In sections of Mole Valley including Hookwood and Charlwood lying just west of the Airport, walking, and cycling mode share is almost 15%, and in areas of Crawley immediately south of Gatwick, over 8% walk and cycle.

14.2.9 Further analysis has been undertaken on the 2016 and 2047 staff numbers by catchment area. Diagram 14.2.3 shows the active travel mode trips from the local area in 2016 and those expected in 2047 with the Project.

Diagram 14.2.1: Home locations of employees walking to work

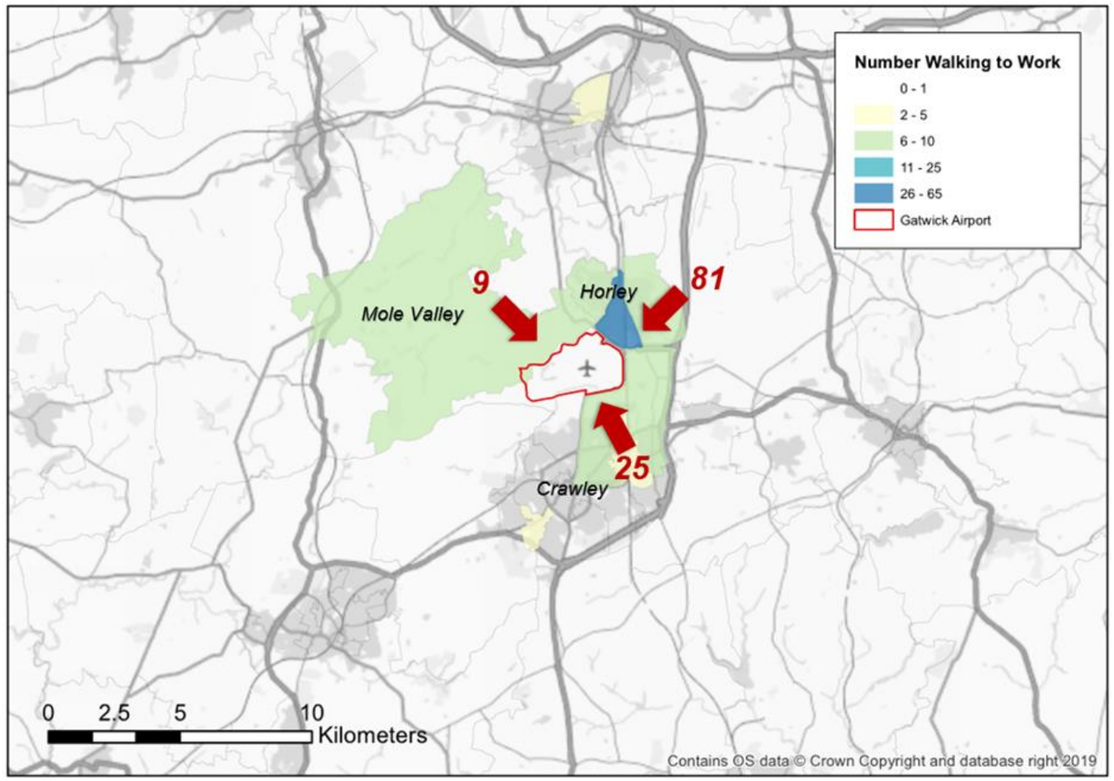


Diagram 14.2.2: Home locations of employees cycling to work

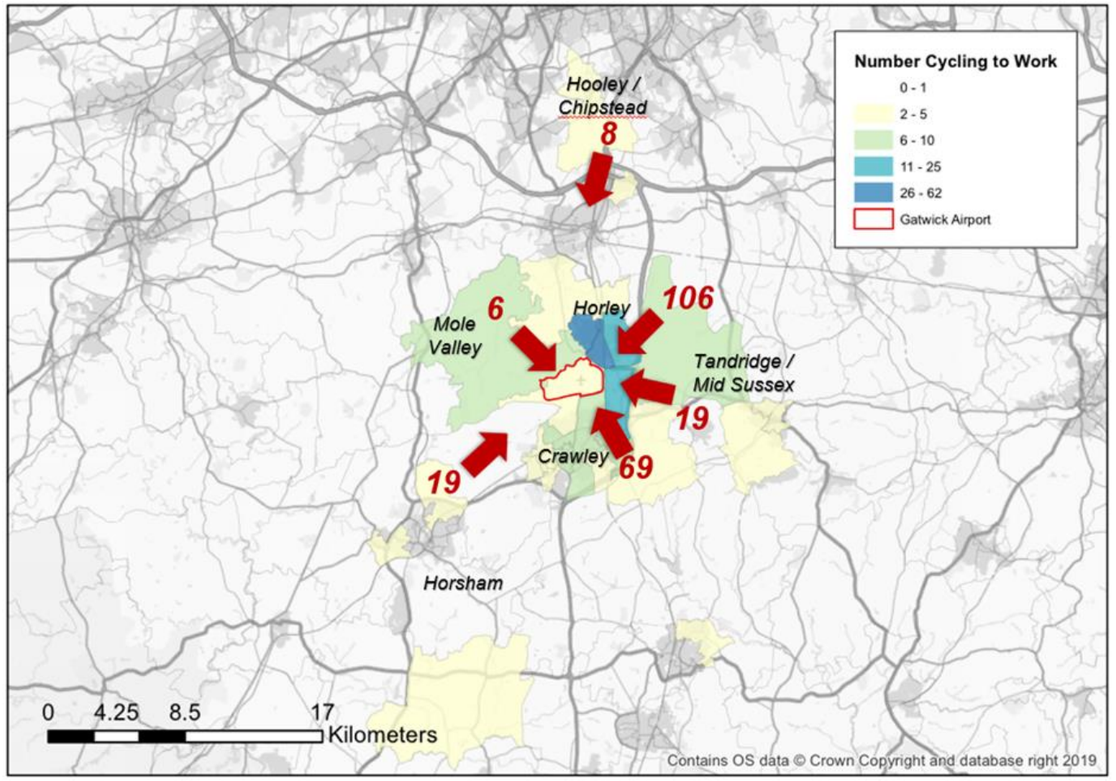
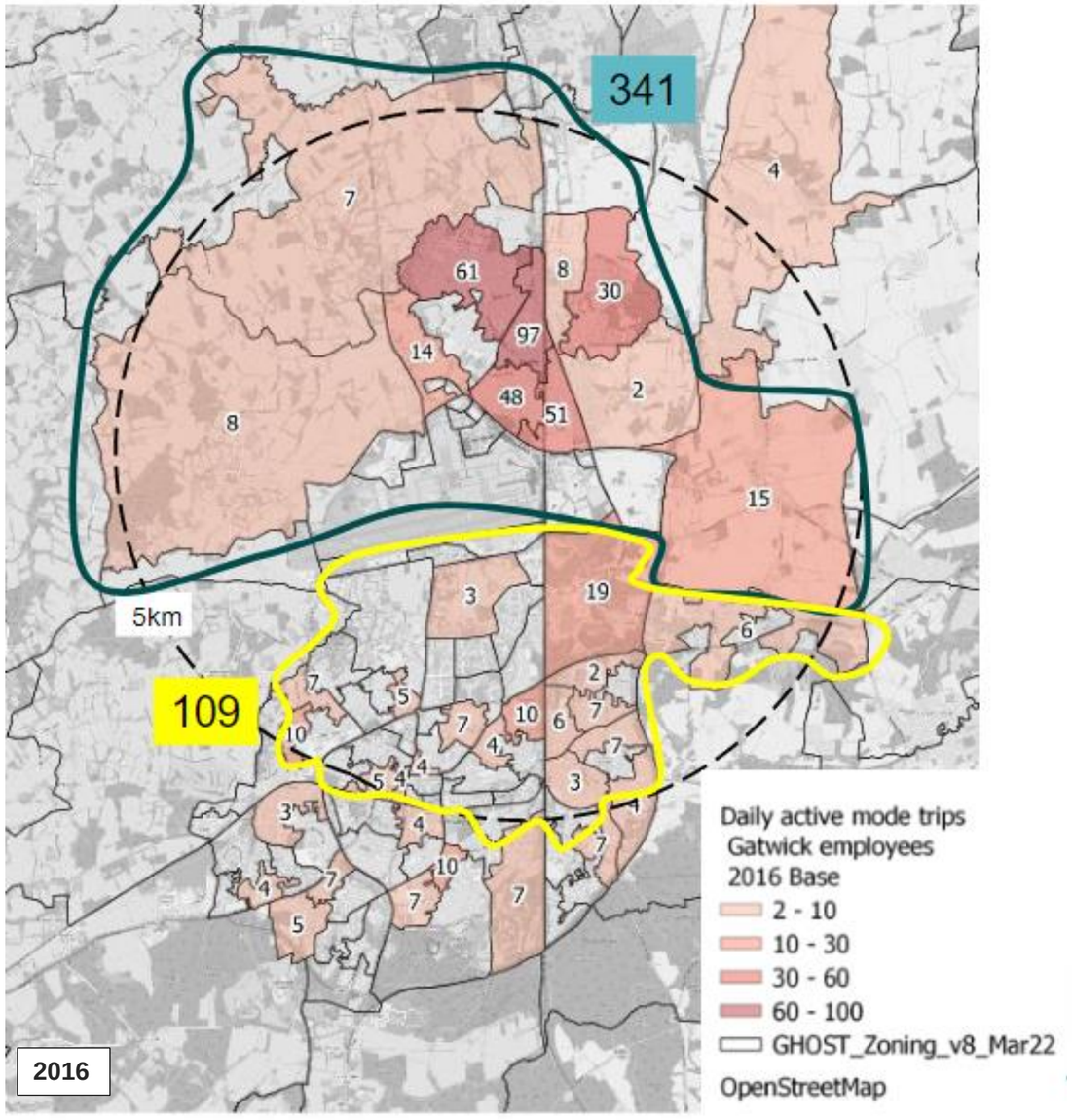
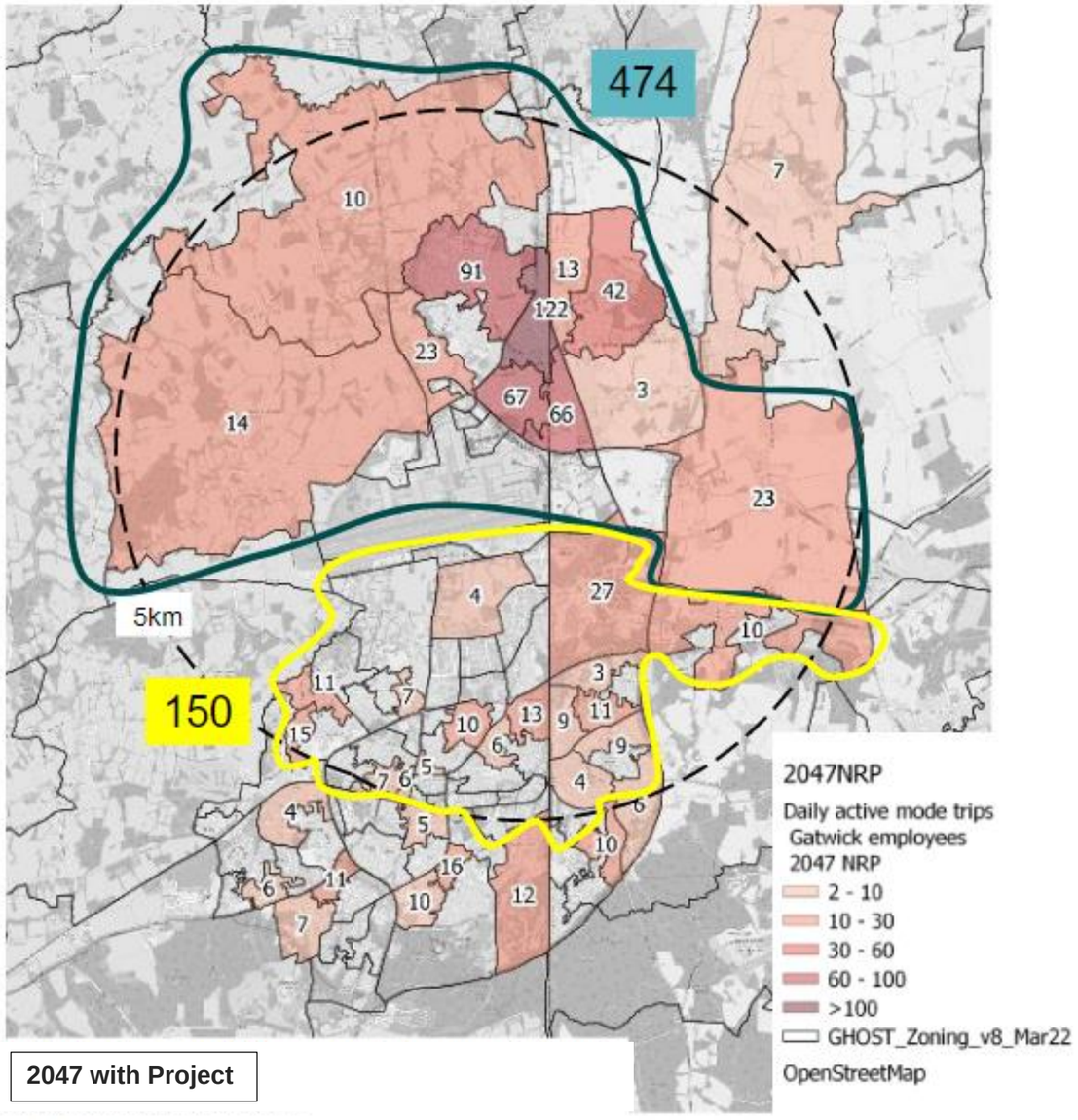


Diagram 14.2.3: Active travel mode trips, 2016 baseline and 2047 with Project





14.3 Current and future networks

Current network

14.3.1 There is a network of walking and cycling routes at the airport, as shown in Diagram 14.3.1. These connect to the wider network of local streets and highways, as well as National Cycle Network Route 21 (NCN21) which runs north and south to the west of the railway line. Additionally, the areas around the Airport are connected by a variety of public footpaths and bridleways, including the Sussex Border Path, mostly providing connectivity through wooded areas and farmland. NCN21 and the network of public rights of way are shown in Diagram 14.3.2.

14.3.2 NCN21 provides the key active travel link into the Airport, with a mixture of on-road and off-road cycle facilities that result in a north/south link of varying quality. A signage strategy has been implemented to direct cyclists and pedestrians along underpasses and overbridges. While some sections of the route provide adequate lighting and priority off-road space, other sections are less well signed and require users to switch to on-road facilities.

14.3.3 Diagram 14.3.3 shows a wider view of cycling routes within 5 km of the Airport. This illustrates the connection to Gatwick via local routes into the centre of Crawley. These routes are primarily on-street but provide connections with the north-south NCN21.

