6. Air Quality

Development of Bristol Airport to Accommodate 12 Million Passengers Per Annum: Response to Comments on Air Quality

1. Introduction

This technical note has been prepared in response to comments received from North Somerset Council (NSC) and third parties on the air quality chapter (Chapter 8) of the Environmental Statement (ES) submitted as part of Bristol Airport Limited's (BAL) planning application for the development of Bristol Airport to accommodate 12 million passengers per annum (mppa) (Application No. 18/P/5118/OUT). **Section 2** of the note provides a response to the comments of NSC whilst **Section 3** considers the key air quality issues identified following review of third-party comments on the planning application.

2. North Somerset Council Comments

NSC officers' comments[1] on the air quality assessment contained in the ES considers the approach to, and key findings of, the assessment. The response states "*Overall, the air quality chapter is well written and comprehensive. I am satisfied with the assessment methodology and criteria used to make the assessment*". BAL welcomes this response.

A number of points (including requests for further information and clarifications) are raised in NSC's comments under the following headings:

- monitoring data;
- study area;
- receptor locations;
- traffic and transport data;
- particulate matter ($PM_{2.5}$);
- aircraft movements;
- source apportionment; and
- receptors close to legal limits.

A summary of NSC's comments under each of the headings above, and BAL's response, is provided below.

[1] Dated 28.01.19.

2.1 Monitoring Data

Summary of NSC comment

Officers note that the ES provides the measured data as annual means from the continuous monitoring station located at Bristol Airport and from diffusion tubes administered by BAL and NSC, which are presented as annual means. Hourly data is requested alongside monthly diffusion tube data for Bristol Airport and the bias adjustment factors used to calculate the annual mean.

BAL response

Figure 2.1 and **Figure 2.2** show scatter plots of the monitored hourly mean NO_2 and PM_{10} concentrations at the continuous monitor for 2017. For most hours of the year, concentrations of both pollutants are below 20 micrograms per cubic metre (μg m^{-3}). For comparison, the legal limit for both pollutants is 40 μg m^{-3} as an annual mean.

Figure 2.1 Monitored hourly mean NO_2 concentrations, 2017

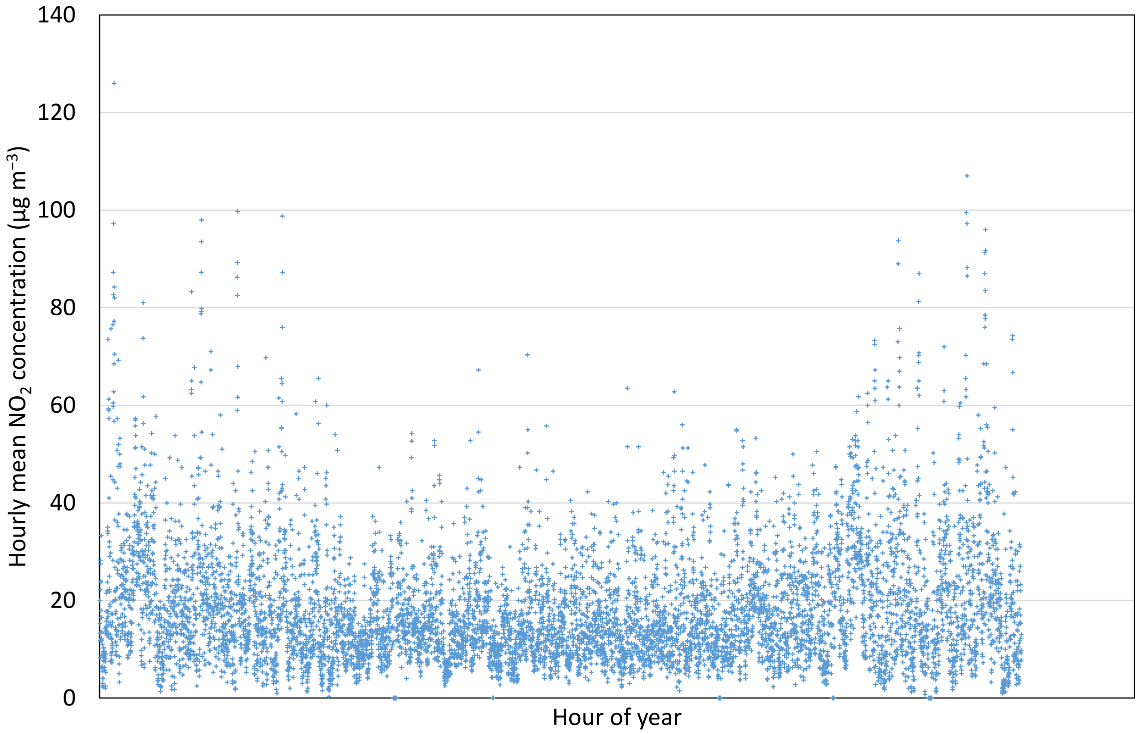
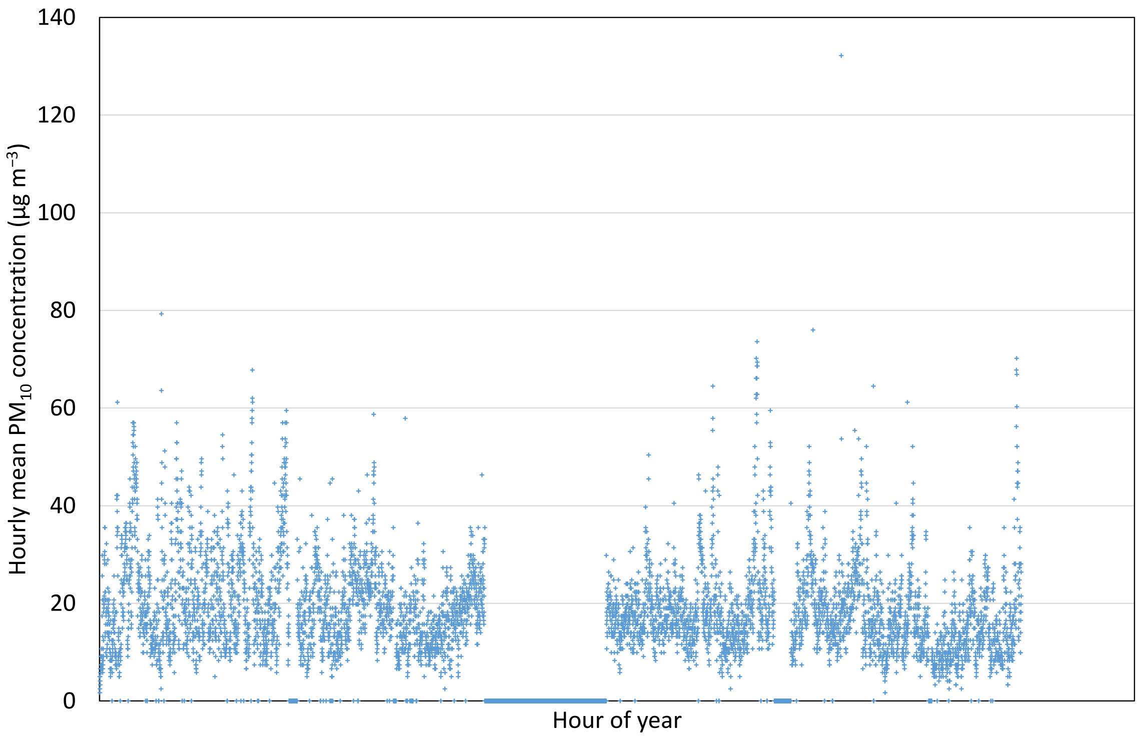