Diagram 14.3.1: Existing active travel network around Gatwick Airport

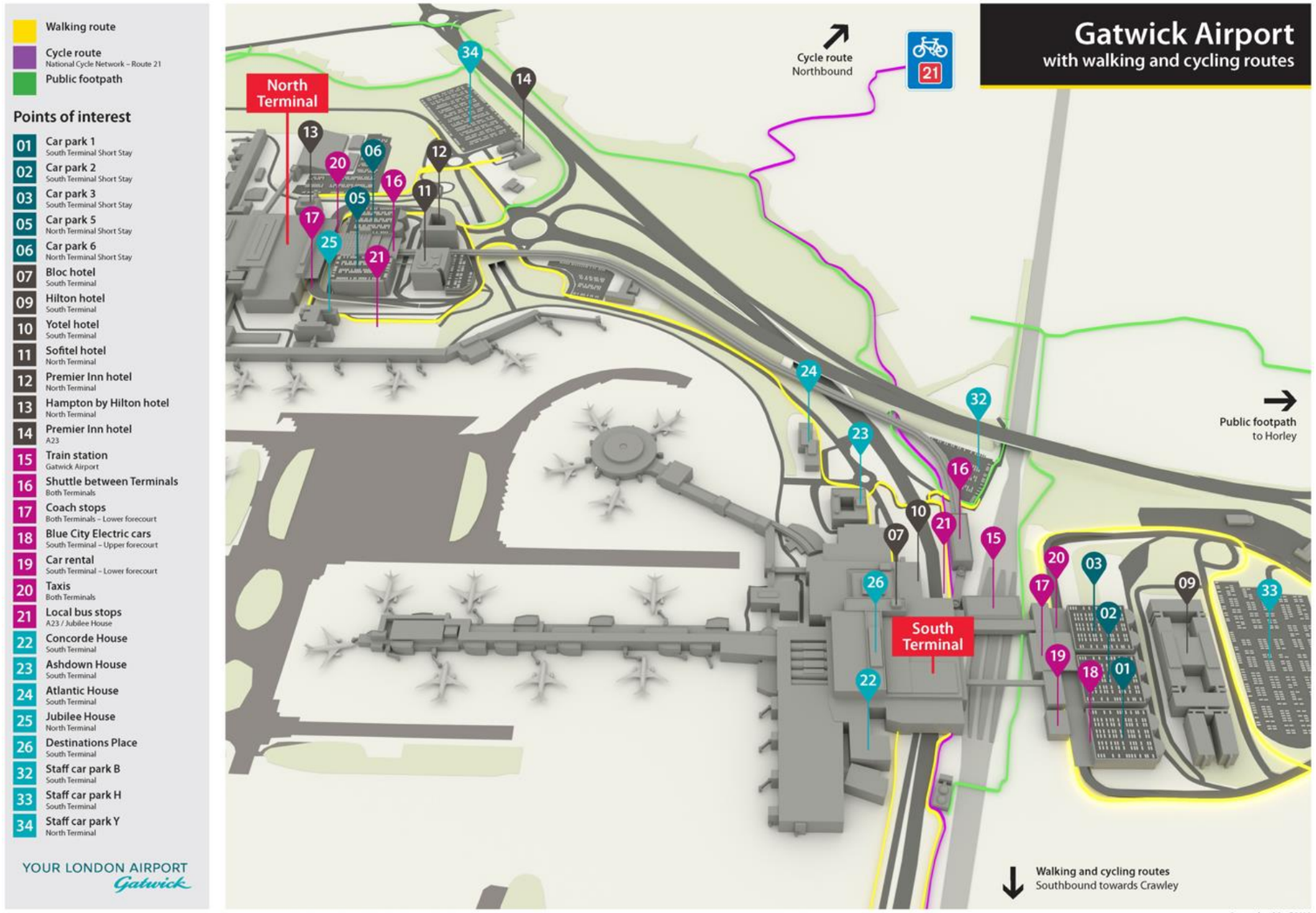


Diagram 14.3.2: Public rights of way around Gatwick Airport

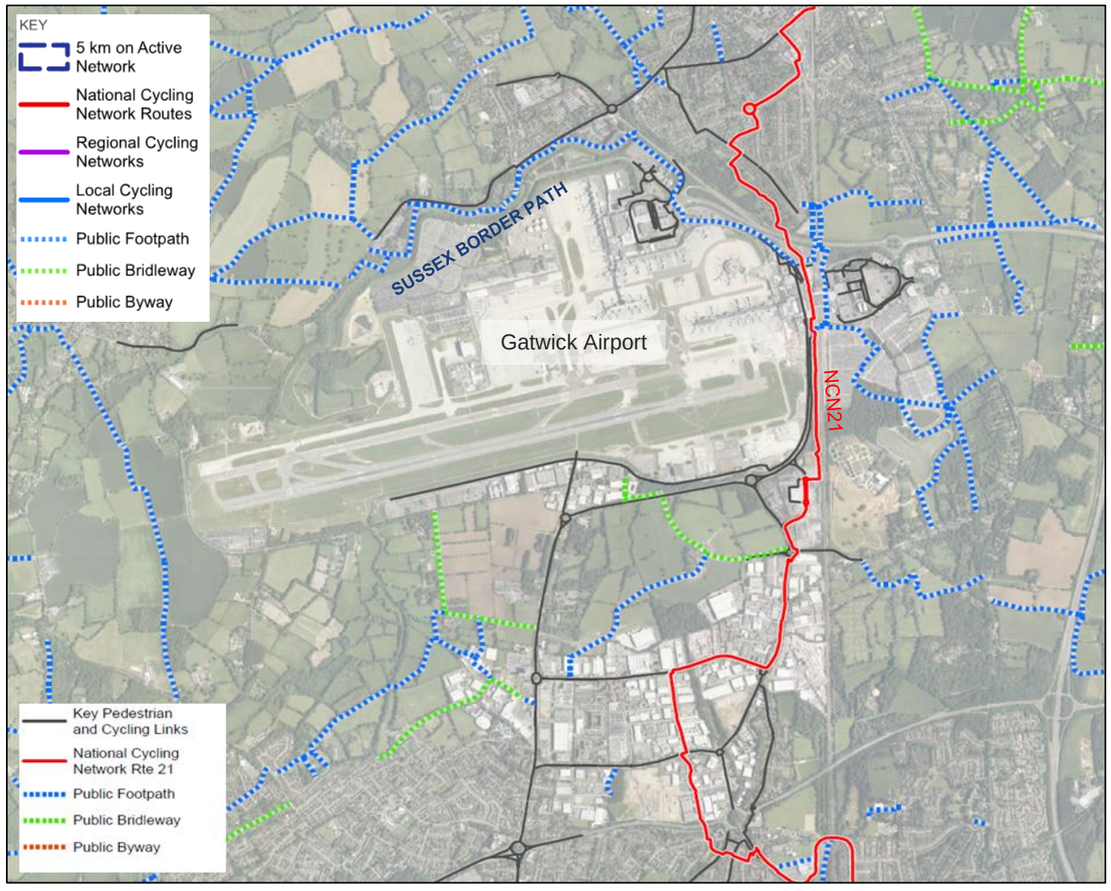
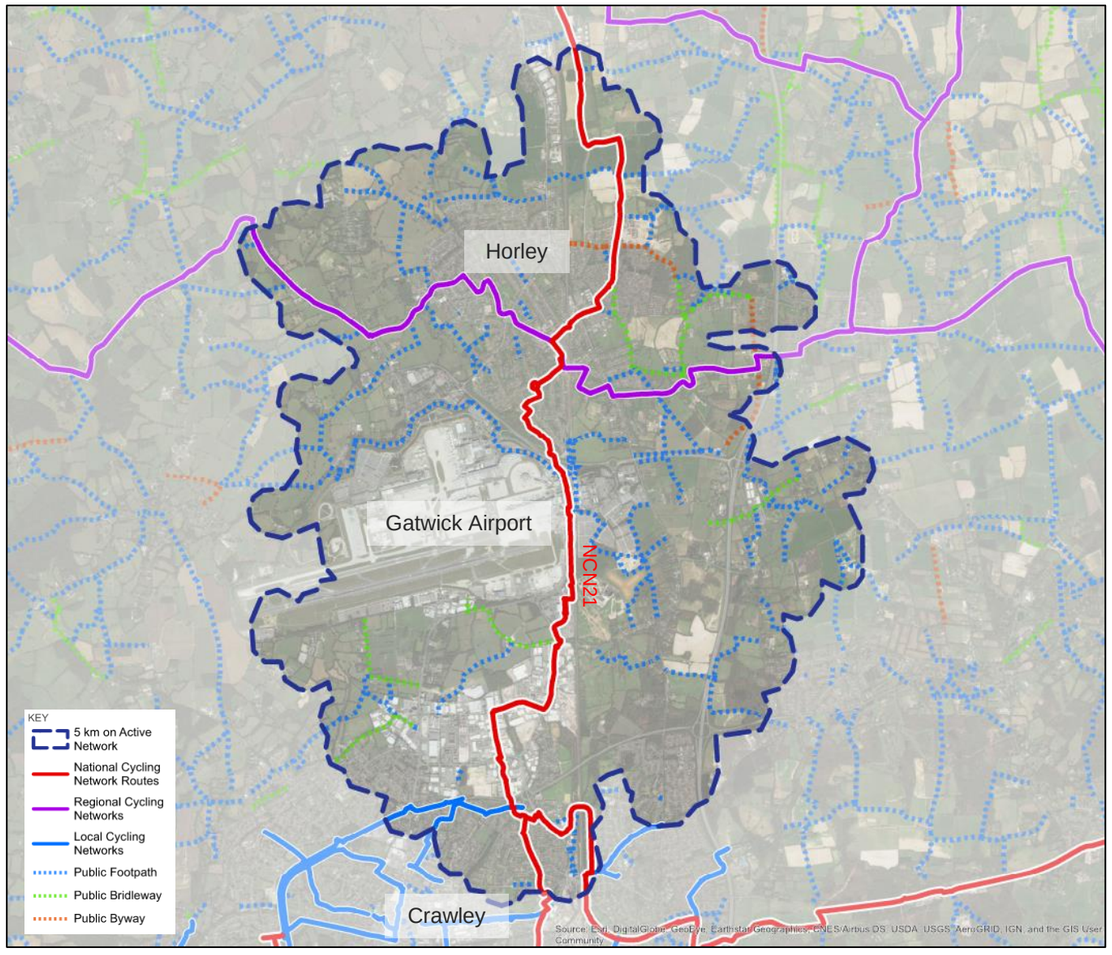


Diagram 14.3.3: Wider cycling network within 5 km of Gatwick Airport



Airport access for walking and cycling

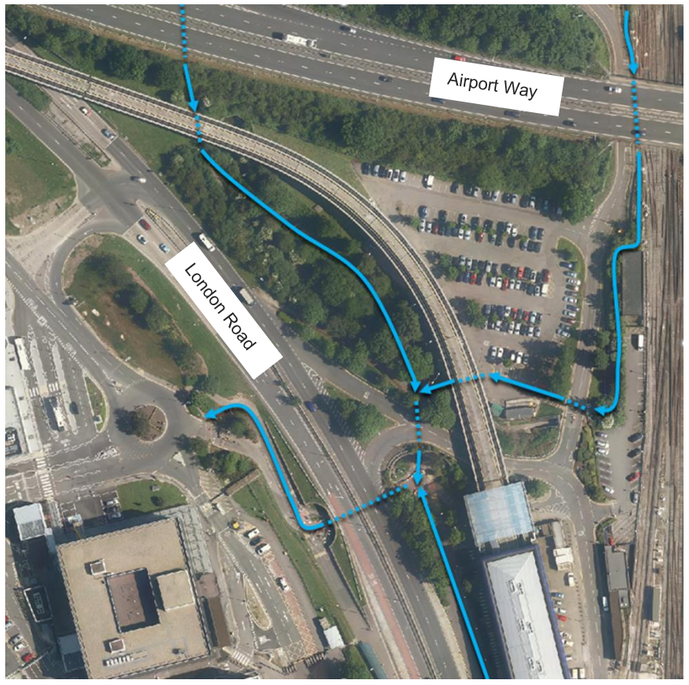
14.3.4 When considering the walking catchment of Horley and access to the South Terminal, the primary access point is via the underpass beneath Airport Way by South Terminal. This is indicated in Diagram 14.3.1 and the routes available are shown in more detail in Diagram 14.3.4. The diagram shows there are two options to travel beneath Airport Way to and from Horley. The route through Riverside Garden Park on the western side is paved and lit and connects directly onto Riverside Road in Horley. It is considered that this route should be promoted as the main walking and cycling route to Horley.

14.3.5 To the south, the NCN21 route provides direct access for pedestrians and cyclists towards Crawley.

14.3.6 In terms of access from Horley to and from the North Terminal, by Longbridge Roundabout, there is a public footpath from Povey Cross Road that runs along the western side of A23 London Road, as indicated in Diagram 14.3.1.

14.3.7 Once on the Airport, the primary route for circulation is via the footpath along Perimeter Road North, which connects the two terminals. There are footways, dropped kerbs, dedicated crossing points within the forecourts. GAL currently undertakes regular audits of facilities and the current ASAS include plans for improving the condition, signage and appearance of the existing routes on the airport.

Diagram 14.3.4: Access route from NCN 21 and Horley to South Terminal area

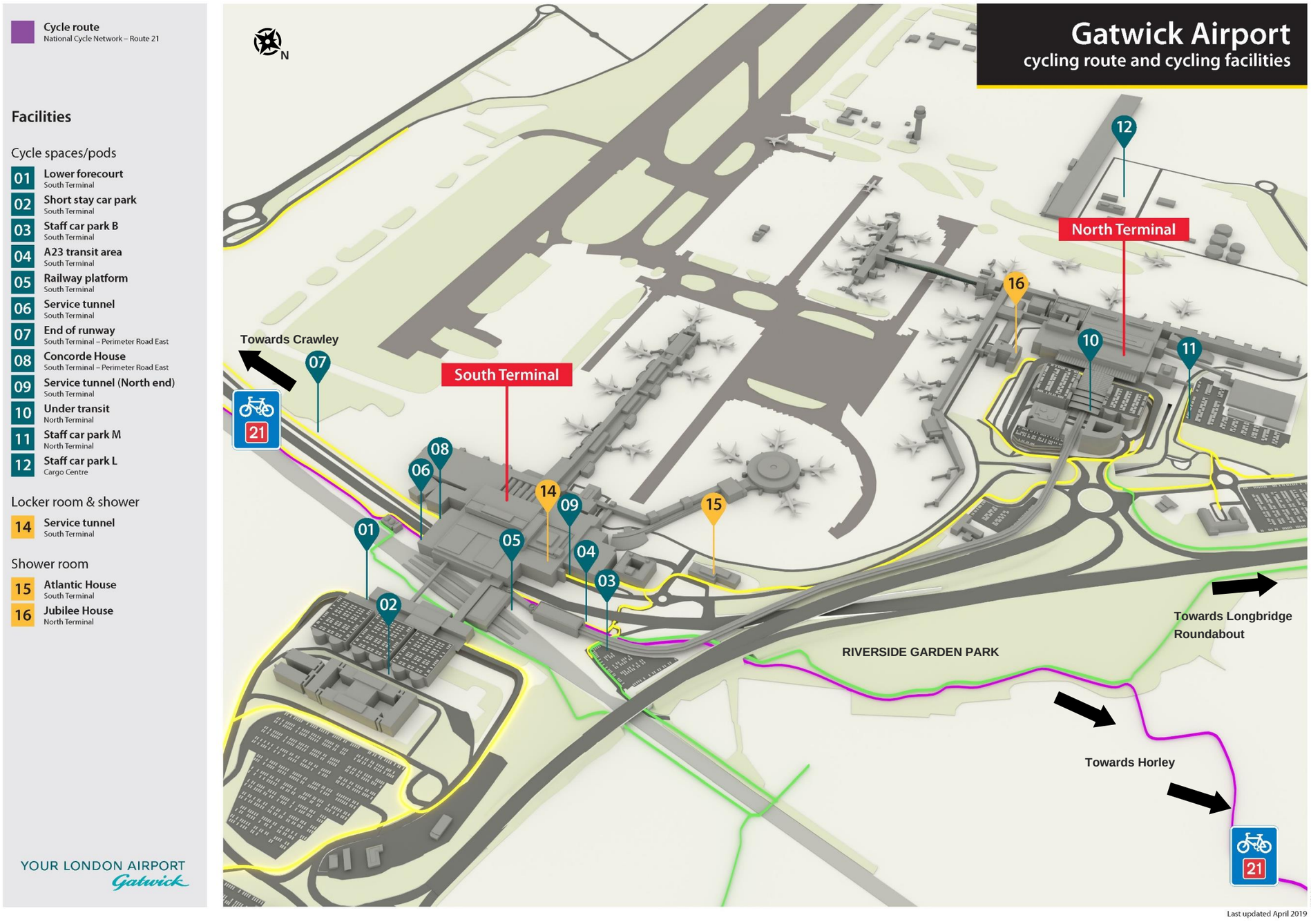


Bicycle parking and amenities

14.3.8 Currently, GAL provides upwards of 300 cycle parking spaces for airport staff and the general public. Cycle parking is available in several of the staff car parks, including car parks B, M and L. Much of the parking is clustered in the vicinity of the NCN 21 cycle route, as shown in Diagram 14.3.5. Cycle parking is reviewed on a regular basis and will be supplemented as part of the current ASAS.

14.3.9 A locker and shower room are available to staff at the South Terminal, with another shower room at Atlantic House. Jubilee House provides the shower facility at the North Terminal. GAL keeps the location and number of facilities under review, to ensure suitable cycle storage, changing and shower facilities are available at main workplaces around the Airport.

Diagram 14.3.5: Gatwick Airport cycling facilities



14.4 Project improvements

14.4.1 As part of the SACs, GAL is committed to achieving 15% of staff journeys to work originating within 8 km of the Airport being made by active modes three years after the opening of the new northern runway.

14.4.2 Walking and cycling improvements are incorporated in the highway works that form part of the Project. These improvements aim to link to existing and proposed networks provided by the local authorities, take into account DfT Cycle Infrastructure Design guidance (LTN 1/20) and have been discussed with stakeholders. The improvements are indicated in Diagram 14.4.1 alongside the key existing walking routes.

14.4.3 Diagram 14.4.2 and Diagram 14.4.3 provide extracts from the general arrangement drawings to show the improvements in more detail.

14.4.4 At Longbridge Roundabout, the existing shared-use paths for walkers and cyclists affected by proposed carriageway modifications are to be replaced with the provision set out in the following paragraphs.

14.4.5 Sections of segregated paths for pedestrians and cyclists are to be introduced around the circulatory carriageway on the northern, western, and southern sides of the roundabout as well as through the roundabout traffic islands and segregated left turn lane island to provide enhanced active travel infrastructure. A shared use path is to be re-provided on the eastern side of the roundabout around the segregated left turn lane with a proposed extension of shared use provision to the south as far as the proposed ramp into Riverside Garden Park. The proposed infrastructure is to tie into shared-use or footway provision beyond the circulatory carriageway extents.

14.4.6 Parallel signalised crossings for pedestrians and cyclists are proposed on each arm of the roundabout to replace the existing shared-use toucan crossings.

14.4.7 A new path connection for pedestrians and cyclists is to be introduced between Longridge Roundabout and the Airport on the western side of the A23 London Road via the proposed widened A23 London Road bridge over River Mole. The typical path provision is to comprise segregated provision between Longbridge Roundabout and North Terminal Roundabout. The proposed onward path connection between North Terminal Roundabout and South Terminal via Gatwick Way and Perimeter Road North is to comprise a shared-use path.

14.4.8 A new shared-use ramp for pedestrians and cyclists to Riverside Garden Park is to be introduced on the eastern side of the A23 London Road, south of the River Mole. The existing footway on the eastern side of the A23 London Road south of the proposed ramp is to be widened up to the existing ramp connection down to Riverside Garden Park northeast of North Terminal Roundabout. A new pedestrian link is proposed to the north of Airport Way between Riverside Car Park and the proposed open recreational space to be created within the extents of the current Car Park B provision at this location.

14.4.9 A new signal-controlled pedestrian crossing is to be introduced across the A23 London Road at the proposed signalised junction on A23 London Road northeast of North Terminal Roundabout. The proposed footway network would provide connectivity between Riverside Garden Park to the east and the North Terminal active travel infrastructure network to the west.

14.4.10 At B2036 Balcombe Road, the existing footway under the M23 spur bridge is to be modified to accommodate the structure changes at this location. An onward pedestrian link is to be provided between Balcombe Road and the existing South Terminal Ring Road footway network. The path is to commence just south of the M23 spur, run parallel to the proposed Gatwick Spur westbound diverge and then connect into the existing footway network at this location.

Diagram 14.4.1: Key walking routes and proposed improvements as part of the Project