Figure 2.2 Monitored hourly mean PM_{10} concentrations, 2017



Monthly bias-adjusted measurements from NO_2 diffusion tubes for 2017 are given in **Table 2.1**. Bias adjustment factors for 2017 were not provided by the laboratory.

Table 2.1 Monthly NO_2 from diffusion tubes, 2017, µg m^{-3}

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
1 Airside OTB	46.1	33.7	39.3	34.1	27.8	34	33.9	35.4	40.5	33.5	41.3	42.5	36.8
2 Fuel Farm Fence	49.3	37.7	39.7	28.1	35.2	33.6	34	28.3	32.3	35.5	33.9	29.1	34.7
3 09 Approach Lights	18.1	16.1	12.3	7.7	8.5	7.2	8	8	8.7	8.8	10.8	9.2	10.3
4 Stone Farm entrance	25.3	16.5	14.5	12.6	12.8	9.7	9.2	9.4	12.8	12	14.8	12.5	13.5
5 Terminal Forecourt	49.7	35.9	40.8	33.4	35	30.1	28.8	27.1	31	39.1	38	20.3	34.1
6 Long Stay CP 112	36.7	26.2	22.7	21.9	18.2	16	16.3	14.3	17.1	20.2	27.8	12.8	20.9
7 AQ station	35.4	32.6	29.3	21.6	20.6	22.5	19.7	22.2	22.7	26.3	24.6	29.1	25.6
8 AQ station	5.3	30.8	27.4	21.8	20.3	21.6	20.1	22	17.7	24	26.8	22.4	21.7
9 AQ station	38.6	24.3	29.5	21.7	21.2	23	19.7	20.2	23	27	28.9	27.8	25.4
10 Main Access Road	43.4	42.4	36.8	40.6	36.7	37.1	34.1	32.2	39.1	32.8	40.1	41	38
11 A38 field	34.7	27.4	30.3	21.6	16.3	18.9	17.7	19.2	11.4	23.9	32.2	29.8	23.6

2.2 Study Area

Summary of NSC comment

NSC states in its comments that consideration should be given in the air quality assessment to junctions included in the Transport Assessment (TA) beyond the adopted study area where traffic numbers are predicted to increase.

BAL response

As noted in the EIA Scoping Report, airport-related traffic potentially extends hundreds of kilometres from the airport, but as traffic disperses with distance the risk of significant air quality impacts declines. The greatest amount of traffic will be on roads directly linked to the airport, and the Scoping Report suggested that only selected roads within a few kilometres of Bristol Airport would be assessed; this was agreed by NSC in its Scoping Opinion. Notwithstanding this, the information requested is currently being prepared and will be submitted to NSC in due course.

2.3 Receptor Locations

Summary of NSC comment

Officers note that there is not a plan in the ES showing where each individual receptor is located, with the exception of those receptors in close proximity to Bristol Airport.

BAL response

Figure 8.14 in Chapter 8 of the ES shows a plan of all the human receptors included in the assessment, and Appendix 8C of the ES includes tables of the receptors' coordinates. Owing to the density of receptors in some locations, with a receptor being assigned to each property in some areas, Figure 8.14 did not label the receptors with the IDs used in the tables of results.

An amended version of Figure 8.14, in eight parts, is attached at **Appendix A**, providing labels for each of the human receptors.

2.4 Traffic and Transport

Summary of NSC comment

Officers note that the air quality assessment refers to data obtained as part of the TA in Chapter 6: Traffic and Transport of the ES but that the actual traffic data used in the air quality assessment is not replicated in the Chapter 8. A summary of the traffic data is therefore requested.

BAL response

The data used for the air quality assessment is based on that provided in Chapter 6: Traffic and Transport of the ES and was not repeated in Chapter 8 to avoid duplication. However, in response to this comment, summaries of the data used as input to the air quality model, after initial processing, are presented in **Appendix B**.

2.5 $PM_{2.5}$

Summary of NSC comment

Officers note that the ES has assessed the annual mean $PM_{2.5}$ and compared this with the air quality objective specified in legislation and guidance. However, they highlight that one of the aims of the Clean Air Strategy is to reduce the public's exposure to particulate matter less than 2.5 microns ($PM_{2.5}$) so that the World Health Organisation's (WHO) guideline level[2] of 10 μg m^{-3} by 2025 is met. Officers request that the air quality assessment is updated to assess predicted concentrations against the WHO guideline levels. In addition, officers highlight that the air quality action level for $PM_{2.5}$ as an annual mean is 25 μg/m^{-3} but that Table 8E.3 of the ES states that the air quality assessment level (AQAL) is 40 μg/m^{-3}.

BAL response

The Clean Air Strategy[3], published in January 2019, sets a new target for concentrations of particulate matter smaller than 2.5 μm diameter ($PM_{2.5}$). It states:

- *"We will progressively cut public exposure to particulate matter pollution as suggested by the World Health Organization. We will set a new, ambitious, long-term target to reduce people's exposure to $PM_{2.5}$ and will publish evidence early in 2019 to examine what action would be needed to meet the WHO annual mean guideline limit of 10 μg/m^3...*
- *"By implementing the policies in this Strategy, we will reduce $PM_{2.5}$ concentrations everywhere, so that the number of people living in locations above the WHO guideline level of 10 μg/m^3 is reduced by 50% by 2025, compared to our 2016 baseline. Areas above the 10 μg/m [sic] guideline limit in 2025 will have lower concentrations than today, and we will set out our plans to reduce $PM_{2.5}$ concentrations even further in due course."*

The ES was completed in accordance with the methodology set out in the EIA Scoping Report, as agreed in NSC's Scoping Opinion. It was submitted before the Clean Air Strategy was finalised and therefore did not adopt the target outlined above. Nonetheless, an assessment against the target is provided below, as requested by NSC.

Assessment

The contribution of Bristol Airport to concentrations of $PM_{2.5}$ in the surroundings of the airport is small, with the principal impacts deriving from road traffic rather than aircraft or on-airport activity. The background concentration in the surroundings of Bristol Airport is also low.

There is no monitoring for $PM_{2.5}$ near Bristol Airport; the closest monitoring station is at Bristol St Pauls, which as an urban location, is not representative of locations where Bristol Airport may have an impact. Background concentrations have therefore been taken from the Defra maps[4].

In 2017, annual mean background $PM_{2.5}$ concentrations, averaged over the specifically-modelled human receptors, were 7.9 μg m^{-3}, falling to 7.4 μg m^{-3} in 2026. These figures include a modelled airport contribution; Defra does not provide a breakdown of this contribution so a small amount of double-counting, estimated to be about 0.5 μg m^{-3}, is included in this assessment.

[2] WHO Regional Office for Europe (2005) Air quality guidelines: Global update

[3] Defra (2019) Clean Air Strategy 2019. https://www.gov.uk/government/publications/clean-air-strategy-2019

[4] Defra. Background mapping data for local authorities. Available online at: https://uk-air.defra.gov.uk/data/laqm-background-home.

Including the contribution from road traffic (including non-airport traffic) and Bristol Airport sources, there is a small number of human receptors where concentrations are over 10 µg m^{-3} in at least one of the modelled scenarios. These receptors are identified in **Table 2.2**, which shows the modelled annual mean $PM_{2.5}$ concentrations in 2017 and in the 10 mppa and 12 mppa 2026 scenarios. These are extracted from the full ES results.

Table 2.2 Receptors with annual mean $PM_{2.5}$ concentrations over 10 µg m^{-3}

Receptor ID	Description	2017	10 mppa	12 mppa	PC
H080	A38 2	10.19	9.85	10.17	0.32
H081	A38 3	10.21	9.93	10.22	0.29
H092	A38 14	10.43	10.02	9.95	-0.07
H093	A38 15	10.01	9.59	9.58	-0.01
H096	A38 18	10.74	10.34	10.06	-0.28
H097	A38 19	10.78	10.42	10.09	-0.33
H099	A38 21	10.24	9.94	9.91	-0.03
H100	A38 22	10.19	9.90	9.92	0.02
H101	A38 23	10.23	9.94	9.98	0.04

PC = 12 mppa concentration less 10 mppa concentration

It can be seen that the receptors are all close to the A38 and so the main contributor to $PM_{2.5}$ concentrations, other than the background, is road traffic rather than aircraft. With the exception of Receptor H081, concentrations at receptors are lower in the 12 mppa scenario than in 2017. The number of receptors over 10 µg m^{-3} decreases from nine in 2017 to four in 12 mppa, due to the declining background and improving emission factors. This trajectory is consistent with the target in the Clean Air Strategy (noting that the evaluation years in the Strategy are 2016–2025 rather than 2017–2026).

In Table 8E.3 of the ES, Appendix E, the AQAL column is incorrect and should read 25 µg m^{-3} throughout rather than 40 µg m^{-3}. This is due to a copying error. All other figures in this table are correct.

2.6 Aircraft Movements

Summary of NSC comment

Officers note that there is a contradiction between the noise chapter and the air quality chapter of the ES with regard to the total number of annual aircraft movements and clarification on this matter is sought. Additionally, officers note that the number of aircraft movements for 10 mmpa (2026) are higher than for the 12 mppa scenario.

Clarification is also sought as to why not all aircraft types have been included in the air quality assessment.

BAL response

In Table 8D.1 of the ES, the headings of the 10 mppa and 12 mppa columns are transposed in error. The correct version of the table is given in **Table 2.3**.

Table 2.3 Number of movements per year of each aircraft type

Aircraft description	2017	10 mppa	12 mppa
A319Ceo	15863	0	0
A320Ceo	14965	11917	6931
A321Ceo	1946	2452	2357
A320Neo	0	27365	32909
A321Neo	0	1128	4243
ATR 72	4064	4414	4243
B737-800	11430	21431	10891
B737-800 Max	0	3678	17256
B752	2218	0	0
B787-8	148	834	801
Canadair Regional Jet 900	0	0	660
DHC-8-400 Dash 8Q	0	0	1320
Embraer 170	177	1766	4809
Embraer 190	2792	392	5846
Embraer RJ135	1569	589	566
Embraer RJ145	8277	10005	3630
General aviation	7129	7129	7129
Other	5611	981	1037
Total (inc. GA)	76189	94080	104629

Differences in the total number of aircraft modelled in the air quality and noise assessments are because:

- For 2017, the noise assessment excludes helicopters (2,593 movements) and military aircraft (36 movements); and
- For 10 mppa and 12 mppa, the air quality assessment includes the same number of general aviation movements as in 2017 (7,129 movements) for conservatism.

Remaining minor discrepancies between the numbers of movements are due to rounding during processing.

For the avoidance of doubt, the air quality and noise assessments have used the same underlying movement data and included the same aircraft types. In the air quality assessment chapter of the ES, some of these (smaller aircraft or those with a small number of movements) are grouped as "other" in the summary tables.

2.7 Source Apportionment

Summary of NSC comment

Noting that the air quality assessment has modelled the combined impact of emissions from both aircraft and road traffic, a breakdown of the percentage contribution from each source is requested.