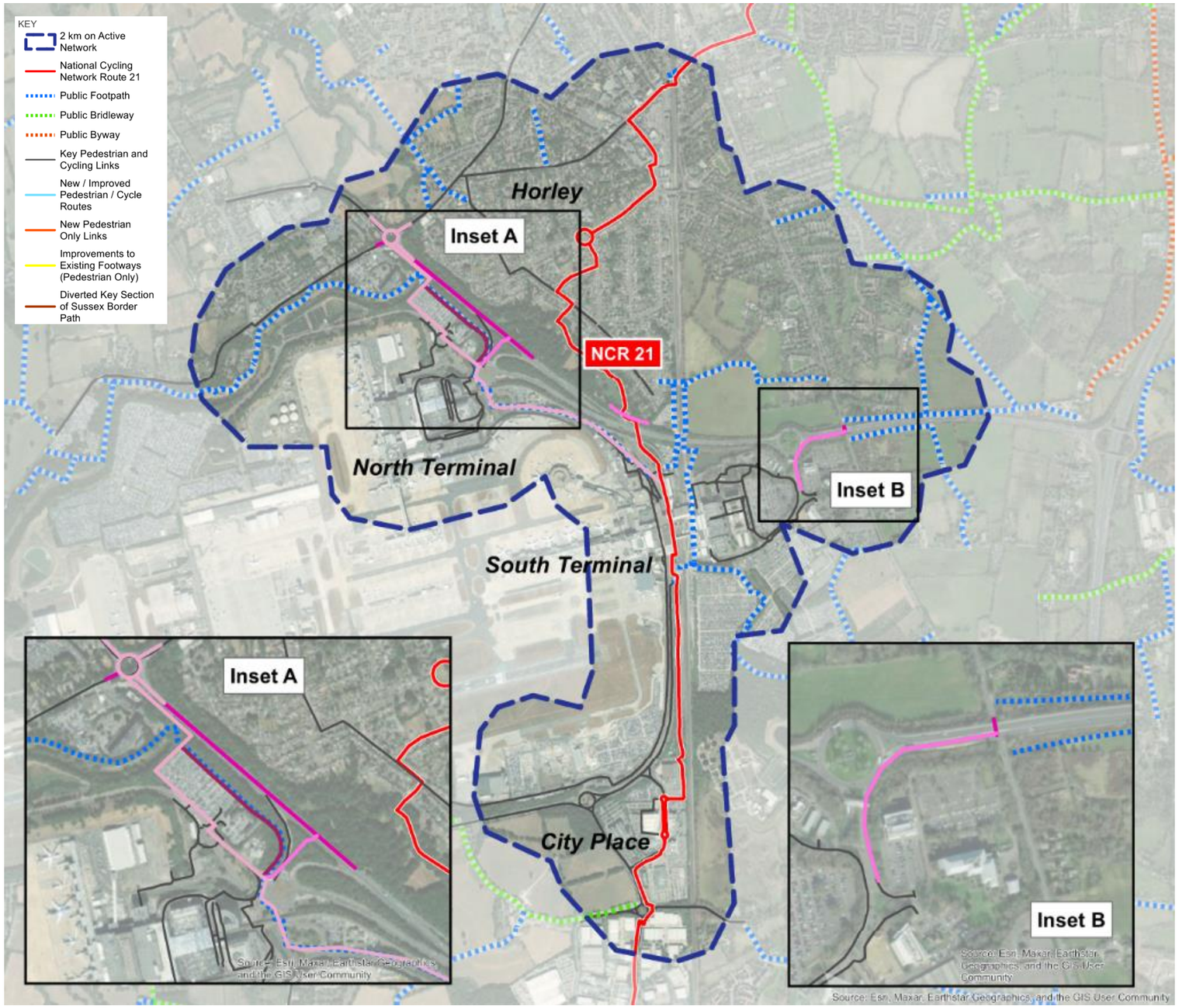
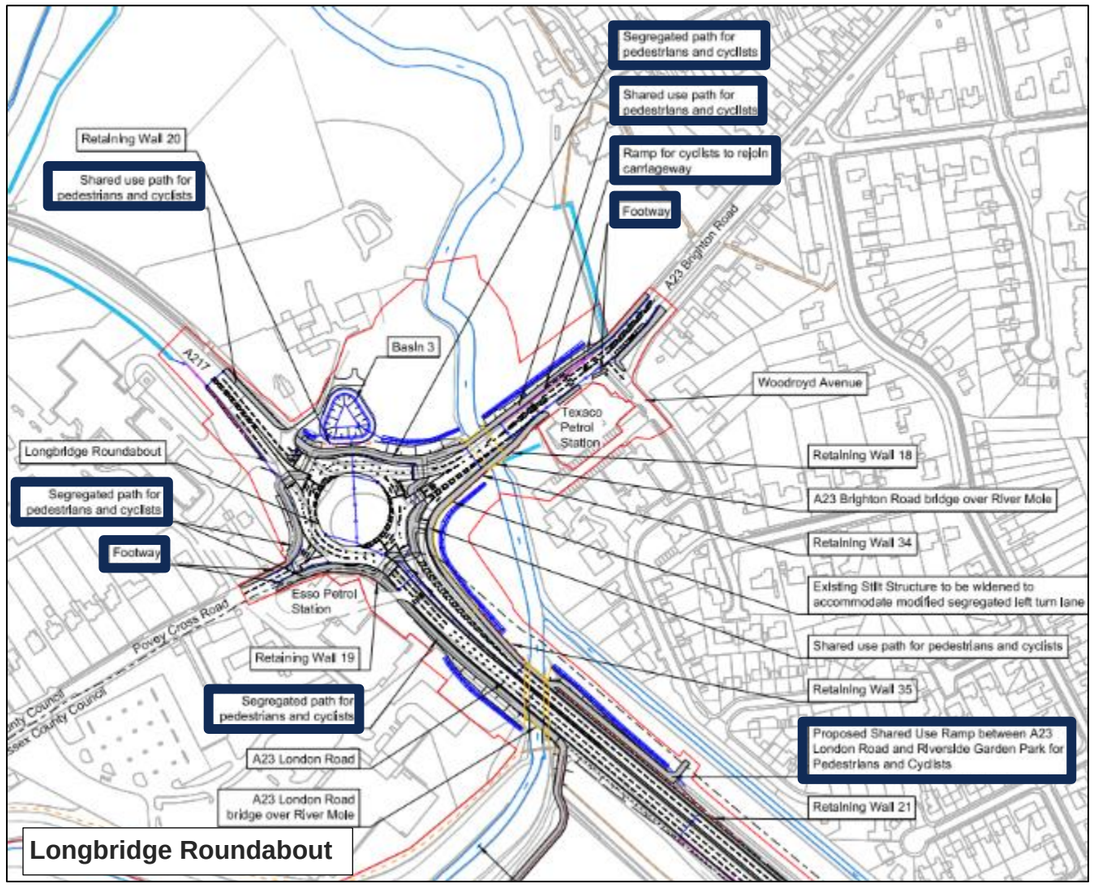


Diagram 14.4.2: Active travel improvements (Longbridge Roundabout and North Terminal)



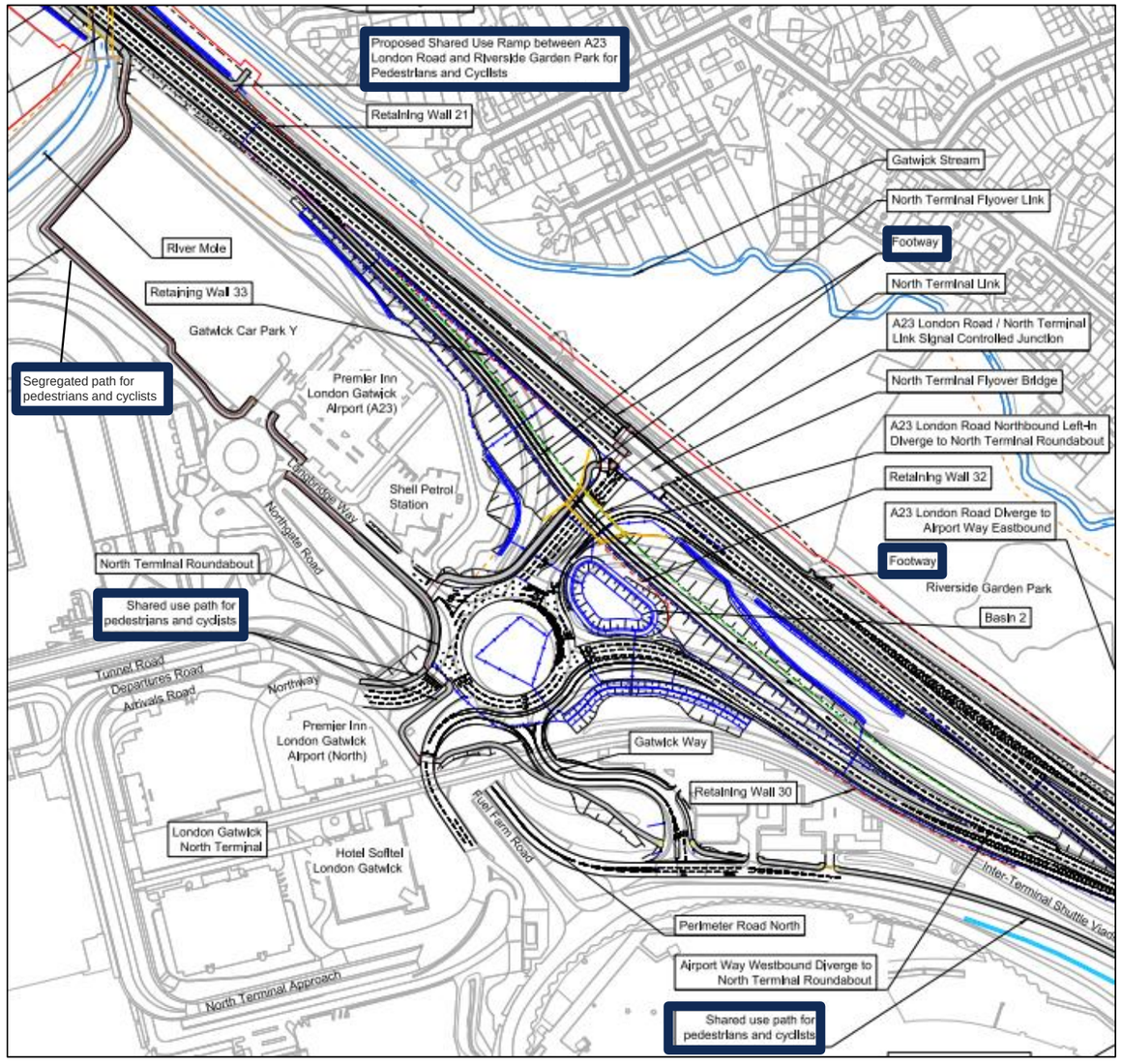
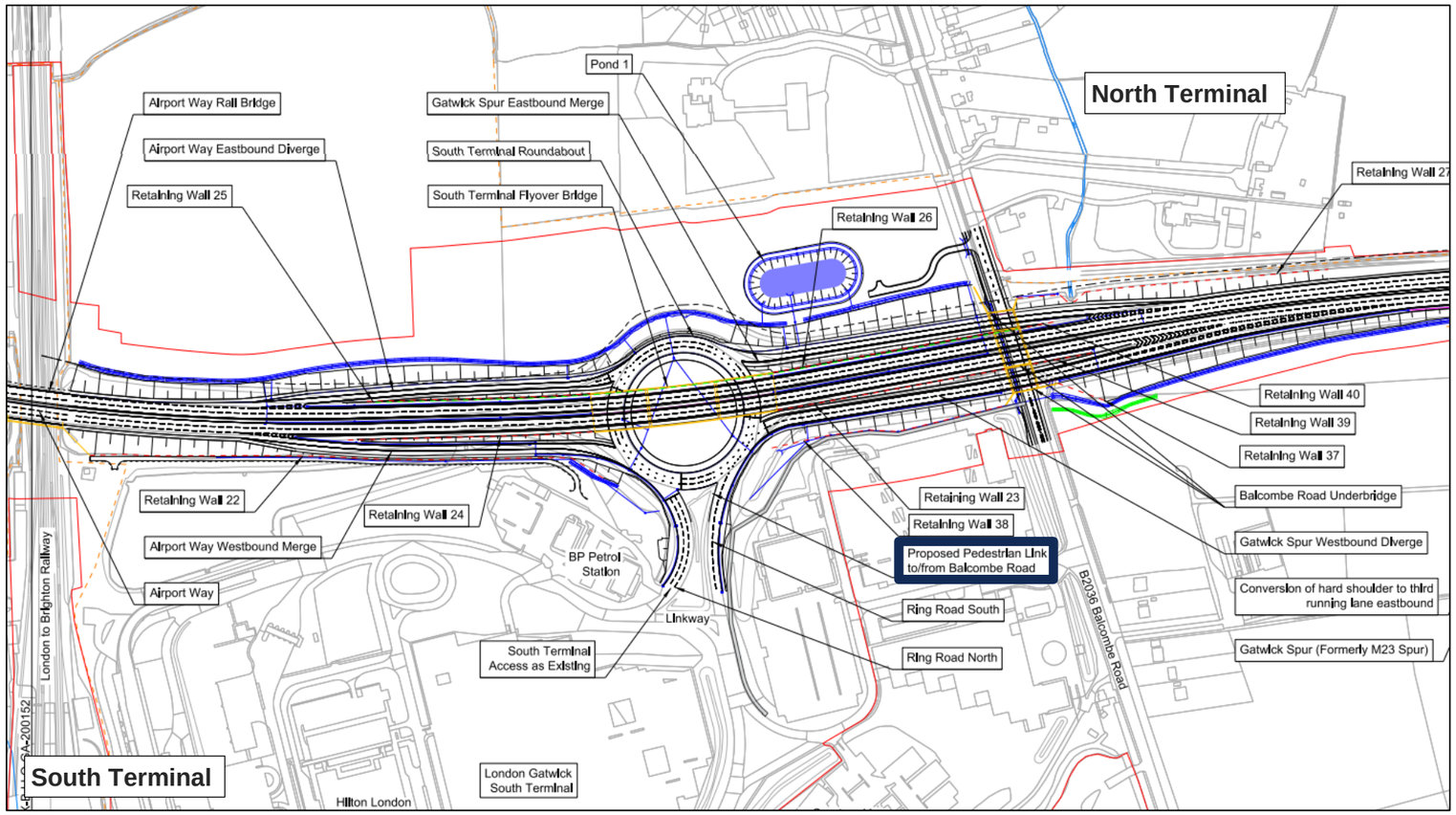


Diagram 14.4.3: Active travel improvements (South Terminal)



14.5 Summary and conclusions

14.5.1 GAL is committed to improving active travel, as demonstrated by the improvements undertaken to date at the Airport and the measures set out in the current ASAS.

14.5.2 As part of the SACs for the Project, GAL is committed to increasing the active travel mode share for staff who live within walking and cycling distance. The Project will deliver walking and cycling improvements as part of the highway works, which will improve connections and the quality of routes and better accommodate walking and cycling movements. As set out in the SACs, GAL is committed to implementing incentives for active travel. The precise nature of those measures will need to be defined in due course and in a future ASAS, in consultation with employers and staff. No further mitigation for active travel is considered to be required.

15 Construction

15.1 Introduction

15.1.1 This chapter provides an assessment of the impacts of construction activities related to the Project on the transport network. The assessment takes into consideration vehicle movements for materials, workforce movements, and the management of access routes and management plans.

15.1.2 The assessment is informed by the following reports, which are prepared by GAL:

- **ES Appendix 5.3.2: CoCP Annex 3 - Outline Construction Traffic Management Plan** (Doc Ref 5.3) – sets out Gatwick's proposed approach to manage the potential impacts of the Project on the Airport operation, local communities, and the natural environment from the Project's material and workforce vehicle movements.
- **ES Appendix 5.3.2: CoCP Annex 2 - Outline Construction Workforce Travel Plan** (Doc Ref 5.3) – provides the package of measures, tailored to meet the needs of individual sites, which sets out a strategy to promote and compel more sustainable travel choices.

15.1.3 The above reports have informed the assessment in this chapter in terms of approach and assumptions, such as those related to the anticipated programme and workforce numbers. This chapter describes the assessment for the following two construction scenarios:

- Airfield Construction – The impact of peak airfield construction vehicle traffic on the highway network.
- Highway Construction – The impact of constructing the surface access improvements (as described in Chapter 2) on the highway network.

15.2 Approach to construction

15.2.1 The exact details of construction methodology and programme are expected to evolve over time. The Buildability Report (see **ES Appendix 5.3.1: Buildability Report** (Doc Ref. 5.3)) sets out the current approach to construction works which includes:

- Considering health and safety throughout the design and construction of the highway works following Health and Safety at Work etc. Act 1974 and the Construction (Design and Management) Regulations 2015 (CDM 2015). Measures to protect the workforce and the travelling public would be implemented on all occasions.
- Taking measures to protect the environment at each stage of construction.
- Meeting the requirements of all relevant legislation, codes of practice and latest standards.
- Minimising the impact of the required works on road users, pedestrians, cyclists, and local communities, particularly concerning traffic management, noise, vibration and pollution control and other major works. Major earthworks operations would be segregated from the public wherever practicable.
- Providing the most sustainable delivery of the highway works by minimising the import and export of the materials to achieve an overall earthwork balance.
- Delivering a safe, integrated, and consistent construction approach GAL will design and deliver an optimised construction logistics plan that will protect the Airport operation and communities.

15.2.2 GAL recognise that the passenger experience is key, and that construction will enhance the 'betterment' of this experience in the long term while not disrupting it in the short term. To meet the demands of this robust delivery programme, mitigating that disruption is threefold:

- To protect the safety of passengers, colleagues, and contractors
- To protect the integrity of the airport operation
- To protect the local communities, their infrastructure and environment

15.3 Construction inputs

Indicative construction programme

15.3.1 The indicative programme of works covering all of the construction activities related to the Project and when these will occur is presented in Chapter 5: Project Description of the ES.

Construction sites

15.3.2 The following main/satellite compounds are anticipated for the construction of the Project (as shown in Diagram 15.3.1):

- main contractor compound (known as MA1);
- airfield satellite compound (for most of the airfield works to the northwest of the airfield);
- car park Z compound (for staging and laydown area for the airside works);
- car park Y compound (for material re-processing from the airside works and at a later stage surface access works);
- South Terminal roundabout contractor compound (main compound for surface access works);
- Longbridge roundabout contractor compound (for surface access works to the Longbridge Roundabout); and
- Car park B compound (for surface access works at Airport Way Bridge over the London to Brighton railway line).

15.3.3 There will be construction-related and construction workforce-related trips to these locations at various project stages. While the approach to car parking for the construction workforce is to park in the official compounds located at MA1, South Terminal and Car Park Y, the construction workforce car parking will mainly take place in MA1 and therefore the highest number of overall trips will be made to this location.

Construction routes

15.3.4 As set out in the Outline Construction Traffic Management Plan (OCTMP), off-airport construction vehicle routing will be approved by the Local Highway Authorities and enforced by GAL. The permitted routes will be set out and agreed with National Highways and the local highway authorities, ensuring sensitive routes and those unsuitable for use by goods vehicles are prohibited for vehicles delivering materials to the site. Dedicated route signs will be set up on the M25, M23, A23 and Airport Way which indicate the approved routes direct to the Airport compounds sites for materials and plant. GAL routinely works with local authorities and National Highways on permitted or advisory routes during disruption, and the same approach could be taken for the construction works.

15.3.5 Construction traffic will be directed to use the strategic road network for as much of each journey as reasonably possible. GAL has identified a single signed route to the Airport for construction traffic on the strategic network via Junction 9 of the M23, as shown in

15.3.6 Diagram 15.3.2. Access will be via M23 Junction 9 through South Terminal roundabout (STR), on to North Terminal roundabout (NTR) and around Longbridge Roundabout. Construction vehicles will then take the A23 south to Gatwick Road roundabout and from there into the MA1 site. The change in traffic flows resulting from construction activities is discussed in Sections 15.4 and 15.5.

15.3.7 No restrictions on routes are proposed for construction worker vehicles.

Construction workforce

15.3.8 An integrated programme has been created based on the individual works within the Project. This influences the schedule of vehicle movements and workforce movements that has been assessed. The programme is indicative but considered to be a reasonable estimate to inform the assessment for the DCO. This indicative programme for the Project is assumed to generate a peak of construction activity in mid-2026, associated with airfield construction works, and again in 2030, associated with the highway works. In each case there would be a peak of approximately 1,350 workers on site for the Project. It should be noted that construction activity in the future baseline is expected to be broadly similar to the Project.

Construction workforce car parking

15.3.9 The approach to car parking for the construction workforce is to park in the official compounds located at MA1, South Terminal and Car Park Y. An internal Project shuttle bus service will then transport the workforce to their site locations from the contractor compounds and will be used for the return journey.

15.3.10 The number of temporary parking spaces required has been assessed quantitively based on the workforce profile. Critical assumptions in the modelling which has been undertaken include:

- Peak construction workforce of approximately 1,350 staff;
- The proportion of the workforce likely to drive to the main contractor compounds is assumed to be up to 90% for the purposes of allocating sufficient parking within the compounds; and
- The maximum parking demand will occur at shift changeover, where parking is required for the workforce arriving while the workforce of the previous shift has not yet left.

15.3.11 On the above basis, a total of 890 spaces are anticipated to be allocated across the compounds, which represents 65% of the total workforce. Bearing in mind that the peak number of construction workers does occur for the full construction period, GAL may be able to reduce the amount of construction worker parking at certain times, particularly towards the end of the highway works construction phase.