BAL response

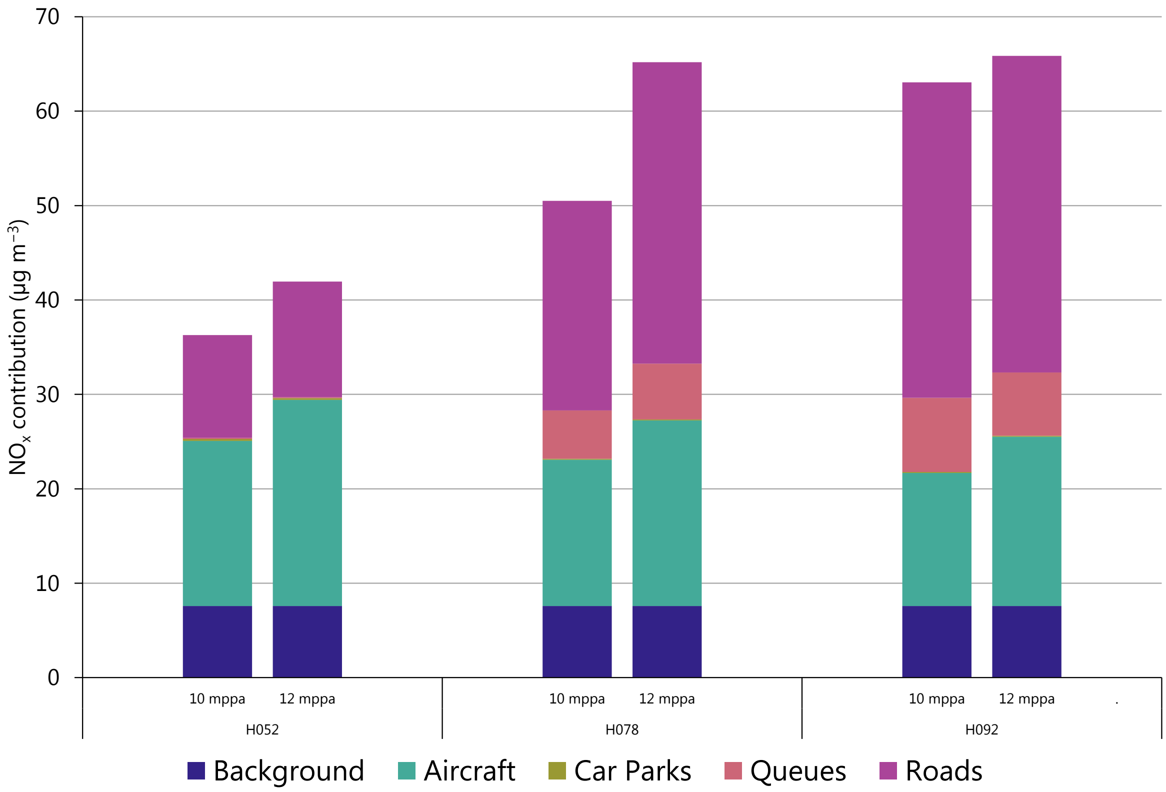
It is not possible to provide a breakdown of the contributions to nitrogen dioxide (NO_2) due to the non-linear relationships used to model the chemical reaction between NO_2 and nitric oxide (NO); however, it is possible to provide this for total oxides of nitrogen (NO_x), and source apportionments for NO_x are given in **Appendix C**. Source apportionments for a small selection of receptors are shown graphically in **General** conclusions are that there is a moderate contribution from aircraft at locations downwind of Bristol Airport, up to about 20 µg m^{-3} of NO_x which would produce roughly 5–10 µg m^{-3} of NO_2. At locations on Downside Road, as well as on the A38, there is an appreciable roads contribution, which along the A38 is greater than the aircraft contribution. Queues along the A38 create a small but non-negligible contribution at affected receptors, up to about 8 µg m^{-3} of NO_x (roughly 2–4 µg m^{-3} of NO_2).

Figure 2.3 for the 10 mppa and 12 mppa cases; these receptors are:

- H052, representing a property on Downside Road in the centre of Lulsgate Bottom;
- H078, representing the Airport Tavern; and
- H092, representing the terrace close to the A38, north of the Forge Motel.

General conclusions are that there is a moderate contribution from aircraft at locations downwind of Bristol Airport, up to about 20 µg m^{-3} of NO_x which would produce roughly 5–10 µg m^{-3} of NO_2. At locations on Downside Road, as well as on the A38, there is an appreciable roads contribution, which along the A38 is greater than the aircraft contribution. Queues along the A38 create a small but non-negligible contribution at affected receptors, up to about 8 µg m^{-3} of NO_x (roughly 2–4 µg m^{-3} of NO_2).

Figure 2.3 Source apportionment for selected receptors, as NO_x



Note that concentrations are NO_x, and should not be compared against the 40 µg m^{-3} limit which is for NO_2.

2.8 Receptors Close to Legal Limits

Summary of NSC comment

NSC notes that some receptor locations are close to the legal limit for annual mean NO_2 and that no cumulative assessment has been undertaken nor mitigation suggested by BAL.

BAL response

The concentrations at the receptors referred to in NSC's comments are all below 36 µg m^{-3} (10% below the limit) which is usually considered a sufficient margin that there is no risk of an exceedance. Considering the conservatism of the assessment, and noting that the proposed A38 highways improvements and public transport measures are important mitigation measures already committed to by BAL, it is not considered that additional mitigation is justified. In addition, it is believed that several of these receptors are not relevant locations; the Airport Tavern is not used as a dwelling, and the former school has planning permission for conversion to a hotel.

A cumulative assessment has been undertaken. No significant sources of emissions were identified that are likely to have a cumulative impact on air quality in combination with the proposed development, except by means of increased road traffic, which has been taken into account in the traffic data generated as part of the traffic and transport assessment.

3. Response to Third Party Comments

Based on a review of third party comments received on the planning application (at the time of writing), the following principal issues have been identified:

- use of monitoring;
- use of 2017 met year;
- use of annual means;
- where impacts have been modelled;
- consideration of a 20mppa scenario;
- airport expansion and Government commitments to improve air quality; and
- impacts on ecologically sensitive sites.

These issues are considered in-turn below.

3.1 Use of Monitoring

Summary of the issue raised

Some consultees suggest that air quality monitors should be used more widely and in all surrounding residential areas.

BAL response

To understand the air quality in a given place, it is necessary to use a combination of monitoring and modelling. Monitoring provides the best estimate of concentrations of pollutants, but it only provides the total concentration at a single location and only as a historical record. In contrast, modelling:

- can provide concentrations at any desired location;
- can distinguish between the various sources of emissions (e.g. airport, roads, industry, housing) and how much each is contributing to the total concentration; and
- can be used to estimate concentrations in the future as a result of measures to reduce emissions, or as a result of new developments such as airport expansion.

Monitoring is important to ensure that the models give accurate results. There are two main types of air quality monitor; continuous monitors and diffusion tubes. Continuous monitors provide hour-by-hour measurements in real time, but it can be difficult to find suitable sites as they are large and need an electricity supply. Diffusion tubes are smaller and so are much more widely used, though they only provide measurements for a whole month. It is accepted practice to use a small number of continuous monitors supplemented by a larger number of diffusion tubes in order to understand air quality across a region.

Monitoring in the vicinity of Bristol Airport consists of:

- one continuous monitor at Bristol Airport, in the long-stay car park downwind of the airport, funded by BAL;
- nine diffusion tubes at various locations around the airport, also funded by BAL; and
- four diffusion tubes on the A38 and Downside Road, operated by NSC.

This is a comprehensive network of monitors and, when supplemented by modelling, provides a good level of understanding of the air quality levels around the airport, including at residential locations.

3.2 Use of 2017 Met Year

Summary of the issue raised

Some consultees expressed concern about the use of a single met year, 2017, for the dispersion modelling.

BAL response

Concentrations depend on how much pollution is being emitted and where, and then on the weather conditions which affect how the pollution is transported and diluted. The main weather effects are from wind direction and wind speed (higher wind speeds lead to lower concentrations), but air quality models also take into account the amount of sunshine and other parameters, which affect how much mixing there is in the air.

When modelling the effects of airport development, it is not possible to forecast future weather conditions and in consequence, it is necessary to use historic weather (meteorological or met) data. The legal limits are set in terms of the concentrations over the course of a calendar year and therefore the model calculates concentrations for every hour of a year to compare against the legal limits. It is usual to use five years of weather data ("met years"), and then use the year that gives the highest concentrations — the worst results — to compare against legal limits. This ensures that there is little risk of the legal limits being exceeded due principally to weather conditions.

For the air quality assessment contained in the ES, a slightly different approach had to be taken because of the complexity introduced by the fact that aircraft emissions also depend on the weather, through runway usage. The full model was run with a single year of met data, but a simplified version of the model was run with a full five met years. The simplified model showed that, at almost all locations of interest, met data for 2017 produced the highest concentrations and so this data was used for the full model to ensure that the worst case was assessed. For the small number of locations where this was not worst case, modelled concentrations were doubled to ensure that they were worst-case. This means that the results presented in the ES are all worst-case, and actual concentrations will be better (i.e. lower) most of the time.

A full year of emissions was modelled on an hour-by-hour basis, to ensure that the full range of varying airport and road activity was included, and also the full range of weather conditions, for example day and night, winter and summer.

3.3 Use of Annual Means

Summary of the issue raised

Some consultees have suggested that that annual mean concentrations of NO_2 should be replaced by short-term statistics such as minima/maxima.

BAL response

Section 2.1 above shows a scatter plot of concentrations measured at the continuous monitors for every hour of 2017. This shows that concentrations of NO_2 are mostly below 20 μg m^{-3} but in some hours the concentration approaches 100 μg m^{-3} or more. There is no particular pattern to when these high concentrations occur, which is typical of monitoring sites elsewhere in the UK.

The ES mainly focuses on annual mean (average) NO_2. This is because there is a legal limit on annual mean NO_2. There is also a legal limit on hourly mean NO_2, but guidance from Defra[5], based on monitoring data, suggests that as long as the annual mean limit is met, it is very unlikely that the hourly mean limit will be exceeded. These annual and hourly limits are themselves based on guidance from the WHO[2] which reflects epidemiological evidence of the health effects of NO_2, taking into account the most vulnerable members of society such as children, the elderly and those with health conditions.

3.4 Where Impacts are Modelled

Summary of the issue raised

Some consultees suggest that the assessment does not address air quality impacts at key locations, e.g. at more distant locations such as Bristol, Bath and Weston-super-Mare, and on minor roads around the airport.

BAL response

The ES has modelled concentrations where there is a risk of significant impacts from the proposed development. As emissions become dispersed and diluted with distance, the extra pollution falls to low levels more than a few kilometres from the airfield, and at the distance of the City of Bristol, will be imperceptible above the existing background concentrations.

Road traffic driving to and from Bristol Airport has been included in the air quality assessment where there is an increase in traffic which might lead to a risk of significant air quality impacts. While many roads will experience some increase in traffic, it takes a substantial amount of traffic to create an air quality problem, and few roads will experience this level of increase. The assessment concluded that there would be no significant impacts from the proposed development.

3.5 20 Mppa Scenario

Summary of the issue raised

Some consultees raised concerns regarding BAL's emerging Master Plan proposals for growth to 20 mppa.

BAL response

The air quality assessment contained in the ES does not consider the expansion of Bristol Airport to 20 mppa. The purpose of the air quality assessment, and the EIA as a whole, is to consider the impacts of the proposed development (i.e. to 12mppa) and it would be inappropriate for consideration to be given to airport growth beyond this level of passenger throughput. In any case, BAL is continuing to develop its plans for a 20mppa capacity airport as part of its emerging Master Plan and therefore any consideration of air quality impacts would be premature. Furthermore, any growth of Bristol Airport beyond 12mppa would be subject to a separate planning application and EIA with associated air quality impacts assessed at that stage.

The effects of growth to 12 mppa are assessed in the ES, and it is shown that while there would be increases in concentrations of NO_2, all concentrations will remain within legal limits.

[5] Defra (2018) Local Air Quality Management Technical Guidance (TG16). February 2018.

3.6 Airport Expansion and Commitments to Improve Air Quality

Summary of the issue raised

Some consultees have commented that there is a conflict between the Government's ambitions for cleaner air and its support for regional airport expansion.

BAL response

This is a matter of national policy which is outside the scope of this planning application. However, it is possible to deliver economic growth while also improving air quality. Air quality in the UK has been improving steadily since the Clean Air Act of 1956 and increases in life expectancy over the last six decades are partly due to this. Over the same period, UK's economy has grown significantly.

National improvements in air quality have been achieved by progressively tackling the major sources of pollution: first domestic coal burning, then major industry, energy production and road vehicles. Emissions from aircraft have been regulated since 1981, with progressively tighter emissions standards introduced since then, and technological improvements to reduce emissions are expected to deliver further improvements in the future. The air quality assessment carried out for the ES does not assume any improvement in aircraft emissions over current technology, except through the natural introduction of newer aircraft models such as the B737 MAX and the A320neo; this is a conservative (worst-case) assumption.

Road vehicles, which **Section 2.7** shows are an important contributor to NO_2 concentrations near Bristol Airport, have also had many technological improvements over the last three decades to reduce their emissions substantially, and work is continuing to reduce emissions further.

Measures are embedded within the scheme to reduce the potential for, and magnitude of, adverse air quality effects arising from the construction and operational phases of the proposed development and to ensure that air quality in the vicinity of the airport is maintained. These measures include:

- Adoption of a dust management plan during the construction phase;
- Design of the airfield layout to minimise times for taxiing and holding by enabling a parallel taxiway; and
- Improvements to the A38 and the internal road layout.

To further reduce the air quality impacts of the proposed development, the proposed Planning Conditions and the Section 106 Heads of Terms (set out in Appendix D to the Planning Statement) include additional measures beyond those embedded as part of the scheme design. These measures include (inter alia) the routeing of HGVs during the construction period and timing of movements in order to reduce congestion and queuing, electric vehicle charging, the production of an Air Quality and Emissions Plan with related, ongoing air quality monitoring and an ambitious public transport modal share target of 15% for passengers. In accordance with normal operational practice, aircraft arrivals and departures are planned to avoid, where possible, over-long idling, taxiing and hold times.

3.7 Impacts on Sensitive Ecological Sites

Summary of the issue raised

Some consultees suggest that the increase in activity at Bristol Airport and associated emissions to air has the potential to change vegetation/affect habitats in the North Somerset and Mendip Bats Special Area of Conservation (SAC) and Sites of Special Scientific Interest (SSSIs).

BAL response

The air quality impacts at ecologically sensitive sites including SACs and SSSIs have been assessed in the ES, and shown to be insignificant, with increases in annual mean NO_x, nitrogen deposition and acid deposition less than 1% of the relevant critical levels and critical loads at the SAC and SSSIs.

Issued by

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Martin Peirce

Approved by

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Alex Melling

Management systems

This document has been produced by Wood Environment & Infrastructure Solutions UK Limited in full compliance with the management systems, which have been certified to ISO 9001, ISO 14001 and OHSAS 18001 by LRQA.