Diagram 15.3.1: Principal construction compounds

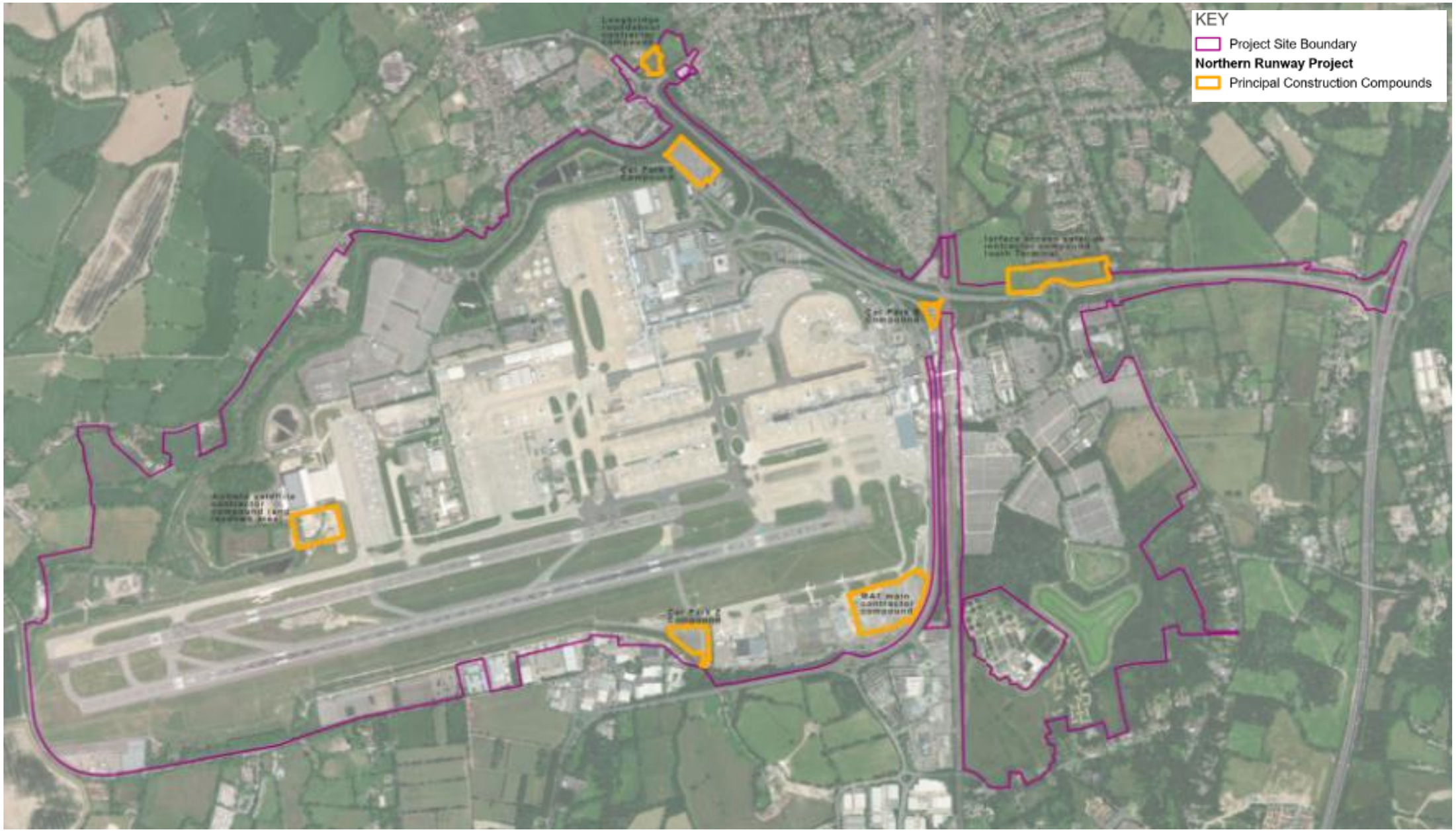
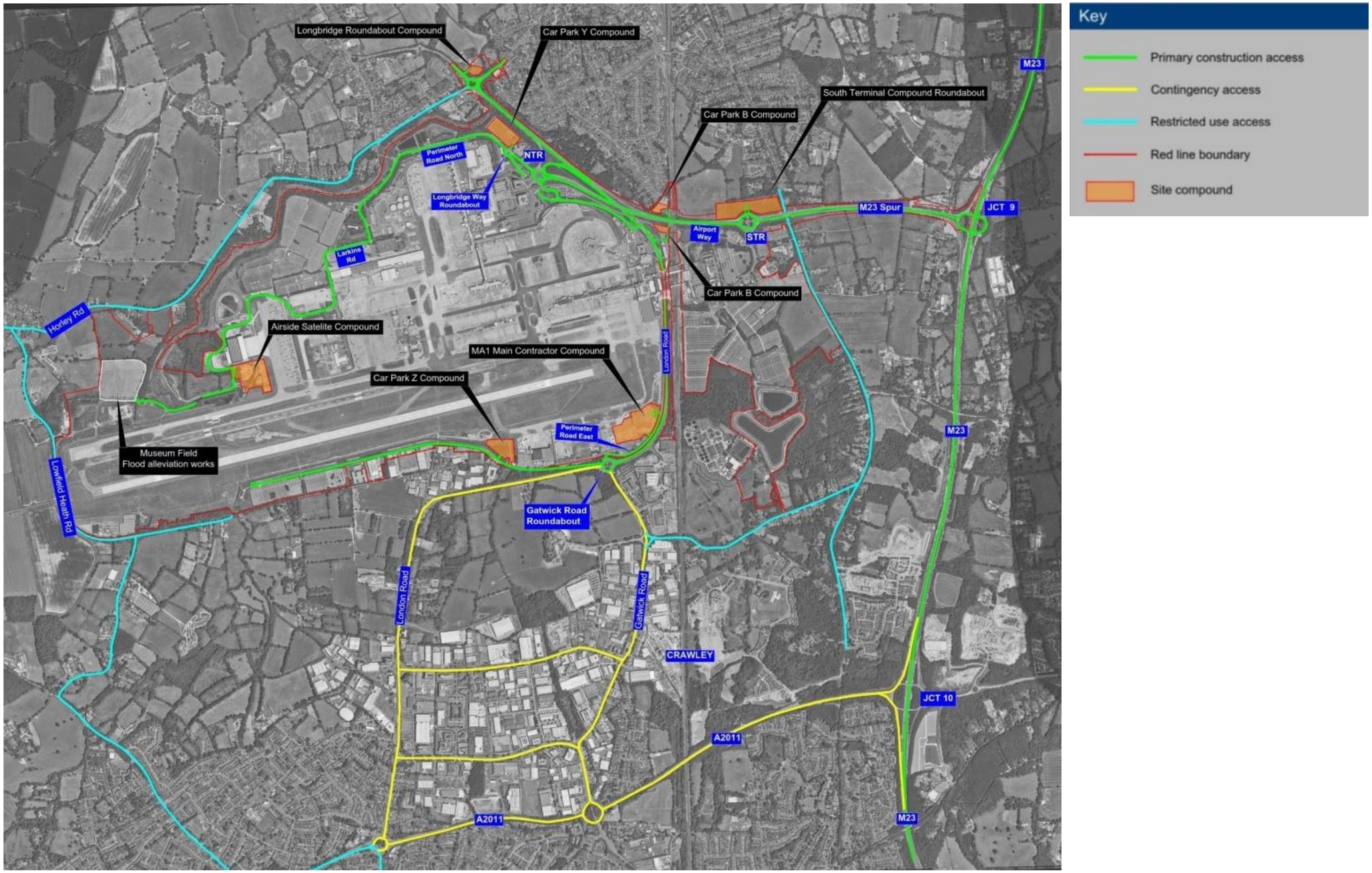


Diagram 15.3.2: Construction access routes to Gatwick Airport



15.4 Airfield construction

15.4.1 Details of the airfield construction are included in the ES Chapter 5: Project Description. The works include reconfiguration of existing maintenance and airfield facilities, alterations to the existing northern runway, airfield works to support use of the realigned northern runway, and extensions to North and South Terminals.

Airfield construction trips

15.4.2 This section relates to vehicles carrying materials to and waste from the Airport, typically Heavy Goods Vehicles (HGVs over 7.5 tonnes), Light Goods Vehicles (LGVs between 3.5 tonnes and 7.5 tonnes) and small delivery vans.

15.4.3 Construction vehicle data has been generated on a monthly basis by GAL's construction team in relation to core and non-core construction activities to deliver the Project. The data is based on anticipated project activity, with vehicle numbers for core works generated from quantities for earthworks, pavement works, drainage, aeronautical ground lighting, navaids etc and non-core works based on an intensity factor and costs of the various projects at design status of RIBA 0-1.

15.4.4 The busiest month for construction vehicle activity is expected to be December 2026 with 38,450 construction vehicles for the busiest shift across the month. This comprises16,360 construction workforce or Personally Owned Vehicles (POVs) and 22,090 other construction vehicles as a mix of HGVs, LGVs and Liveried Vans with two shifts per day.

15.4.5 However, December is a lower month for traffic on the highway network around the Airport and therefore the assessment has also considered other months during the peak period of construction activity in 2026 and 2027. Typically, the summer months, with high Airport activity and background traffic, are the busiest on the network.

15.4.6 Accordingly, the modelling and assessment conservatively considers the busiest summer month for construction activity which is expected to occur in June 2028 with 32,100 vehicles for the busiest shift across that month, comprising 14,300 POVs and 17,800 other construction vehicles and with three shifts per day (two x 10-hour shifts and an 8-hour night shift).

15.4.7 Monthly data has been used to generate daily and peak period traffic volumes by:

- Considering shift patterns;
- Dividing monthly vehicle numbers by 22 working days per month;
- Assuming 1.5 construction workers per vehicle, which is considered to be conservative. GAL's construction team has data which suggests that a reasonable proportion of the recent workforce on airside projects at the Airport came to site in minivans with up to six people per van. As such, 1.5 construction workers per vehicle is considered a conservative case; and
- Assuming that 10% of the construction workforce travel by public transport mode. Again, this is a conservative assumption given the excellent connectivity provided by Gatwick Airport railway station, as well as local bus and long-distance coach services.

15.4.8 The shift patterns in June 2028 mean that, for the busiest daytime shift, the monthly total construction vehicles are 17,800 vehicles, equivalent to 8,900 in one direction. When divided by 22 working days and spread over a 10-hour shift, the estimated vehicle trip generation is 40 vehicles (HGVs and LGVs) in and out every hour along the M23 Spur. At this stage, material-carrying construction vehicles (ie LGVs and HGVs) have not been excluded from peak hours on the highway network to test the impact of extra construction traffic in the peak.

15.4.9 The modelling work includes assumptions on construction traffic which are expected to provide a robust case in terms of highway impact. For example, the modelling assumes that construction vehicle movements would take place in highway peak hours (when the network is at its busiest). To further reduce the impact of construction traffic, the OCTMP identifies measures which could be implemented to meet the following objectives:

- reducing potential congestion impacts, caused by additional vehicles on the network over and above typical traffic levels;
- reducing safety risks related to construction vehicle movements;
- minimising emission levels;
- limiting noise impacts; and
- minimising other impacts such as wear and tear of the road network and dust from construction traffic.

15.4.10 The modelling work takes into account the proposed construction vehicle routes indicated in

15.4.11 Diagram 15.3.2 and which will be secured by the OCTMP.

Airfield construction worker trips

15.4.12 Based on the information provided in paragraph 15.4.6, the three shifts in June 2028 mean that, for the busiest daytime peak, the monthly total POVs is 14,300 vehicles, equivalent to 7,150 POVs in one direction. When divided by 22 working days and factored by 90% to reflect 10% of construction workers on public transport, this gives 360 construction worker vehicles travelling each way to and from the site on a working day in June 2028, with arrivals and departures split between three shifts. The modelling work assumes that there will be 150 construction worker vehicles in the AM peak hour. The peak construction worker vehicle activity is expected to be similar in the busiest autumn and winter months.

Objectives of the Outline Construction Workforce Travel Plan (OCWTP)

15.4.13 The modelling work includes assumptions on construction worker behaviour which are expected to be robust case in terms of highway impact. However, to encourage more sustainable travel patterns, an OCWTP has been developed for the Project. It focuses specifically on how the construction workforce will travel to and from the Airport and identifies measures that encourage alternatives to the use of private car, especially single-occupancy journeys. It sets out aspirations to encourage alternative means of travel, particularly as a way to reduce the environmental impact of the Project, ensure that the construction workforce have a choice of a range of travel options and ensure that they can access the Airport and sites safely during construction. For the purpose of a robust assessment of the impacts on the highway network, the OCWTP measures and any potential modal shifts beyond a 10% public transport mode share have not been included in the modelling work.

15.4.14 It should be noted that each contractor appointed by GAL to deliver the Project will be responsible for developing their own detailed OCWTP and will be monitored against it to ensure compliance. The OCWTP is therefore a guidance document to inform appropriate strategies from contractors, which will then become enshrined in contracts and obligations as the Project moves forward.

15.4.15 The overall objectives of the OCWTP are:

- Reduce travel by private car, particularly single occupancy car journeys;
- Encourage a reduction in car dependency;
- Encourage multi-occupancy car use;
- Increase the workforce awareness of the environmental and health benefits of different travel choices;
- Maximise accessibility for public transport, walking and cycling as sustainable transport modes;
- Achieve the highest possible public transport mode share; and
- Encourage sustainable travel choices.

OCWTP initiatives

15.4.16 A summary of the initiatives identified in the OCWTP is provided in this section. It should be noted that the modelling work has robust assumptions around workforce travel and does not rely on specific measures in the OCWTP to be delivered.

15.4.17 The key initiatives considered in the OCWTP are:

- Walking and cycling – provision of safe cycle route as part of the surface access improvements, a 'cycle to work bundle' including discounts on bike and equipment purchases and free bike servicing, provision of cycle stands and showering and locker facilities;
- Public transport – public transport initiatives such as providing shuttle buses from designated pick-up points to the construction site, working with local authorities to increase frequency and/or capacity of public transit routes that serve the construction site, offering incentives or subsidies for workers who use public transportation to commute to the construction site, and encouraging designated parking areas for workers who carpool to commute to site;
- Encourage car sharing by implementing incentives such as dedicated car share bays closer to welfare buildings, free meal vouchers, cost savings where the cost of fuel is split with the car sharer;
- Dedicated Workforce Shuttle Bus Service – this is a major undertaking which requires bus service planning, procurement of a supplier and space for operation at Gatwick's bus stops and train station to pick up and drop off the workforce. Further development for the arrangement of dedicated workforce buses is under way and will be further defined;
- Park and Ride Workforce Stations – the possibility of developing one or more 'Park and Ride' workforce stations outside of the Airport and creating a dedicated workforce bus connection from these locations to contractor compounds is being considered. This would support maintaining business as usual for Airport passengers and reduce the potential impact of construction workers using the rail, local roads and local bus service;
- Low Emission Bus Fleet Vehicles – use of FORS standard vehicles should be mandatory for bus fleet vehicles. Through adherence to the European environmental regulations required for accreditation under the FORS scheme, Euro 6 engines will be expected in all contractor workforce bus services accessing the Airport. Given the significance of air quality at various locations around the Airport, this measure is intended to help reduce the impact of vehicle emissions; and
- Lift Share Schemes – such as Demand Responsive Transport, also known as Demand Responsive Transit (DRT), Demand Responsive Service (DRS), Dial-a-Ride Transit (DART) or Flexible Transport Services (FTS). This is a form of transport where vehicles alter their routes based on particular transport demand rather than using a fixed route or timetable. These vehicles typically pick up and drop off passengers in locations according to passengers needs and can include taxis, buses, or other vehicles.

Assessment of airfield construction impacts

Approach and methdology

15.4.18 Peak airfield construction activity is expected between 2024 and 2029. The modelling has tested the summer peak level of construction activity in June 2028 (as set out in paragraphs 15.4.4 to 15.4.6) on the 2029 future baseline airport and background traffic levels to provide a robust assessment of potential construction impacts. The difference in traffic flows between 2028 and 2029 will be small (less than 5% higher) and accordingly within the daily variation in any given year.

15.4.19 In order to provide a reasonable distribution of potential locations from which construction workers will travel to/from, the modelling assumes that construction workers are drawn from Croydon, the Gatwick Diamond area and Brighton and Hove. Whilst some construction workers will be drawn from a wider catchment, the length of the Northern Runway construction works over several years is likely to result in construction workers staying in the area temporarily while working at the Airport and this is the assumption used for modelling. The distribution of construction workers by Local Authority reflects the proportion of construction workers living in those areas from 2019 Office of National Statistics data. The trips are distributed evenly between zones in these Local Authority areas. Given that it will be very difficult to mandate and then monitor routes for construction workers, it is assumed that

these vehicles will arrive at MA1 via the most appropriate highway route from or to each zone.

Comparison of future baseline 2029 and airfield construction

15.4.20 Diagram 15.4.1 shows the traffic flow comparison between the 2029 future baseline and with airfield construction, for the AM peak hour. Further analysis is contained in the Strategic Modelling Report (Annex B).

15.4.21 The estimated construction vehicle trip generation is 40 vehicles (HGVs and LGVs) in and out an hour along the M23 Spur, and 150 construction worker vehicles in the AM peak hour.

15.4.22 Strategic modelling shows that no link exceeds an increase in total traffic of over 30%, which is expected given the relatively low hourly volume of airfield construction traffic generated by the Project.

15.4.23 The modelling shows that HGV flows increase by more than 30% on some roads into the Airport in the AM and PM peaks, which is expected given the requirement for construction HGVs related to the Project to use the Strategic Road Network. The roads include:

- M23 Spur, J9-South Terminal roundabout;
- A23 Airport Way;
- A23 London Road, North Terminal to Longbridge Roundabout;
- A23 London Road, Beehive Ring Road to South Terminal; and
- A23 London Road, Beehive Ring Road to A23 London Road.

15.4.24 In addition, with the 360 construction worker vehicles per day coming from nine Local Authority areas, the greatest number of vehicles travelling to and from one Local Authority area is around 40 vehicles in an hour. This is only a small increase in traffic when considered against other demand on highways and roads around the Airport. The above effects are shown in Diagram 15.4.1 for the AM peak hour, where there are very localised effects.

15.4.25 Using the same assessment methodology as is described in Chapter 12, Diagram 15.4.2 shows the nodes which have been identified with medium and high magnitudes of impact. These junctions have been reviewed as set out in Table 15.4.1 and further details are included in Annex E.

15.4.26 The table shows that some of the nodes are identified because of 'model noise'. Whilst every effort has been made to ensure the model networks reflect the expected future network state, with the coding of junctions being appropriate and traffic loading from zones being reasonable. However, where high levels of congestion are predicted within such models a localised effect known as 'model noise' can occur. This results in traffic demand switching between routes in successive iterations (of a model run), and when compared against a corresponding scenario, may indicate effects that do not appear logical in the context of the test. This can indicate lower levels of model convergence in specific localised areas, which can make the model results subject to higher levels of uncertainty.

15.4.27 Within the Gatwick model, some localised 'model noise' has been identified in two particular areas – Croydon and Steyning. These locations have been reviewed in detail and it is clear that airport traffic represents a very small proportion of traffic in these areas (less than 1%). The large changes in traffic flows between future baseline and with Project scenarios in these areas, and the associated impacts, are due to background traffic switching between routes with very similar journey times within the model, when in practice this is unlikely to happen, for instance because the alternative route is unsuitable or is not the signed route. These effects arising from model noise are not considered likely to occur in practice as a result of the Project.