Appendix A
Receptor Locations

Key

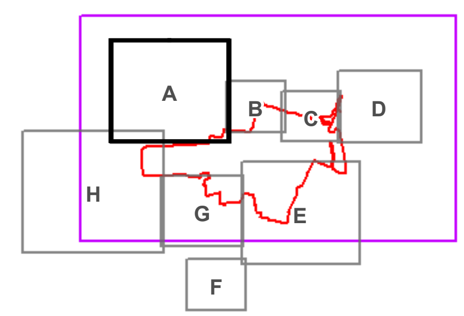
Red Line Boundary

Core Assessment Area

Human Receptors

0 50 100 150 200 250 300 m

Scale at A3: 1:5,000



Client

Bristol Airport

Amazing journeys start here

Development of Bristol Airport to Accommodate 12 Million Passengers Per Annum

Figure 8.14
Human Receptors
Zone A

February 2019

wood.

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Key

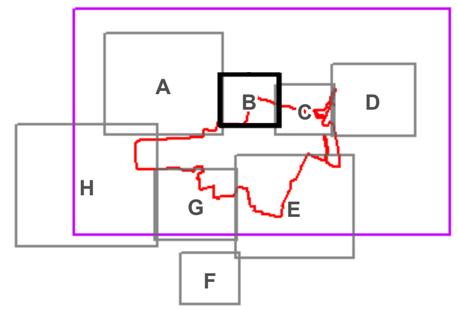
Red Line Boundary

Core Assessment Area

Human Receptors

0 50 100 150 m

Scale at A3: 1:2,500



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Development of Bristol Airport to Accommodate 12 Million Passengers Per Annum

Figure 8.14
Human Receptors
Zone B

February 2019

wood.

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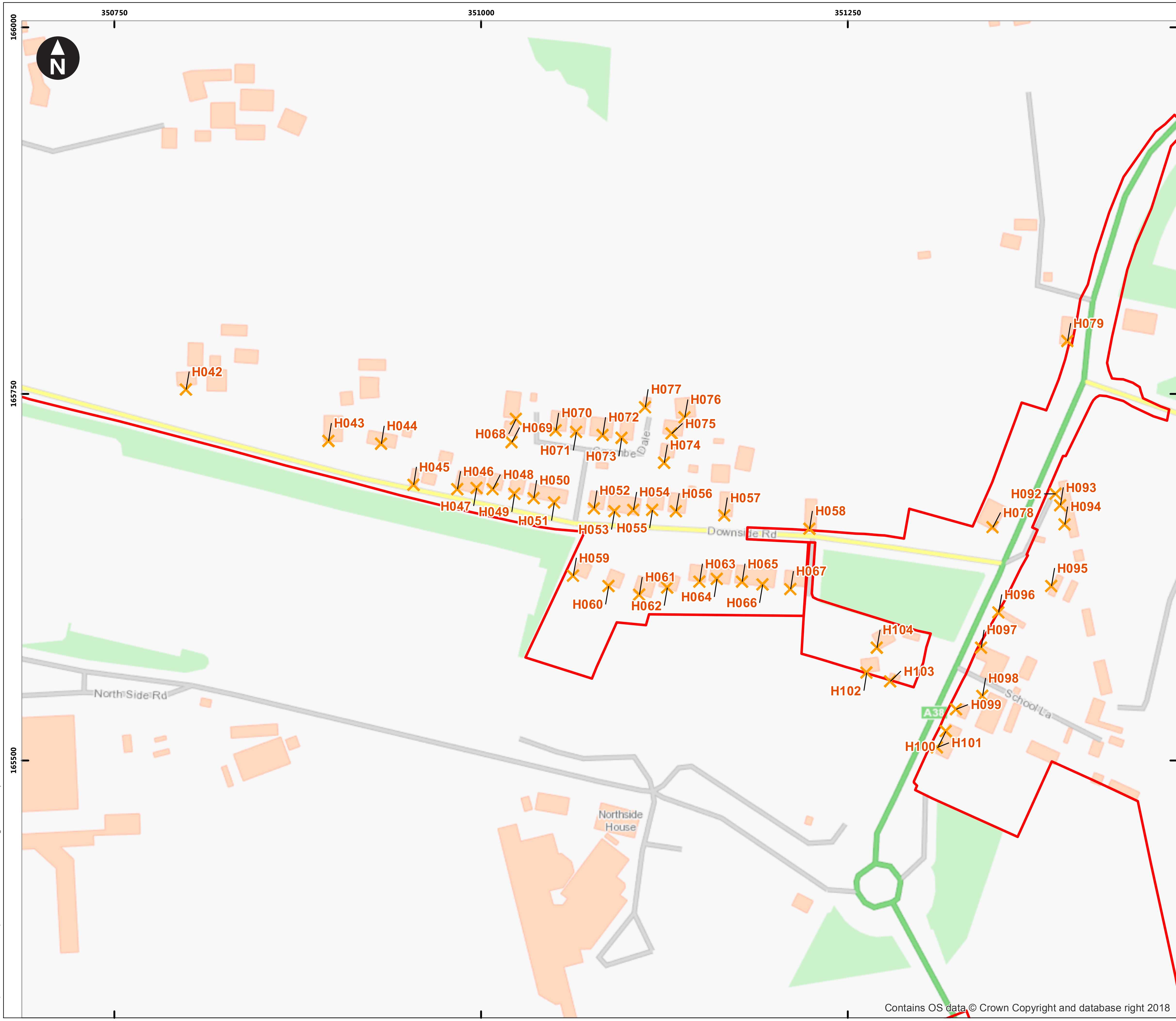
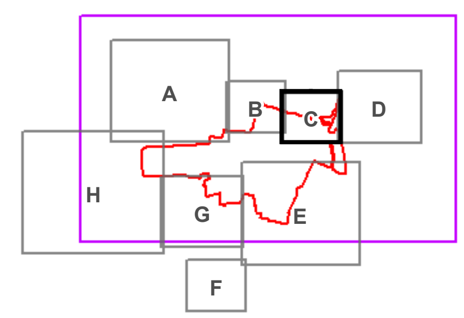


Key

- Red Line Boundary
- Core Assessment Area
- Human Receptors

0 50 100 150 m

Scale at A3: 1:2,500



Client

Bristol Airport
Amazing journeys start here

Development of Bristol Airport to Accommodate 12 Million Passengers Per Annum

Figure 8.14
Human Receptors
Zone C

February 2019

wood.