Diagram 15.4.1: Traffic flow change during the airfield construction scenario (AM Peak)

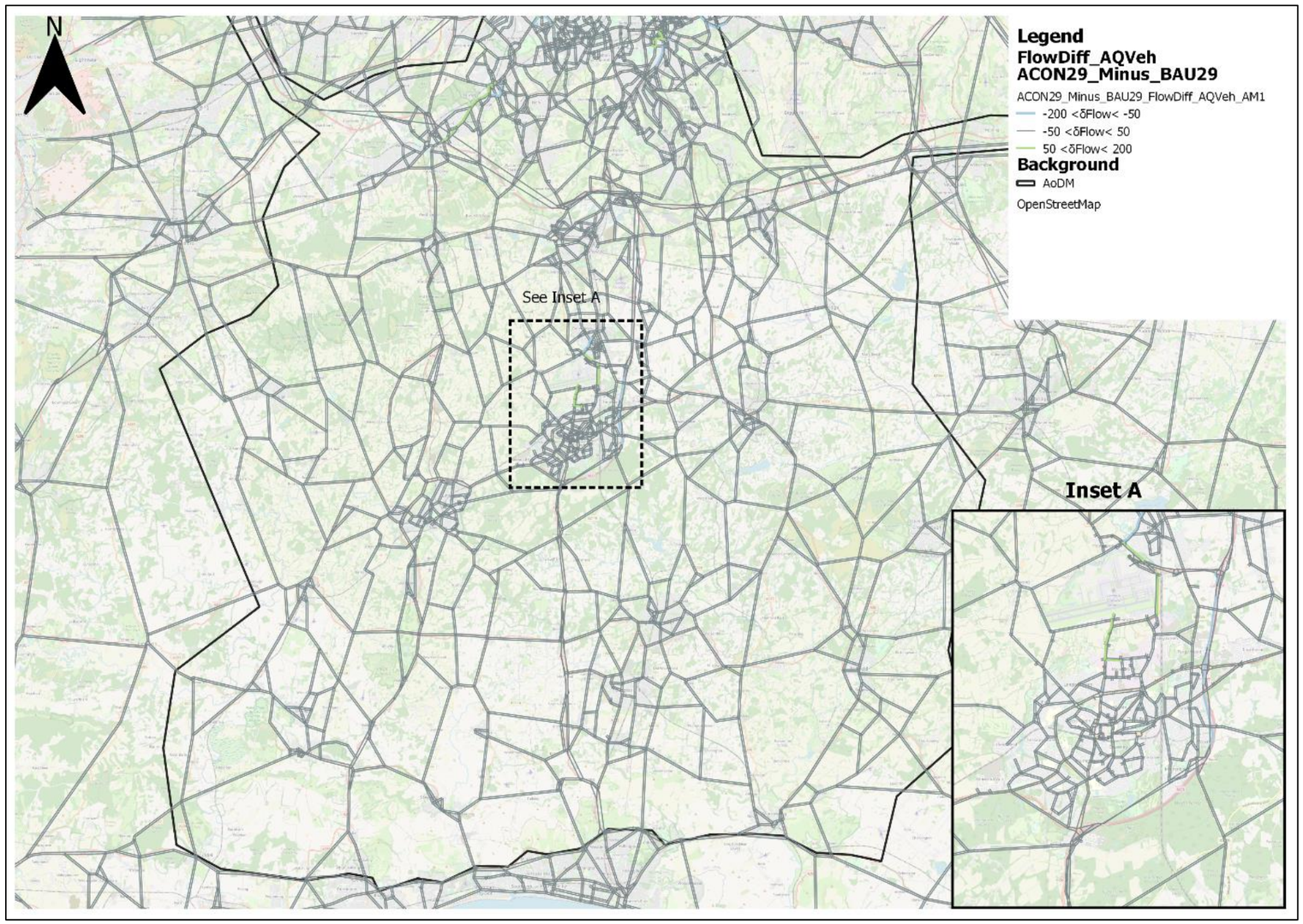


Diagram 15.4.2: 2029 airfield construction magnitude of impact (medium and high)

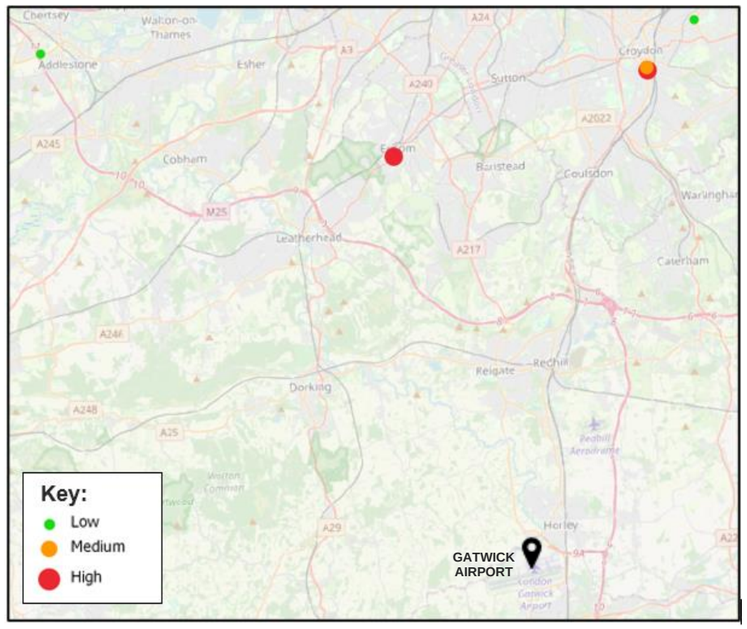


Table 15.4.1: 2029 Airfield construction junction assessment

Node	Magnitude of Impact	Name	Assessment	Mitigation
55025	High	South Croydon/Bartlett Street, Croydon	This junction is shown to be operating well within capacity in the future baseline in all time periods. The impact from the Project is identified in the AM2 peak where there is a reduction in traffic (-118 vehicles) but an increase in V/C ratio (from 17% to 109%). From reviewing the model, this appears to be due to model noise (see paragraphs 15.4.26 and 15.4.27) and localised reassignment of background traffic from the adjacent junction to the west (where the V/C ratio increases from 61% to 76%), which results in queuing that affects the operation of this junction. The proportion of airport traffic at this junction is very small (1%) and the number of additional airport trips as a result of the Project is negligible (no change to -2 across the peak periods). For the other peak periods the junction operates with ample capacity (V/C ratio around 17% with construction).	No mitigation is required.
53192	High	South Street/Woodcote Road/Dorking Road, Epsom	This junction is identified as operating close to capacity in the morning and evening peak periods in the future baseline, with V/C ratios of between 91% and 99%. The impact from the Project is identified in the AM1 peak where there is an increase in traffic, although given that similar increases are not seen in other time periods, this is considered to be due to model noise and reassignment of background traffic. The proportion of airport traffic at this junction is very small (less than 1%) and the number of additional airport trips as a result of the Project is negligible (no change to +1 across the peak periods). The junction would continue to operate close to capacity with the Project, with V/C ratio in the AM1 peak 97% being lower than V/C ratios experienced in other time periods.	No mitigation is required.
55022	Medium	Brighton Road/Warham Road/South End, Croydon	This junction is shown to be operating well within capacity in the future baseline in all time periods. The impact from the Project is identified in the AM1 peak where there is an increase in traffic which is considered to be due to model noise and reassignment of background traffic. The proportion of airport traffic at this junction is very small (around 1%) and the number of additional airport trips as a result of the Project is negligible (-6 to +1 vehicles across the peak periods). The junction would continue to operate within capacity with the Project (V/C ratio up to 85%).	No mitigation is required.

15.5 Highway construction

15.5.1 To understand the impact of constructing the surface access proposals, including full and partial grade-separation for junctions at North and South Terminal Roundabouts, an assessment has been undertaken for a conservative construction phase which envisages highway works being in progress at Longbridge, North and South Terminal Roundabouts at the same time.

15.5.2 The highway programme has considered how activities in each part of the area covered by the highway works would be undertaken and integrated with each other. Further information is set out in the Environmental Statement Chapter 5: Project Description and **ES Appendix 5.3.1: Buildability Report** (Doc Ref. 5.3). The programme is indicative and has been developed with the aim of balancing the overall duration of works with the need to reduce disruption by minimising or avoiding prolonged road closures, particularly at the busiest times of year on this part of the network. Highway modelling using both the strategic and microsimulation models was used to inform the principles of the highway construction programme that forms the basis for this assessment.

Overview of highway works

15.5.3 All highway construction activities tend to follow a broadly similar construction sequence, with the duration and detail dependent upon the scale and complexity of the scheme. A high-level summary is provided below, and more information is provided in the Construction Buildability Report Part B (Surface Access Works), see **ES Appendix 5.3.1: Buildability Report** (Doc Ref. 5.3).

- Activities normally start with site clearance where required and protection or diversion of utilities affected by the scheme.
- Once the site is cleared, earthworks and excavation commence where necessary and where possible excavated material is placed in stockpiles for re-use.
- Structure foundations are then constructed and other ancillary items may also be constructed at this stage including access chambers, draw pits, drainage pipes and ducts for services.
- Above ground structures are then built, often in parallel with the construction of new road pavements, kerbs, footways and other hard surfacing.
- Finishing works including landscaping and the installation of vehicle barriers, street furniture, lighting and road markings. Where necessary, redundant sections of road would also be reinstated to landscaping.

15.5.4 Overall, the objective will be to maintain safe working zones, with appropriate temporary speed limits, clearances and safety barriers between construction areas and lanes that are open to traffic. Where necessary, short to medium-duration temporary lane closures will be needed to allow construction activities to proceed safely. Occasional temporary full closures of carriageways or roads may be needed for certain critical activities, and these will be timed to avoid the busiest times of the day or night, with appropriate alternate routes in place and signposted. Some night-working will be required.

South Terminal roundabout and M23 spur

15.5.5 The Project involves providing grade separation of the traffic movements at the existing South Terminal Roundabout, together with providing three lanes eastbound on the M23 Spur to M23 Junction 9.

15.5.6 The roundabout itself will remain in its current position and be connected to the new flyover by four new slip roads. Traffic signal control will be installed on the roundabout. Space to construct the slip roads is restricted in some places and, where this is the case, retaining structures will be needed to support them clear of the surface features that need to be avoided, such as, for example, the water storage pond to the south of Airport Way and east of the Brighton-London main line. The need to incorporate slip roads to/from the M23 Spur motorway east of South Terminal Roundabout means that the existing bridge over B2036 Balcombe Road will require replacement. To the west of the roundabout a third lane would be added westbound over the Brighton Main Line railway, requiring alterations to the bridge.

15.5.7 After site clearance and diversion or protection of utilities, the proposed construction sequence envisages first constructing the new slip road and associated retaining structures together with the bridges that will carry the slip roads over Balcombe Road. The M23 Spur eastbound will also be widened. Traffic on the M23 Spur will then be diverted to use the new slip roads to and from the roundabout, allowing works to commence on constructing the new flyover bridge for through traffic, together with the replacement bridge for the main carriageway over Balcombe Road. Finally, new embankments and other highway earthworks will be completed and the South Terminal Roundabout will be modified.

15.5.8 All construction activities will take into account the need to maintain safe working zones, with appropriate temporary speed limits, clearances and safety barriers between construction areas and trafficked lanes. Where necessary, short-duration temporary lane closures will be needed to allow construction activities to proceed safely. Occasional temporary full closures of carriageways or roads may be needed for certain critical activities and these will be timed to avoid the busiest times of the day or night, with appropriate alternate routes in place and signposted. Access along Balcombe Road will be maintained except for occasional short-term closures to enable certain bridge deck construction activities to take place safely. Access into the Gatwick South Terminal area will be maintained at all times.

North Terminal roundabout

15.5.9 This scheme involves providing partial grade separation of the traffic movements at the North Terminal Roundabout.

15.5.10 The existing roundabout would be enlarged to create additional capacity. An elevated flyover would connect Airport Way to the A23 London Road in the westbound direction only. The existing eastbound exit from the roundabout to Airport Way would be closed and a new connection would be made to a new at-grade signalised junction on the A23 London Road, which would include pedestrian crossing facilities A third lane will be added to the northbound A23 London Road approaching the roundabout, requiring replacement of the existing bridge over the River Mole.

15.5.11 The overall sequence will be to first clear the site and divert or protect utilities and other services to be retained. Work can then begin on the reconfiguration of the road layout, which starts with removal of the A23 London Road central reserve and widening of the northbound carriageway, including widening the River Mole bridge. Work will also commence on widening the bridge over the Brighton Main Line. Work will then progress to constructing the revised links between Airport Way eastbound and the A23 London Road, including the new signalised junction, before the existing roundabout is enlarged. Once complete, the new roundabout and link roads will be opened to traffic, allowing the Airport Way westbound approach to the roundabout to be realigned. Finally, the new flyover link will be completed.

Longbridge roundabout

15.5.12 The capacity of Longbridge roundabout will be increased by providing full width running lanes throughout the junction and signalising certain arms. The new roundabout will have a larger circulatory carriageway and will extend further west and north to

accommodate wider circulating lanes and improved capacity on exit and entry lanes, particularly for the A23 arm to and from Horley. Additional pedestrian and cycle crossing facilities and routes will be provided. And improved capacity on exit and entry lanes, particularly for the A23 arm to and from Horley. The A23 Brighton Road bridge over the River Mole will be widened.

15.5.13 All works will take place at the same levels or very slightly higher than the existing road network.

15.5.14 All construction activities will take into account the need to maintain safe working zones, with appropriate clearances and safety barriers between construction areas and trafficked lanes. Where necessary, short-duration temporary lane closures may be needed to allow construction activities to proceed safely, however it is not expected that the roundabout will need to be fully closed to traffic.

15.5.15 Following initial works to divert utilities and prepare the site, the broad construction sequence will start with the replacement of the southern half of the new bridge over the River Mole. When complete, traffic will be switched to the replaced part of the bridge, allowing the northern side to be replaced in a similar way. Following these stages, work will take place to widen the existing stilt structure in the eastern quadrant of the roundabout, with the western side of the roundabout being widened concurrently. Finally, the central island of the roundabout will be modified and utilities will be returned to the River Mole bridge.

Terminal access roads and forecourts

15.5.16 Works to the terminal access roads and forecourt areas will be required to ensure they can safely and efficiently accommodate the predicted increase in demand. The highway-related aspects to this work include selective widening of the roads that enter and leave the terminal areas, improved or refreshed road markings and signage to aid and inform road users and improved footpaths and road crossings for users other than vehicles and their occupants.

15.5.17 The work will be timed to minimise disruption to existing users and to ensure airport operations can continue as efficiently as possible whilst maintaining safe working zones to construction activities. All works will take place at the same levels as the existing road network.

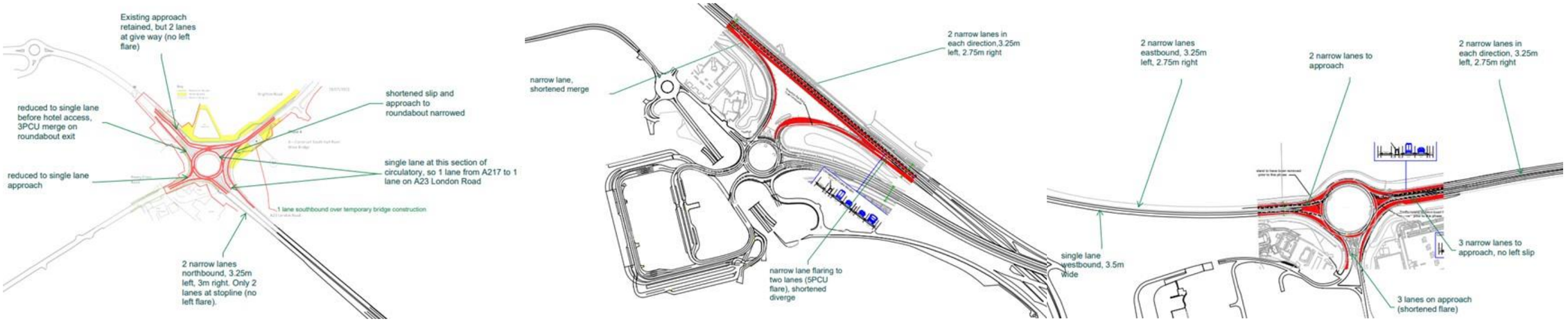
15.5.18 Construction methods will be typical of this type of construction activity and are not expected to include the use of unusual or exceptional plant or equipment. Access into the Gatwick terminal areas will be maintained at all times and during busy periods the number of lanes open to traffic will not be reduced. Access to side roads and facilities alongside the primary roads to be widened will be maintained at all times. If temporary road access or lanes closures are required to maintain safe working zones whilst completing the works, signed alternative access arrangements will be put in place.

Assessment of highway construction impacts

Approach and methodology

15.5.19 The most complex highway construction phase as currently envisaged would involve a combination of construction works at Longbridge, North and South Terminal Roundabouts, as shown in Diagram 15.5.1. Although the construction programmes for each of the three works areas have been developed separately, there is significant overlaps when it comes to access, safety and traffic management, as well as the need to minimise disruption. Concurrent works in each area are therefore proposed, which will assist in providing more consistent traffic management arrangements as well as limit the duration of the overall works programme. The construction methods are typical for the works envisaged but the sequencing of these to avoid unnecessary disruption creates complexity.

Diagram 15.5.1: Proposed Highway Construction Phase for assessment – Longbridge Roundabout, North Terminal Roundabout, South Terminal Roundabout



15.5.20 Various traffic management arrangements will be needed throughout the duration of the highway works period, which is expected to last between three and four years. Traffic management layouts will change as construction progresses in each of the three main works areas. The phase of highway construction works used for the assessment represents the most complex combination of traffic management requirements across the whole of the works zone. Under the indicative programme this is expected to be in place in the latter part of 2029 and could last for a period of up to six months. It would include:

Longbridge Roundabout

- Narrow lane running and temporary lane closures on approaches to the roundabout, with some contraflow working to allow bridge widening to take place.

North Terminal roundabout

- Narrow lanes on merges and diverges, likely requiring some traffic management on the A23;
- Narrow lane running on the A23 London Road over the River Mole bridge; and
- A combination of narrow lanes and/or lane closures and contraflow running on the western section of Airport Way to allow the flyover to be built.

South Terminal roundabout

- Narrow lane running or periods of temporary lane closure on the M23 Spur and/or Airport Way, with some contraflow running for bridge works and tying in the new slips back to the M23 Spurl; and
- No right turn into the Airport, owing to the reduced capacity of the roundabout, with traffic being sent to Junction 9 to U-turn.

All roundabouts

- Single or narrow lanes on the circulatory of both roundabouts.

15.5.21 Accordingly, strategic modelling has tested the most conservative construction phase against traffic conditions in the 2029 model, including demand from the Project, ie assuming the Northern Runway is open, to provide a robust assessment of potential construction impacts with additional demand generated by increased runway capacity.

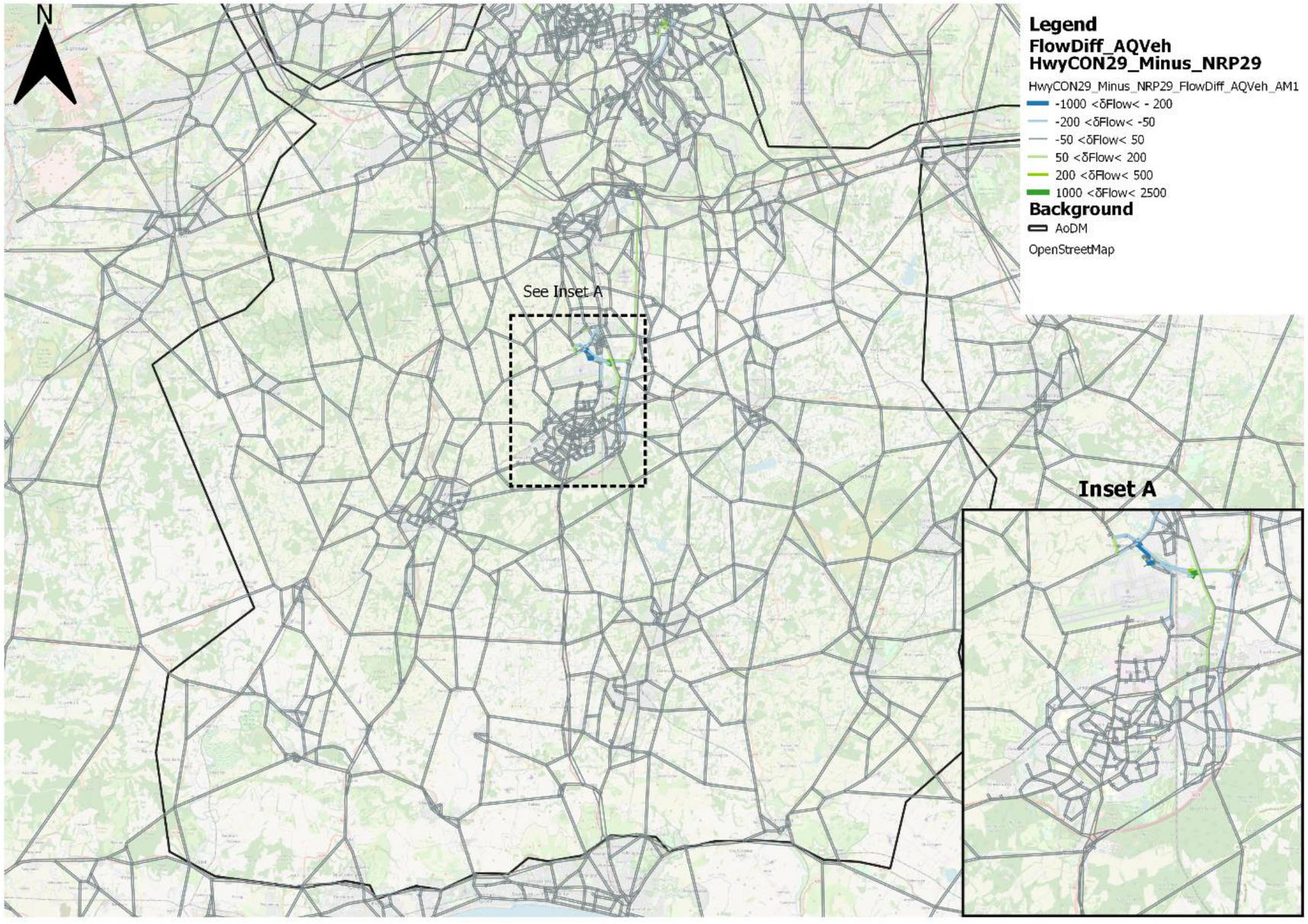
15.5.22 The assessment for the highway works construction period assumes that the network represents the existing highway network, modified to represent traffic management arrangements that would be present during the most complex phase of works and/or changes already completed to the network by that time.

Comparison of scenarios with Project and with highway construction works (2029)

15.5.23 Modelling of this scenario shows reassignment of traffic owing to the temporary highway works on the M23 Spur, as per Diagram 15.5.2. The links shown in blue indicate a reduction in traffic. It can be seen that traffic reduces on the M23 Spur, as a result of non-airport traffic seeking alternative routes. The works also affect traffic levels on the M23 itself with reductions also shown by the model on the motorway.

15.5.24 The modelling shows increases on highway or road links in green. Notable changes include north-south traffic between Horley and Crawley rerouting via Balcombe Road as well as some traffic taking a route on the west side of the Airport from Ifield Avenue in Crawley via Bonnets Lane, Lowfield Heath Road, Horley Road and Charlwood Road and into Horley via Povey Cross.

Diagram 15.5.2: Reassignment of Traffic during Highway Construction (Annual Average Daily Traffic)



15.5.25 It should be noted that flows are shown as Annual Average Daily Traffic (AADT), equivalent to average 24-hour flows. As such, where dark green or blue is shown, traffic flow has changed by 1,000 AADT or more, which is equivalent to a change of around 42 vehicles or more per hour on average on those roads. These changes are therefore relatively small, less than one vehicle per minute, which is reflected in changes in junction performance.

15.5.26 Using the assessment methodology set out in Chapter 12, Diagram 15.5.3 shows the nodes which have been identified with medium and high magnitudes of impact. These junctions have been reviewed as set out in Table 15.5.1 and further details are included in Annex E.

Diagram 15.5.3: 2029 Highway Construction Magnitude of impact (medium and high)

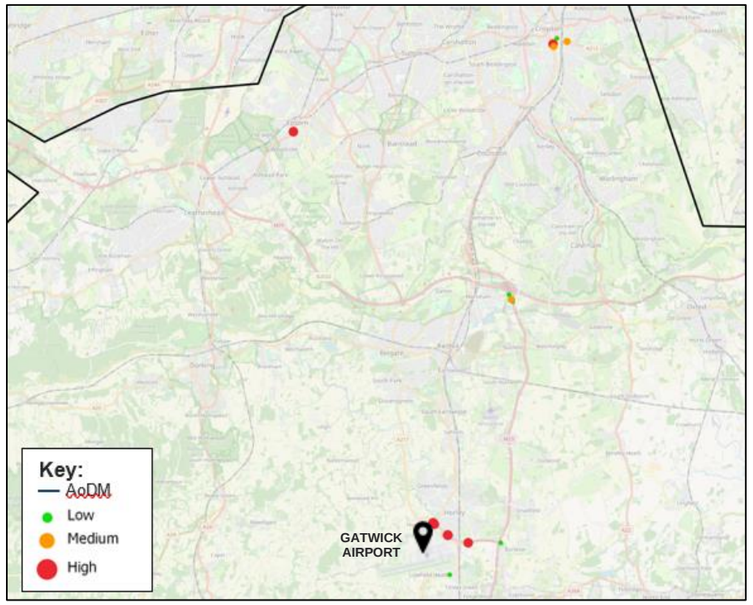


Table 15.5.1: 2029 Highway Construction junction assessment

Node	Magnitude of Impact	Name	Assessment	Mitigation
54710	Medium	Coombe Rd/South Park Hill Rd, Croydon	This junction is shown to be operating close to capacity in the morning peak periods and within capacity at other time periods in the future baseline (maximum V/C ratios of 99% in the AM1 period). With the Project and highway construction activity the model shows increases in traffic in the AM2 period, which are not reflected in other time periods. This is considered to be due to model noise (see paragraphs 15.4.26 and 15.4.27) and reassignment of background traffic. The proportion of airport traffic at this junction is very small (less than 1%) and the number of additional airport trips as a result of the highway construction works is negligible (-1 to +1 vehicle across the peak periods). With the Project and highway construction activity the junction would continue to operate within or close to capacity, with a maximum V/C ratio of 98% in the AM1 time period.	No mitigation is required.
55021	High	Southbridge Road/South End, Croydon	This impact is identified in the AM1 peak where there is an increase in traffic of around 250 vehicles, but without a similar increase in the following AM2 period despite a similar total volume of traffic passing through the junction. This is considered to be due to model noise and reassignment of background traffic (see paragraphs 15.4.26 and 15.4.27). The proportion of airport traffic at this junction is very small (around 1%) and the change in airport-related trips as a result of the Project is negligible (reducing by up to 6 vehicles across the peak periods). The junction continues to operate within capacity (V/C of 91% in the AM1 period with the Project and highway construction).	No junction mitigation is required.
55022	Medium	Brighton Road/Warham Road/South End, Croydon	This impact is identified in the AM1 peak where there is an increase in traffic of around 240 vehicles but without similar increases in other peak periods, despite a similar total volume of traffic passing through the junction. This is considered to be due to model noise and reassignment of background traffic (see paragraphs 15.4.26 and 15.4.27). The proportion of airport traffic at this junction is very small (around 1%) and the change in airport-related trips as a result of the Project is negligible (a reduction of up to 7 vehicles across the peak periods). The junction continues to operate within capacity (V/C ratio up to 85.4% with the Project and highway construction).	No junction mitigation is required.
53192	High	South Street/Woodcote Road/Dorking Road, Epsom	This impact is identified in the AM1 peak where there is an increase in traffic of around 160 vehicles, but without similar increases in other periods despite similar total volumes of traffic passing through the junction. This is considered to be due to model noise and reassignment of background traffic (see paragraphs 15.4.26 and 15.4.27). There is no change in airport-related traffic associated with the Project and highway construction. The	No junction mitigation is required.

Node	Magnitude of Impact	Name	Assessment	Mitigation
			junction is operating at capacity (V/C ratio of 97% in the AM1 peak with Project and highway construction).	
19607	Medium	M23/M25 southern diverge	The impact is identified in the AM1 peak, where the V/C increases by 2% from 93.7% to 95.8%. The node continues to operate within capacity.	No junction mitigation is required.
15084	High	South Terminal – Airport Way Roundabout East/A23, Gatwick	This junction is indicated to be operating within capacity in the future baseline. It is part of the South Terminal Roundabout, which would be affected by the traffic management required for the highway construction works and would also experience some increase in traffic while the works are being undertaken. The impacts from the Project are identified in the AM1 and AM2 peak periods. AM1 is shown with a reduction of overall traffic (-7 vehicles) in the and an increase in Project airport traffic (+159 vehicles). AM2 is shown with an overall increase in vehicles (+99 vehicles) and a reduction in Project airport traffic (+11 vehicles). The model nevertheless indicates that the junction would continue to operate with V/C ratios of less than 100% in all time periods, and the impact of the Project shown by the modelling would would be temporary (lasting around six months, based on the indicative programme) while the highway works are being undertaken.	No mitigation is required.
15083	High	London Rd/Airport Way, Gatwick	The model generally indicates that these locations would operate within capacity in the future baseline, but during highway construction they would be affected by the traffic management required for the highway construction, leading to a reduction in the number of lanes (and associated saturation flows) This would result in higher V/C ratios, approaching 100%, for a temporary period (lasting around six months, based on the indicative programme) while the highway works are being undertaken.	No mitigation is required.
14801	High	Longbridge Roundabout		
16768	High	London Rd/A23		

15.6 Summary and conclusions

15.6.1 Airfield construction traffic has been compared against the 2029 future baseline scenario. Highway construction traffic has been compared against the 2029 future baseline scenario with the inclusion of additional travel demand from the Project in that year and modifications to the highway network to represent traffic management that would be in place in the most complex phase of highway construction.

15.6.2 Based on the levels of construction traffic described above, it is not considered that peak airfield or highway construction will have a significant impact on the performance of the highway network around the Airport. A number of nodes have been identified in the strategic model to have medium or high impacts. These junctions have been examined; some indicated impacts are due to model noise and are not considered likely to occur in practice, and some are due to the temporary reduction in highway capacity as the highway works are taking place. No requirements for physical mitigation have been identified.

15.6.3 Whilst the modelling indicates that there is available capacity in peak hours on the network, without assuming that construction traffic would be managed to reduce its volume in peak periods, there is further benefit in aiming to minimise the amount of construction traffic at peak times to make sure construction works related to the Project do not negatively impact on network capacity and safety. The modelling work does not rely on the full range of measures which could be implemented. A number of measures are indicated in the OCTMP and OCWTP which would help to reduce the number of construction-related vehicles on the highway network. These will be further developed for the final versions of the OCTMP and OCWTP which are expected to be secured through DCO Requirements and would further reduce impacts.

16 Freight, cargo and logistics

16.1 Introduction

16.1.1 Strategic and local highway modelling as described in Chapters 12 and 13 includes air cargo and logistics activities associated with the operation of Gatwick Airport. The models include the main access points to the Gatwick site from the wider road network for cargo and logistics vehicles.

16.1.2 This chapter provides more information on the freight, cargo and logistics movements in the current and future baseline scenarios.

16.2 Freight movements at Gatwick Airport

16.2.1 At Gatwick, there are four types of goods vehicle movements, as described below.

- Air cargo: movements related to shipments that have been brought in or will be taken away by air, typically in the belly of passenger aircraft.
- Logistics: movements that relate to goods delivered to businesses that operate on-airport, including retailers, food and beverage outlets and catering. The reverse flow of waste away is also included in logistics movements.
- Airline servicing: movements related to inflight catering, including movements to the consolidation centre near Perimeter Road South, as well as those between the consolidation centre and the aircraft.
- Airport servicing: movements related to construction and maintenance on the Airport estate.

16.2.2 Each of these movements occurs in a different area of the Airport.

- Air cargo and logistics are handled in the cargo area north of the airfield and west of North Terminal.
- Waste consolidation occurs south of the cargo area along Larkins Road.
- Airline servicing is based south of the airfield in the Gatwick Gate Industrial Estate.
- Airport servicing originates from both north and south of the airfield, depending on the type of activity.

16.2.3 This section describes these different types of traffic, their activity within each freight zone and impact on the road network. For the purposes of the assessment, freight traffic comprises Light Goods Vehicles (LGVs) and Heavy Goods Vehicles (HGVs).

16.3 Air cargo

Current demand and future growth

16.3.1 In 2019, Gatwick handled over 150,000 tonnes of cargo driven by additional long-haul services. A high proportion of Gatwick's cargo traffic involves non-EU markets and most of this cargo is carried by passenger aircraft in the form of belly cargo. This is expected to continue into the future.

16.3.2 Gatwick's cargo volumes are forecast to grow to over 290,000 tonnes by 2047 in the future baseline and just under 350,000 tonnes with the Project in the same period. The cargo growth forecast used in the modelling work is shown in Table 16.3.1.

Table 16.3.1: Cargo growth forecast (tonnes)

Year	Future baseline	With Project
2016	76,800	
2018	150,057	
2029	227,705	250,816
2032	234,969	304,626
2047	290,499	348,430

16.3.3 Forecast growth in cargo volumes is driven by an increasing proportion and volume of flights to long haul markets where cargo volumes are typically strong. To serve these markets, the forecasts anticipate a greater proportion of wide-body aircraft with cargo capacities in line with or greater than today's fleet.

Cargo handling area

16.3.4 The cargo facility covers an area of 10 hectares. This is made up of 23,000 m² of cargo sheds, plus office accommodation, areas for HGV loading, unloading and parking, and open equipment parking areas.

16.3.5 The cargo sheds are owned by a third party with a long-term ground lease. Gatwick has no direct commercial involvement with the cargo operation, although GAL manages the Border Inspection Post located there. The inspection post is used for temporary storage, inspection and clearance of live animals and foodstuffs.

16.3.6 The Gatwick Direct logistics operation run by DHL, consolidates deliveries and some of the waste collection operation, is also located in part of the cargo building (see Section 16.4).

16.3.7 In the mid-2000s, the cargo area handled 300,000 tonnes of air freight annually. Therefore, it is envisaged the return to these historic air cargo levels by 2047 can be accommodated within the existing air cargo area.

16.3.8 The cargo area is shown in

16.3.9 Diagram 16.3.1. Access is via the North Terminal Roundabout. The Project will reconfigure this junction to provide additional capacity. Longbridge Roundabout will also be upgraded as part of the Project. These proposed highway improvements are set out in Chapter 2.

Current cargo traffic

16.3.10 When considering cargo growth into the future, the following can be inferred from current operations.

- Landside vehicle movements related to air cargo tend to be outside typical commuter peak periods.
- The last decade has witnessed an increase in consolidation with fewer but larger shipments on heavier vehicles, such as typical 30 tonne HGVs.
- The number of cargo vehicles is typically low when compared against other vehicle movements to and from Gatwick. Cargo handlers typically expect a maximum of between 50 and 60 LGVs and HGVs per day.

16.3.11 Data from August 2019 shows an average two vehicles per hour (55 across the day) into Dnata's[12] area of the cargo centre. Whilst there is no current data for Royal Mail, WFS movements and other cargo movements, it is estimated that a maximum of five vehicles of varying size arrive at the cargo centre in any given

[12] Dnata provides air services such as ground handling and flight catering.

hour currently. When compared to traffic on the highway network around the Airport, this is a very low level of vehicle activity.

Diagram 16.3.1: Location and scale of cargo and freight facilities

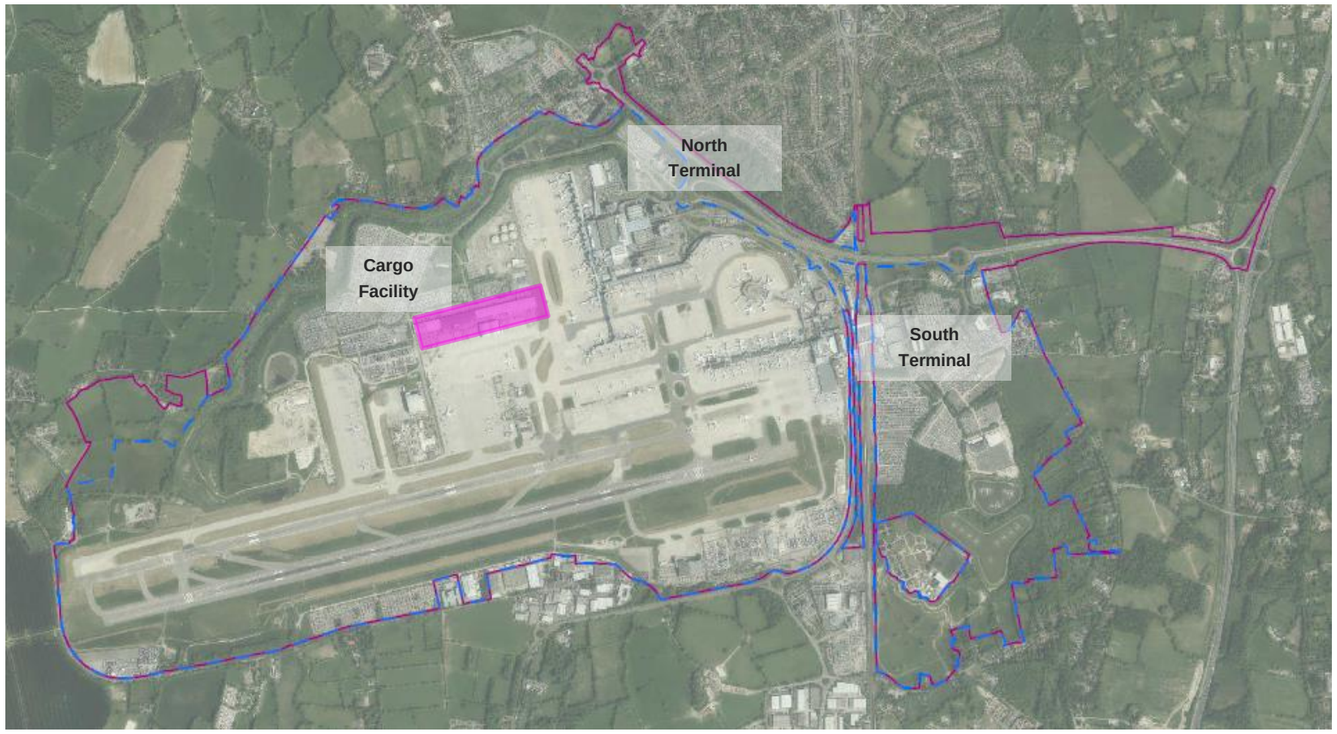


Diagram 16.3.2: Cargo Facility during Commuter Peak Period – Low Activity

16.4 Logistics

Gatwick Direct

16.4.1 Gatwick Direct is a consolidation centre, which opened in November 2013, for the handling of consumer goods that are sold by retail concessionaires in the terminal buildings. This is a fully secure operation, controlled by GAL security and with CCTV throughout, but operated by DHL.