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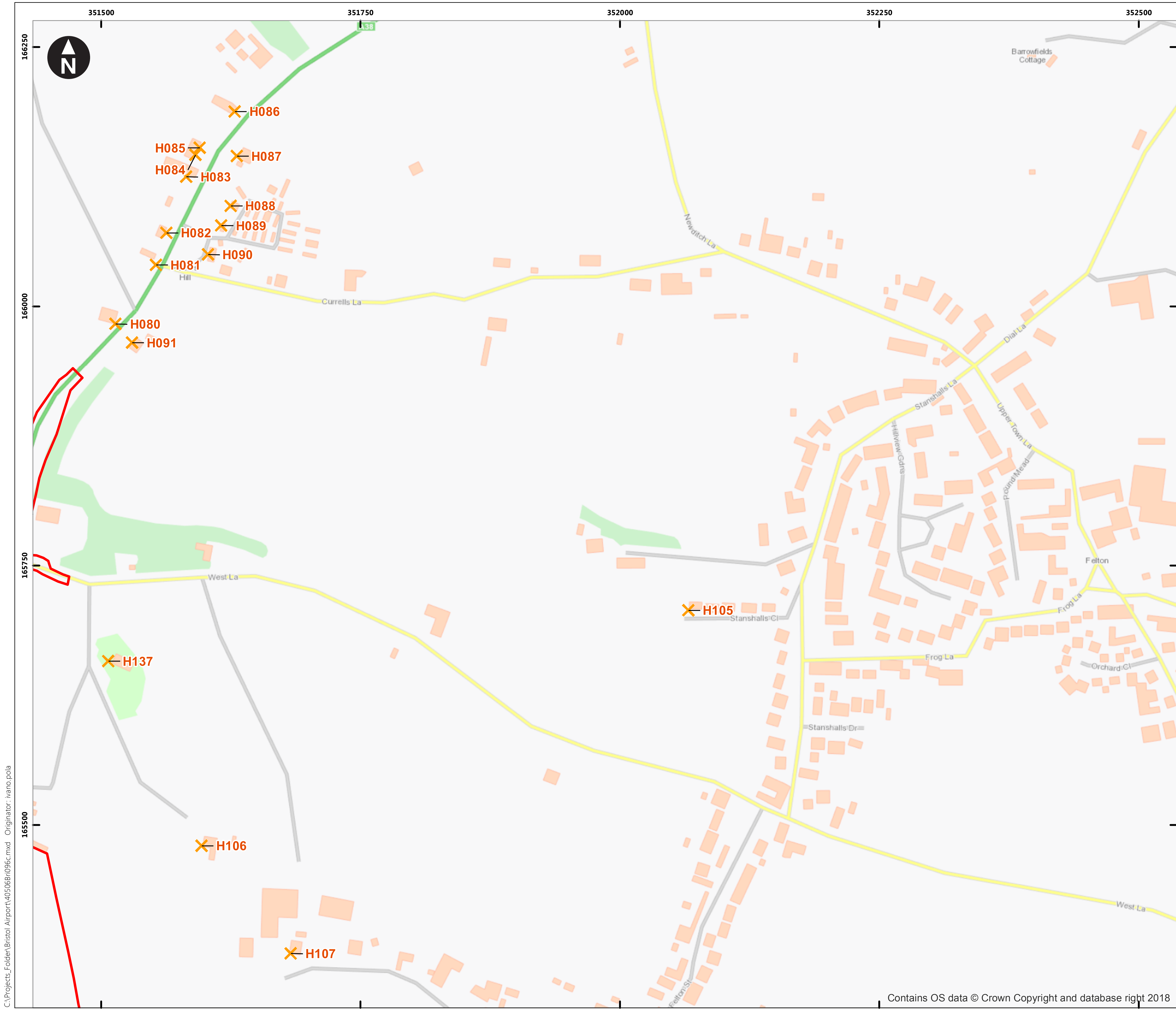

Key

Red Line Boundary

Core Assessment Area

Human Receptors

0 50 100 150 200 m

Scale at A3: 1:3,500

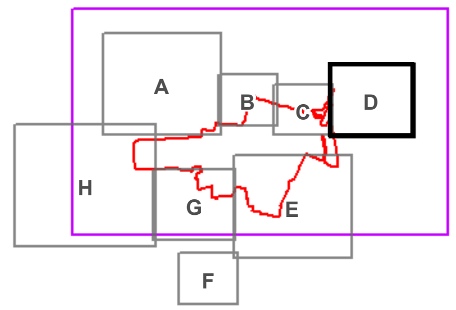

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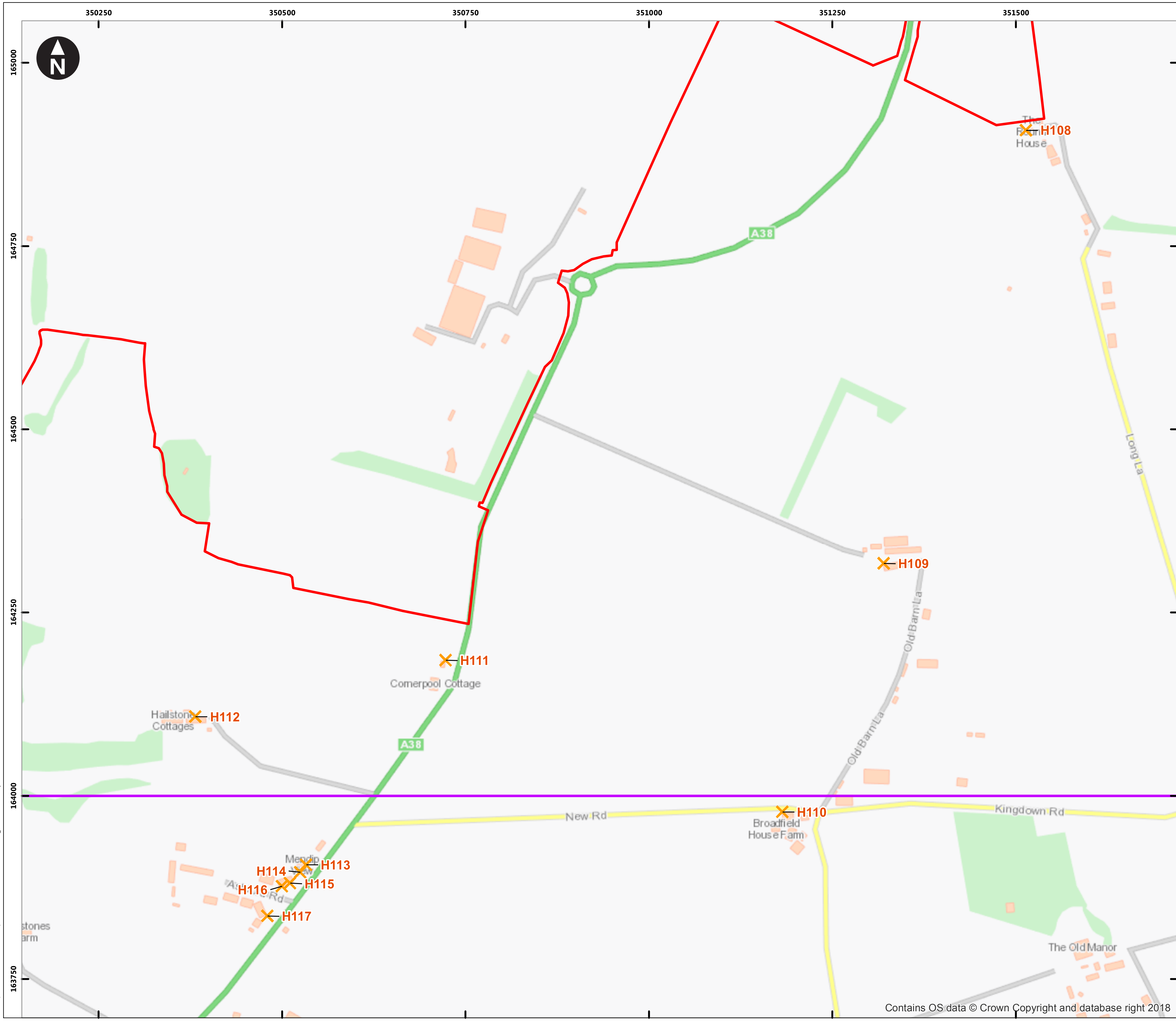
Figure 8.14
Human Receptors
Zone D