16.4.2 The Gatwick Direct facility is located at the eastern end of the cargo facility. There is an airside/landside boundary that runs through the Gatwick Direct warehouse, with screening being conducted through a security fence from one side of the building to the other.

16.4.3 All vehicles arriving at Gatwick Direct must have an online, system-generated valid booking reference with a specific timed delivery. This allows DHL to manage incoming flows to suit operations and/or peak traffic hours on road networks. Vehicles are directed to specific loading bays by the booking reference.

16.4.4 When goods arrive, they are unloaded against the booking-in information and marshalled prior to being screened through the control point (CP) fence. GAL has introduced paying for screening, the cost of which is invoiced to Gatwick Direct users.

16.4.5 The major benefits to concessionaires are in time-saving and potentially stockroom savings, therefore cost reduction. Moreover, there is no need to have airside passes/training for staff. The benefit to GAL is that fewer vehicles are allowed, or need to pass, airside.

16.4.6 The service has reduced airside vehicle traffic, and through managed deliveries and increased volumes should help to reduce landside vehicles and spread the deliveries over non-peak hours. Both will be of benefit for the access strategy for Gatwick.

16.4.7 Gatwick Direct therefore brings advantages in terms of efficiency and security, but importantly for the road network, also in terms of potential consolidation and a reduction in vehicle movements.

16.4.8 Data from August 2019 shows an average four vehicles per hour (84 across the day) from 350 different suppliers into the Gatwick Direct area managed by DHL. 50% of vehicles entered between 05:00-12:00, peaking at 05:00-06:00 and 10:00-11:00, with peak hour arrivals up to seven vehicles. 46% of all vehicles booked in by DHL were LGVs, with most arrivals through the morning and middle of the day. On average, two HGVs arrived per hour across the day. Again, these numbers are not significant compared to flows on the wider network.

Waste

16.4.9 There are three groups of waste movements: Gatwick airside, Gatwick landside and third party. Data from October 2019 shows an average one vehicle per hour (16 across the day) into the waste centre.

16.5 Airline servicing

16.5.1 Airline servicing includes provision of fuel, catering, and other services.

16.5.2 Data on tanker trips to/from the fuel farm from outside the Airport and supplier trips to/from the catering consolidation centre from outside the Airport have been analysed and included in the modelling.

16.6 Airport servicing

16.6.1 Airport servicing includes movements by construction, facilities maintenance, air traffic control and other services.

16.6.2 Data exists for business-as-usual construction traffic and this data is used to inform baseline construction and maintenance and activity in terms of number of vehicles as compared to capital expenditure of works.

16.7 Logistics and servicing vehicle movements

16.7.1 For goods vehicle trips using the Gatwick zones not related to the cargo terminal, these have been increased in line with the increase in passengers per annum for each of the scenarios. The growth factors used for these vehicles are shown in Table 16.7.1.

Table 16.7.1: Growth in Gatwick goods vehicles servicing the airport (from 2016 base year)

Year	Baseline	With Project
2029	1.4	1.5
2032	1.46	1.77
2047	1.65	1.97

16.8 Summary and conclusions

16.8.1 There is currently a range of vehicle movements at Gatwick Airport for cargo, logistics and servicing. Data for these movements have been collected and included in the current and future baseline scenarios, against which the Project is assessed. The future baseline includes an allowance for these types of vehicles.

16.8.2 The number of cargo-related vehicles travelling to and from the Airport is very small in relation to total traffic volumes on the road network around the Airport, being in the order of five to ten movements an hour in 2019. Cargo tonnage is expected to grow by around 100% by 2047 in the future baseline condition. However, advances in consolidation and delivery methods may mean that vehicle numbers increase at a lower rate, leading to between ten and 20 vehicle movements an hour in the 2047 future baseline.

16.8.3 With the Project, cargo tonnage is expected to be around 20% higher in 2047 than it would be in the equivalent future baseline scenario. This suggests around 12 to 24 vehicle movements an hour, an increase of between two and four movements an hour compared to the 2047 future baseline. This is a very small number of additional vehicles resulting from the Project, both in absolute terms and in relation to the level of traffic activity on the surrounding road network. Cargo-related traffic associated with the Project will therefore have no impact on highway network operation.

17 Resilience, reliability and future trends

17.1 Resilience and reliability

GAL operational response capability

17.1.1 GAL currently has a 24/7 surface transport operational response team to enable it to react and respond to incidents or accidents at the Airport, as well as on transport networks approaching the Airport.

17.1.2 The role of the operational response team includes managing and inspecting the road network and using established safety techniques to monitor, analyse and prevent accidents. The team is also equipped to clear roads in winter conditions and to respond to extreme wet weather events.

17.1.3 The safety response to accidents and incidents on the road network is governed principally by highway regulations. GAL's approach is to have a comprehensive strategy and systems to manage these risks. In addition, protocols are in place with key stakeholders and agencies, including West Sussex Police, to deliver a rapid and coordinated response.

17.1.4 GAL has implemented joined-up rail contingency planning with Network Rail, relevant Train Operating Companies and Transport for London. This aligned thinking and coordinated response has been clearly demonstrated during planned closures, as described in paragraphs 17.1.20 to 17.1.23.

Resilience and reliability of the rail network

Configuration of the network

17.1.5 The Brighton-London main line is one of the busiest railway lines in the country and the performance and resilience of this part of the network is important to the whole of the south of England.

17.1.6 The Brighton-London main line has a number of built-in diversionary routes, which increase its resilience:

- North of Gatwick there are two independent parallel routes as far as Purley;
- Beyond East Croydon there are three independent routes to different London termini, allowing for diversions when necessary;
- From South Croydon, there are five tracks to provide additional 'tidal flow' capability;
- A completely independent route to London is also available via Horsham and Epsom;
- In times of operational disruption, all trains from Gatwick Airport can use any route to London; and
- There is scope to turn trains back at Three Bridges, where one of the Thameslink depots is located.

Infrastructure resilience

17.1.7 The Network Rail Sussex Area Route Study, published in 2015, identifies the long-term strategy for the Sussex Route, particularly in terms of enhancing capacity to meet forecast traffic growth through projects such as the Thameslink Programme, whilst also considering the need for a renewal programme to address sustainability, resilience, and asset performance along the Brighton-London main line. The Route Study recognises that there is a balance required between increasing capacity and improving reliability through planned upgrades.

17.1.8 Data collected by Network Rail prior to the Covid-19 pandemic shows that passenger numbers on the line have more than doubled since the year 2000 leading to busier services and more crowded trains in peak periods, particularly north of Croydon.

17.1.9 A major infrastructure proposal exists to eliminate bottlenecks in the Croydon and Windmill Bridge area to release more train paths to run additional train services to reduce crowding and support future growth. This is known as the Croydon Area Remodelling Scheme (CARS), although this project is not yet committed and is therefore not included in the future baseline for the assessment of this Project.

17.1.10 In addition, removing the bottlenecks on the line will provide greater resilience. At the moment, these bottlenecks mean that passengers on the Brighton-London main line are more likely to experience knock-on delays when an incident occurs.

17.1.11 In addition to major investment, Network Rail has also been carrying out a progressive series of renewals and repairs to improve reliability and performance on the Brighton-London main line, including a major nine-day closure in February 2019 and an additional series of weekend closures around it.

17.1.12 The focus of these improvements has been towards the southern end of the line between Three Bridges and Brighton/Lewes, with repairs to bridges and tunnels, drainage improvements and upgrades to power supply, points, signals, and track.

17.1.13 The main works undertaken during the 9-day closure related to renewal of the Balcombe Tunnel Junction along with upgrades to lineside signalling and power systems between Haywards Heath and Preston Park.

17.1.14 Separate weekend closures were also carried out, with works including ballast cleaning, signal upgrades, improved track formation (Preston Park Station), rerailing through Keymer level crossing and deep cleaning of track and other infrastructure (Wivelsfield Station).

17.1.15 The works described above represent £67 million in upgrades to the Brighton-London main line corridor to improve reliability along the line.

17.1.16 In addition, engineering works on the East Coast Main Line north of London, will significantly improve reliability for all operators, including Great Northern and Thameslink.

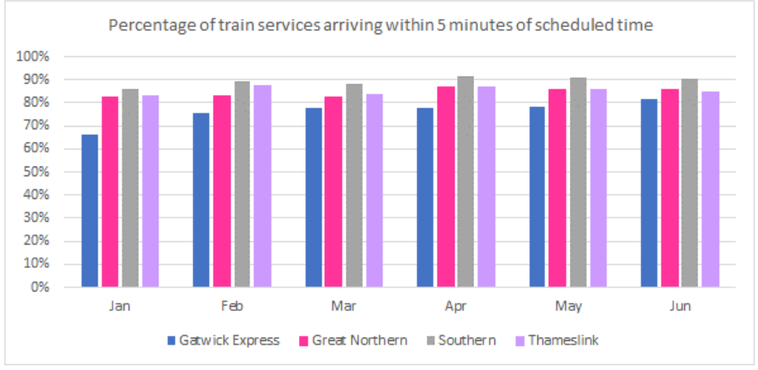
Service reliability

17.1.17 Gatwick Airport has one of the widest ranges of through train destinations of any station in the south of England, which makes it an ideal transport hub with a number of alternative routes, including to two London termini. In particular, the improvement works related to the Thameslink Programme, including redevelopment of London Bridge station, has reduced the dependency of Gatwick Airport services on the London Victoria route and provided a robust second connection to central London via Thameslink services. There are also turnback facilities at London Bridge and Blackfriars for Thameslink services.

17.1.18 As such, the busyness of the Brighton-London main line provides a high degree of service resilience for passengers wishing to travel to and from Gatwick Airport.

17.1.19 Diagram 17.1.1 shows the percentage of trains arriving within five minutes of scheduled time for the first six months of 2019 for the four train services operated by Govia Thameslink Railway. Punctuality in June 2019 was 80% or above on all services. Punctuality information from 2020/21 has not been reported here owing to the impact of Covid-19 on the rail industry.

Diagram 17.1.1: Percentage of train services arriving within 5 minutes of scheduled time (January to June 2019)



Working with the train operating companies

17.1.20 Relationships between GAL and the Train Operating Companies (TOCs) are strong, with joint ownership of issues and contingency response, such that both parties work to resolve incidents jointly using consistent passenger communications.

17.1.21 Govia Thameslink Railway (GTR) works very closely with Network Rail and operates a joint Regional Operations Centre at Three Bridges, which now controls all trains on the network, with staff working alongside each other and taking joint operational decisions.

17.1.22 The Regional Operations Centre (ROC) is located less than a mile from Gatwick Airport at Three Bridges. From this centre, Network Rail can work with operators on emergency response planning and keep the maximum capacity available for as much time as possible. The proximity to the Airport facilitates a close operational relationship between GAL, GTR and Network Rail.

17.1.23 The management approach based on the new ROC helps facilitate a more effective response to different factors affecting the railway, including:

- power supply interruptions;
- critical and seasonal weather;
- network maintenance plans; and
- renewals and replacement programmes.

Resilience and reliability of the highways network

Configuration of the network

17.1.24 Gatwick is well connected to the strategic highway network with direct access from the M23. Junction 9 of the M23 is the main access point with an onward link of dual carriageway motorway standard road to Junction 9a at the Airport's South Terminal Roundabout. The M23 provides strategic access to the M25 (Junction 7).

17.1.25 There are a number of parallel routes between Gatwick and the M25 that can provide alternatives to the M23 in the event of a major incident and absorb a large volume of traffic. The A23 provides an alternative highway access and links the airport with Crawley and other nearby towns.

17.1.26 In addition, whilst not the preferred routing, access to the Airport can also occur via Junction 10 of the M23.

Infrastructure resilience

17.1.27 The M23 is heavily used by traffic travelling to and from Gatwick and between Brighton and London. As a result, safety, congestion and journey times are all important considerations.

17.1.28 National Highways' M23 Smart Motorway Project has enabled proactive management of the M23, including the link roads from/to the M25 at Junction 8, Junction 9 and the Spur to Gatwick, as well as Junction 10. The scheme includes:

- Creating a permanent fourth lane between Junctions 8 and 10;
- redefined junction layouts to accommodate the fourth lane - in particular a dedicated northbound slip road before Junction 9 to minimise congestion as traffic leaves the motorway and heads towards Gatwick;
- new gantries with variable message signs and new electronic information signs, signals and CCTV cameras;
- installing emergency areas in place of the hard shoulder which include emergency telephones and CCTV cameras to improve emergency service response times; and
- creating a new emergency turn-around facility at Coopers Hill Road to minimise response times to incidents.

17.1.29 The project was completed in 2020, and the additional running lane in each direction adds capacity and resilience to the strategic network serving Gatwick at peak times.

17.1.30 National Highways is committed to improving conditions on the M25, through a variety of enhancements as well as the M25 South West Quadrant study, which is looking at ways to enhance capacity from Junctions 7 (for the M23) to 16 (for the M40).

17.1.31 National Highways' "M25 South West Quadrant Strategic Study, Stage 3 Report" (Highways England, 2017) recognised that this is the busiest section of road in the country.

17.1.32 The study recommends that the focus of future work should not be on widening the existing road but on reducing pressures and providing parallel capacity to relieve the motorway network. This should work first to find alternatives to travel, or to move traffic to more sustainable modes. The volume of travel would mean that road enhancements are also likely to be needed.

Service reliability

17.1.33 National Highways published the "London Orbital and M23 to Gatwick Route Strategy" in March 2017 (Highways England, 2017) which provides a high-level view of the current performance of the Strategic Road Network.

17.1.34 The report recognises that an essential facet of a resilient road network is the ability to effectively divert traffic in the event of an unplanned incident. Near Gatwick, the A23 south together with the A2011 and A265 east are identified as being part of the diversionary route network.

17.1.35 There are a number of alternative 'A' routes that run parallel to the M23 corridor including the A23, A217, A264/A22 and A24 which can act as diversionary routes.

Working with the highway authorities

17.1.36 GAL has a strong working relationship with West Sussex and Surrey County Councils, National Highways and West Sussex Police. Incidents are resolved as quickly as possible using protocols in place with key stakeholders and agencies to deliver a rapid and coordinated response.

17.2 Future transport trends

Introduction

17.2.1 This chapter highlights the key transport trends and future opportunities for GAL. These are not relied upon as part of the assessment of the impacts of the Project but represent further potential to encourage more sustainable travel patterns. GAL is already exploring aspects of these trends and will continue to do so as it evolves future ASAS initiatives.

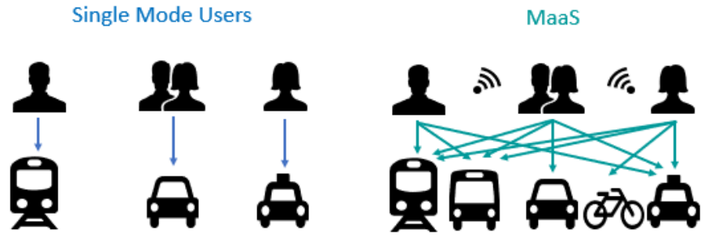
Mobility-as-a-Service

17.2.2 Mobility-as-a-Service, sometimes referenced as MaaS, reflects a move towards buying transport as a service with travellers having access to up-to-date information to enable them to choose from a range of transport options for any specific journey. It implies a change in the way people buy mobility with more shared services and a move away from car ownership.

17.2.3 To support these changes, GAL is considering ways to develop an integrated travel planning tool, either hosted on or directed via the Airport's website and accessible on a mobile device through an app.

17.2.4 Using this app, passengers, customers, and employees will be able to choose across a range of surface transport modes weighing up next available service, frequency of service and cost in one integrated platform. This is illustrated in Diagram 17.2.1.

Diagram 17.2.1: Single mode or Mobility-as-a-Service



17.2.5 Passengers benefit by being able to assess the most appropriate mode for their journey, augmented by real-time information on fares, journey time, delays, and incidents.

17.2.6 Transport operators benefit from a transparent platform enabling more sustainable mode choices driven by greater awareness and certainty of available public transport options.

17.2.7 Challenges to Mobility-as-a-Service include the need to integrate data into a single user-friendly platform. Also, as demonstrated by the success of private hire services such as Uber, MaaS may simply shift some car users into a different type of car rather than onto public transport. However, some private hire operators use hybrid or fully electric vehicles thus provide improved sustainability.

Electric vehicles (EVs) and zero emission vehicles (ZEVs)

Background

17.2.8 Alternative fuel platforms, such as electric vehicles (EVs), offer a potential pathway for reducing carbon and air pollutant emissions associated with increased airport traffic.

17.2.9 At the end of 2018, there were just over 184,000 EVs in the UK. While this represents a small fraction of the vehicle fleet in the UK (around 0.5%), market growth is strong.

17.2.10 EV batteries are charged by plugging the vehicle into a charge point. A spectrum of alternating and direct current (AC and DC) charging infrastructure exists, which may be characterised as slow to rapid charging. The total time required to charge an EV varies both by battery capacity and the on-board charging equipment. Depending on the vehicle and type of charging infrastructure used, current vehicles may take up to eight hours to reach a full state of charge from empty. However, fast and rapid charging infrastructure is increasingly available which can recharge 80% of a typical vehicle's capacity in less than one hour.

17.2.11 Forecasts of EV uptake in the UK (National Grid, 2019) anticipate that most vehicles sold in the future will be fully battery electric, with the speed of transition varying between scenarios. By 2050, it is envisaged that battery electric cars and vans will comprise 80 to 90% of all vehicles on UK roads. The car fleet is expected to transition more quickly than other vehicle types, with between 90% and 100% of cars being fully electric by 2050.

17.2.12 For users who need to charge their vehicles while at the Airport, several models of infrastructure delivery could be deployed. These include:

- Distributed slow charging – a large, distributed network of low-power charge points deployed across parking facilities, typically serving only one parking space. This method can be relatively inefficient in long-stay parking, since the vehicle may only require the use of the charger for a small portion of the overall parking duration.
- Valet model – where a parking attendant would be able to move and charge multiple vehicles each day on the same charge points. A similar model could be the use of mobile charging units, perhaps with automation using robot technology.
- Rapid charging hub – these feature clusters of rapid and ultrarapid chargers. These locations would be comparable to a conventional petrol station and provide confidence among EV owners that vehicles could be charged as needed.

17.2.13 GAL will have different levels of influence on different airport users, as follows:

- Airport passengers – GAL has least direct influence on the take-up of EVs by air passengers. Nonetheless, GAL can support those passengers that do own EVs by providing sufficient, flexible charging options;
- Airport staff – GAL has more influence over airport staff choices. A variety of incentive programs could be developed for those choosing to drive electric cars, balanced against the aim of increasing the use of other sustainable modes.
- Taxis and private hire vehicles – GAL's official taxi operator already uses an electric fleet but GAL does not have direct influence over other taxi operators or private-hire vehicle companies;
- Buses and coaches – GAL can influence certain bus operations directly, such as long-stay car park buses, and has some influence over third party providers; and
- Freight – GAL has a high level of influence on its own supply chains, but less on other Airport businesses. Businesses operating on-airport can be incentivised to choose sustainable suppliers and GAL itself could facilitate identification of suppliers for airport businesses.

Current ASAS

17.2.14 GAL is already considering electric vehicles in the current ASAS. In relation to forecourt use, the current ASAS initiatives include the following:

- Gatwick is working with Gridserve to provide an electric charging forecourt close to the South Terminal Long Stay car parks, which is expected to be completed in Summer 2023;
- Under a new contract with Gatwick Airport Cars GAL is seeking to agree a timeframe by which all of their taxi fleet will be electric and hybrid;

- GAL is developing a programme for introducing more electric charging points in short-stay passenger car parks and staff car parks, including trials of rapid charging points for airport staff;
- GAL continues to work with Metrobus regarding zero emission vehicles operating on Gatwick routes using hydrogen fuel cell technology;
- GAL is also engaging with off-airport providers that operate approved shuttle bus services to Gatwick to agree a trajectory for these to move to ultra-low or zero emission vehicles; and
- All of GAL's operational vehicles will transition to zero emission vehicles by 2030.

17.2.15 GAL is also considering options for electric vehicle charging as part of an airport-wide strategy that includes airside operational vehicles, staff, and passengers, either within existing car parks or through new, dedicated facilities and travel options. The strategy acknowledges the importance of providing charging equipment flexibly, responding to identified needs or benefits while also taking opportunities to innovate. These measures will help to reduce emissions from road traffic and contribute to carbon and air quality emission reduction targets.

17.2.16 In relation to surface access, GAL remains committed to a reduction in car travel, including zero emission vehicles, as they will still contribute to congestion and may increase levels of delay that may itself increase emissions. Using public transport, active travel and shared travel remains the priority for the current ASAS but GAL will work with service providers to speed the transition of the GAL vehicle fleet, taxis and car rental vehicles to electric vehicles and ensure available charging for staff and passengers where and when they need it.

Autonomous vehicles (AVs)

Background

17.2.17 The advent of Autonomous Vehicles (AVs) promises an array of benefits to transport users and systems, making driving more efficient, productive, safer, and more sustainable. However, the timescales for the take-up of AVs depends on several factors including the ability to introduce high levels of automation at scale, government and public acceptance and consumers' preferred models for meeting their mobility needs.

17.2.18 Although vehicles with autonomous capability, which still require human intervention in certain circumstances, are being tested internationally in some transport markets such vehicles are not yet in widespread production or operation. Radical changes to the mobility landscape will be required with introduction of higher levels of autonomy.

17.2.19 Timescales for deployment of advanced AV technologies remain uncertain but it appears likely that significant growth in self-driving vehicles in the UK is likely to begin toward the end the of the next decade and continue into the 2040s. Markets such as taxis/private hire vehicles, buses, and freight may begin transitioning to automated technologies more quickly.

17.2.20 In long term, the primary impacts of AVs at airports could be a reduction in overall parking requirements; more intensive pick-up and drop-off activity near terminals; and/or a potential locate parking in more remote locations to provide additional forecourt space. GAL is already exploring optimising long-term parking through its robotic valet pilot, which uses small tows capable of lifting a vehicle by the wheels and moving it to secure storage area. This system has the potential to store 50% more vehicles within a given area than traditional, self-parking arrangements (Airport Technology, 2019).

17.2.21 AV buses could serve a wide variety of landside transportation functions. Driverless shuttles could be operated higher on frequencies, providing convenient circulators to move staff and passengers between terminals, remote parking facilities, rental car centres, and worksites across the Airport. This type of operation is likely to be easier to introduce on the airside where vehicle types are more controlled.

17.2.22 Given that this technology is in its infancy, the current ASAS does not contain specific measures to address AVs. The uncertainty about the speed of technological development and take-up and the fact that this is beyond Gatwick's control means that the assessment for the Project does not assume any use of AV, nor makes any commitments to it and therefore the use of AVs is not considered in this assessment. GAL will respond to AVs and their introduction as the technology begins to emerge and be relevant to airports of comparable size and scale. GAL will therefore evolve and adapt its AV strategy over time.

18 Conclusions

18.1 Introduction

18.1.1 The Project proposes alterations to the existing northern runway at London Gatwick Airport which would enable dual runway operations. The impacts on the transport networks serving and surrounding the Airport as a result of the increase in passenger numbers and employees from the Project have been assessed in this Transport Assessment.

18.1.2 GAL has developed a robust strategy for surface access matters associated with the Project. It has developed the Surface Access Commitments (SACs), which are set out in a separate document submitted with the DCO application. These will deliver improvements to public transport and active travel, alongside measures to reduce the level of single-occupancy car use, with a commitment to achieving specific sustainable transport mode shares as the Project progresses.

18.1.3 The Project also proposes physical surface access improvement works, which improve highway capacity between the M23 Spur and Longbridge Roundabout and provide for improved connectivity for pedestrians and cyclists. These works will be in place by the summer period after the third anniversary of commencing dual runway operations.

18.1.4 The Project will lead to growth in the number of air passengers using the Airport, and in the number of staff working there. The assessment has used extensive transport modelling work to consider impacts on the highway and public transport networks. The modelling has been undertaken in accordance with prevailing industry guidance and requirements, including that set out in the DfT's Transport Appraisal Guidance. GAL has also undertaken significant engagement with keys stakeholders, including the highway authorities, local planning authorities, Network Rail and Transport for London.

18.1.5 The assessment considers three assessment years: 2029, assumed to be the year of opening of the new runway; 2032, representing a point three years thereafter and the year in which the highway works would be completed; and 2047, representing a year 15 years after opening of the highway works, in line with requirements in the DMRB to test the operation of new highway schemes at this time horizon. It compares conditions in the relevant future baseline with those with the Project in the same year.

18.1.6 A summary of the main conclusions of the assessment is provided below.

18.2 Rail

18.2.1 Gatwick Airport has a fully integrated railway station adjacent to the South Terminal located on the Brighton Main Line, connecting London to Brighton. The station is also served by the North Downs Line and Arun Valley Line services. This means that Gatwick Airport achieved a public transport mode share of around 47% (prior to the pandemic). In pursuing an increase in public transport mode share, Gatwick has consistently out-performed other major UK airports over the last 10-15 years, seeing considerable growth in the percentage of trips using sustainable modes.

18.2.2 The impact of the additional rail passengers arising from the Project has been assessed on the rail network by examining line loadings (the number of passengers on trains on departure of each station), Seated Load Factors (the number of seats occupied) and the percentage of standing capacity occupied. This is set out in Chapter 9.

18.2.3 The assessment includes all committed improvements proposed by the rail industry in the future baseline and the with Project scenarios. However, the last Control Period considered for improvements is CP7 (which is to 2029) so the modelling currently assumes no further improvements between 2029 and 2047, which is considered a conservative assumption. The assessments have been undertaken for both the network peak (the hour with highest aggregate line loading) and Project peak (hour with the highest increase in rail passengers as the result of the Project).

18.2.4 The assessment highlights that the train services are typically busiest northbound towards London in the morning peak, and southbound towards Gatwick in the afternoon peak. In general, the greatest increases in patronage related to the Project will be in the counter-peak direction.

18.2.5 Compared against the future baseline, the additional passengers from the Project represent a small percentage increase in the occupancy of train services and no significant additional crowding on rail services is expected as a result. There are expected to be standing passengers on services in both directions between East Croydon and London Bridge and London Victoria in 2029 and 2032, in both the future baseline and with Project scenarios, although spare standing capacity would remain available. The travel time for this section of the route is within the 20-minute threshold that DfT uses as guidance for acceptable standing, as long as the standing capacity is not exceeded.

18.2.6 In 2047, standing is anticipated to take place along more of the route in the future baseline and with Project scenarios, but again spare standing capacity would be available. Although standing for more than 20 minutes is undesirable, the assessment has made no demand adjustments to reflect post-Covid travel behaviours. Pre-Covid behaviour is therefore assumed in the assessment, meaning that the peak crowding levels may be overstated.

18.2.7 The rail crowding assessment indicates that no mitigation is required on rail services for the Project.

18.3 Gatwick Airport Station and inter-terminal shuttle

18.3.1 The Gatwick Station Project is being delivered by Network Rail and is due for completion in 2023. It will double the size of the station overbridge, add five new lifts and eight escalators to improve passenger flow, and widen two platforms to reduce crowding.

18.3.2 Crowding at the station has been assessed in Chapter 10 using a Legion simulation model. Both concourse and platform levels have been assessed. The modelling shows that some congestion could be expected in terms of queuing at concourse level by 2047 in both future baseline and with Project scenarios, with small increases as a result of the Project. This is considered acceptable as it is limited to peak times when busier conditions would be expected in any event as a result of background rail passenger use (for example, commuters not related to the Airport). The degree of congestion indicated is not unexpected or untypical of busier stations across the rail network.

18.3.3 The assessment shows that the Gatwick Station Project provides sufficient capacity to accommodate growth from the Project. No further improvements will be required to the railway station platforms or concourse beyond completion of the Gatwick Station Project. The modelling work and outcomes have been discussed with Network Rail and it is agreed that the approach is logical and that the results are as would be expected and are proportionate.

18.3.4 The Legion model has been extended to include the inter-terminal shuttle which operates between the North and South terminals. Modelling to 2047 with the Project shows that the boarding platform of the shuttle stations, particularly at the South Terminal, can become congested at peak times but no mitigation is required.

18.4 Bus and coach

18.4.1 Gatwick is served by a range of coach and bus services, and a review of the existing frequencies show that services have yet to fully return to pre-pandemic levels. New regional coach and local bus routes are expected in the future baseline and further enhancements are provided in the SACs, in order to further increase public transport mode share amongst passengers and staff, in parallel with measures to reduce car use. It is also expected that the bus and coach market will respond to increased demand at the Airport and elsewhere over time, leading to a wider underlying increase in route frequencies.

18.4.2 Bus and coach improvements have been identified and included as part of the strategic modelling work to reflect the SACs which form part of the Project. Overall, the modelling work shows that the enhancements as part of the SACs would lead to an improvement in bus and coach mode shares for air passengers from around 7.5% in the 2029 future baseline to 9% in the 2047 with Project scenario, and for employees from around 18% in the 2029 future baseline to around 21% for employees by 2047 with the Project.

18.4.3 Bus and coach operators are able to adjust capacity to manage loadings more readily than rail services by adjusting frequencies as Gatwick demand grows. Additionally, GAL holds regular discussions with operators which will help to anticipate potential changes in demand and secure and support improvements to bus services where possible. Coach and bus loadings are therefore not assessed against a fixed capacity plan. With the proposed enhancements, no specific mitigation is considered to be required to address capacity on bus and coach services.

18.5 Highway network

18.5.1 Gatwick Airport is well located on the strategic road network, with direct access via the M23 motorway. The Gatwick strategic highway model uses SATURN software and has been developed using National Highway's South East Regional Transport Model (SERTM). The strategic model has informed a VISSIM microsimulation model for the local highway network within the vicinity of the Airport. Technical detail on the strategic modelling work is provided in Annex B, and on the VISSIM modelling work in Annex C.

18.5.2 Details of the proposed highway improvement works as part of the Project at South Terminal roundabout, North Terminal roundabout and Longbridge roundabout are provided in Chapter 2.

18.5.3 The impact of the Project has been assessed at a strategic highway network level in terms of journey times on key routes taken from the strategic model, and a review of junction performance using a magnitude of impact approach (see Annex E for a review of individual modelling nodes and junctions). These assessments compare the future baseline and with Project scenarios for the assessment years of 2029, 2032 and 2047.

18.5.4 The assessment takes account of committed developments and transport infrastructure schemes which are sufficiently advanced to be 'near certain' or 'more than likely', as described in the modelling guidance in TAG. It does not include future improvements that might need to come forward as a result of other development proposals across the modelled area, unless these are already known and sufficiently certain. The analysis shows that between 2029 and 2047 in the future baseline, journey times are expected to increase on a range of representative routes across the highway network. The Project is not expected to add significantly to road journey times, with the greatest increase being around two minutes in any of the modelled years. There are also some routes on which journey times are expected to decrease as a result of the Project.

18.5.5 On nodes and junctions, it should be noted that a number of locations were identified where changes in traffic flows and junction performance were considered to be the result of 'model noise'. This is typically identified as traffic switching between parallel routes with similar journey times, particularly where this occurs in one time period but not in another, or does not occur consistently across scenarios, and is a function of the processes within the model which are often unlikely to be replicated in practice. These changes are not related to the Project or the airport.

18.5.6 The VISSIM modelling work shows that the local highway network around the airport is expected to experience increasing congestion in the future baseline. This is indicated by slow moving traffic on the M23 Spur approaching South Terminal Roundabout in both the morning and evening peak periods and queues on the exit from the South Terminal complex onto South Terminal Roundabout. By 2047 in the future baseline, congestion in these and other locations will have increased further, with congestion also becoming evident on the entry to North Terminal and at Longbridge Roundabout.

18.5.7 The model outputs for the future baseline in 2032 show that some congestion is expected on the network, with slow moving traffic on the M23 Spur approaching South Terminal Roundabout in both the morning and evening peak periods and queues on the exit from the South Terminal complex onto South Terminal Roundabout. By 2047 in the future baseline, congestion in these locations will have increased further, with congestion becoming more widespread, including on the entry to North Terminal and at Longbridge Roundabout.

18.5.8 The future baseline scenarios indicate that without the Project, the network would operate close to capacity in several locations. The inclusion of the highway works as part of the Project prevents unacceptable highway conditions arising.

18.5.9 The highway works forming part of the Project will be complete and operational three years after dual runway operation commences in line with this assessment.

18.5.10 The VISSIM model outputs for the with Project scenarios (which include the Project demand and highway improvement works) show improved performance on the local network compared to the equivalent future baseline scenario. This includes locations such as the M23 Spur, where congestion would largely be removed, South and North Terminals where queues would be substantially reduced, and Longbridge Roundabout where conditions would be improved slightly compared to those expected in the future baseline. The highway performance at Longbridge Roundabout would be achieved in addition to the extra capacity provided for active modes within the highway works. Although some parts of the network would remain busy, the overall operation of the highway network with the Project and the associated highway works would be no worse than in the future baseline despite the additional demand arising from the Project.

18.6 Active travel

18.6.1 GAL aims to make active travel an attractive and realistic choice for short journeys to and from the airport by developing and promoting accessible, safe, and well-planned active travel opportunities. As part of the SACs for the Project, GAL is committed to increasing the active travel mode share for staff who live within walking and cycling distance.

18.6.2 Gatwick Airport benefits from access to the National Cycle Network Route 21 (NCN21) which runs north-south and provides

access to Crawley, Horley and beyond. There are also other traffic-free public rights of way routes.

18.6.3 The surface access improvements as part of the Project will deliver a number of new or improved connections and improvements to walking and cycling infrastructure.

18.6.4 The improvements will include enhancements to NCN21, an additional pedestrian route connecting to Balcombe Road, provision of signalised crossings and shared use walking/cycling paths, and upgrading of the proposed ramp to the south east of A23 London Road River Mole bridge to enable shared pedestrian and cyclist use. Further details are provided in Chapter 2 and Chapter 14.

18.7 Construction

18.7.1 An assessment of the impacts of construction activities related to the Project on the transport network has been undertaken and this is set out in Chapter 15. The assessment takes into consideration vehicle movements for materials, workforce movements, and the management of access routes and management plan, for both airfield and highway construction works.

18.7.2 In terms of airfield construction, the proposal is to have all material-carrying construction traffic (HGVs and LGVs) use Junction 9 and the M23 Spur which form part of the SRN. The SRN is designed to handle higher volumes of traffic. Construction workforce traffic has been modelled as coming via the shortest route.

18.7.3 Based on the levels of construction traffic estimated for the Project, it is not considered that peak airfield construction will have a significant effect on the performance of the highway network around the Airport.

18.7.4 Modelling of highway construction shows reassignment of traffic owing to the temporary highway works on the M23 Spur, with traffic volumes reducing on the M23 Spur as background traffic not needing to access the Airport seeks alternative routes. The works also impact on traffic levels on the M23 itself with reductions also shown by the model on the motorway. M23 Junction 9 shows an increase in traffic flows related to right-turning into the Airport being forbidden during this construction phase and therefore traffic from the west heading to South Terminal having to U-turn at Junction 9.

18.7.5 The modelling shows increases in north-south traffic between Horley and Crawley rerouting via Balcombe Road as well as some traffic taking a route on the west side of the Airport from Ifield Avenue in Crawley via Bonnets Lane, Lowfield Heath Road, Horley Road and Charlwood Road and into Horley via Povey Cross.

18.7.6 These temporary changes are relatively small in traffic terms, less than one vehicle per minute. As such, capacity issues at junctions are only observed on the SRN where works are taking place or at junctions on-airport.

18.7.7 The exact details of the construction methodology and programme are expected to evolve over time. The approach to construction works includes minimising the impact on road users, pedestrians, cyclists, and local communities. An Outline Construction Traffic Management Plan (OCTMP) and Outline Construction Workforce Travel Plan (OCWTP) have been prepared to accompany the DCO application.

18.8 Summary

18.8.1 This report provides a detailed assessment of the impact of the Project on the transport networks, supported by technical reports contained in the annexes.

18.8.2 Gatwick Airport is well connected by sustainable travel modes and already achieve high public transport mode shares. The Project commits to delivering further enhancements to bus and coach services, and improvements to active travel connections to and from the local area are incorporated into the surface access improvements works.

18.8.3 The range of assessments has shown that the growth in passenger and employee numbers as the result of the Project can be accommodated on the transport networks, with limited changes to crowding on rail services when compared to the future baseline, the Gatwick Station Project providing sufficient capacity to accommodate growth from the Project, and the proposed highway improvement works providing adequate capacity and presenting an overall improvement to local network performance when compared to future baseline.

18.8.4 GAL is committed to promoting sustainable travel and the surface access improvements will also deliver key pedestrian and cyclist connections and infrastructure. The SACs which form part of the Project set out GAL's commitments to surface access interventions in order to achieve specific mode shares within a specific timescale.

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20 Glossary

Term	Description
AADT	Annual Average Daily Traffic
ANPR	Automatic Number Plate Recognition
AQMA	Air Quality Management Area
ASAS	Airport Surface Access Strategy
AV	Autonomous Vehicle
CAA	Civil Aviation Authority
CARS	Croydon Area Remodelling Scheme
CIF	Common interface file
CP5	Control Period 5
CP6	Control Period 6 (2019-2024)
CP7	Control Period 7 (2024-2029)
DCO	Development Consent Order
DfT	Department for Transport
DLR	Docklands Light Railway
DMRB	Design Manual for Roads and Bridges
EIA	Environmental Impact Assessment
ES	Environmental Statement
EV	Electric Vehicle
GAL	Gatwick Airport Limited
HGV	Heavy Goods Vehicle
LGV	Light Goods Vehicle
LoS	Level of Service
LTP	Local Transport Plan
MCC	Manual Classified Counts
mppa	Millions of passengers per annum
NCN	National Cycling Network
NCR	National Cycle Route
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
NPS	National Policy Statement
CoCP	Code of Construction Practice
OCTMP	Outline Construction Traffic Management Plan
OCWTP	Outline Construction Workforce Travel Plan
ORR	Office of Rail and Road
PEIR	Preliminary Environmental Information Report
PGC	Passenger Guidance Capacity

Term	Description
PHEV	Plug-in Hybrid Electric Vehicle
PHV	Private Hire Vehicle
PINS	Planning Inspectorate
PR	Periodic Review
PTAR	Preliminary Transport Assessment Report
RIS	Road Investment Strategy
SACs	Surface Access Commitments
SERTM	South East Regional Transport Model
SRN	Strategic Road Network
TA	Transport Assessment
TEMPRO	Trip End Model Presentation Program
TfL	Transport for London
tph	Trains per hour
vehs	Vehicles
ZEV	Zero Emissions Vehicle