February 2019

wood.



Key

- Red Line Boundary
- Core Assessment Area
- Human Receptors

0 50 100 150 200 250 300 m

Scale at A3: 1:5,000

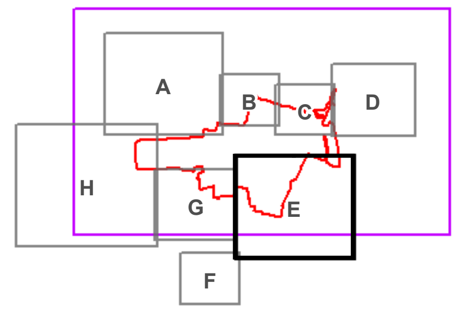


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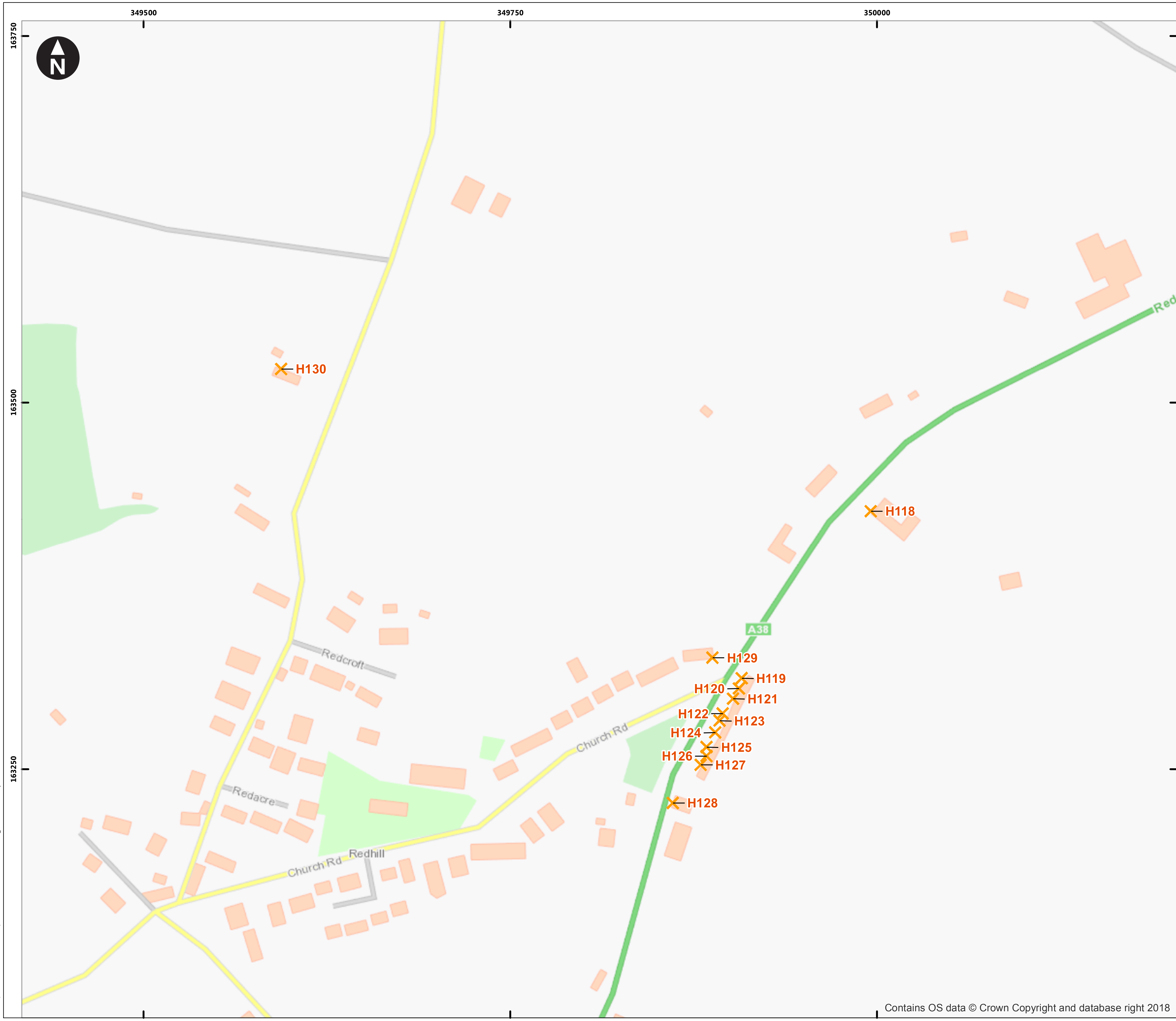
Figure 8.14
Human Receptors
Zone E

February 2019

wood.



Key

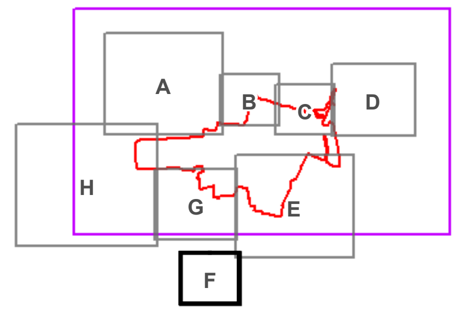
Red Line Boundary

Core Assessment Area

Human Receptors

0 50 100 150 m

Scale at A3: 1:2,500



Client

Bristol Airport
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Development of Bristol Airport to Accommodate 12 Million Passengers Per Annum

Figure 8.14
Human Receptors
Zone F

February 2019

wood.

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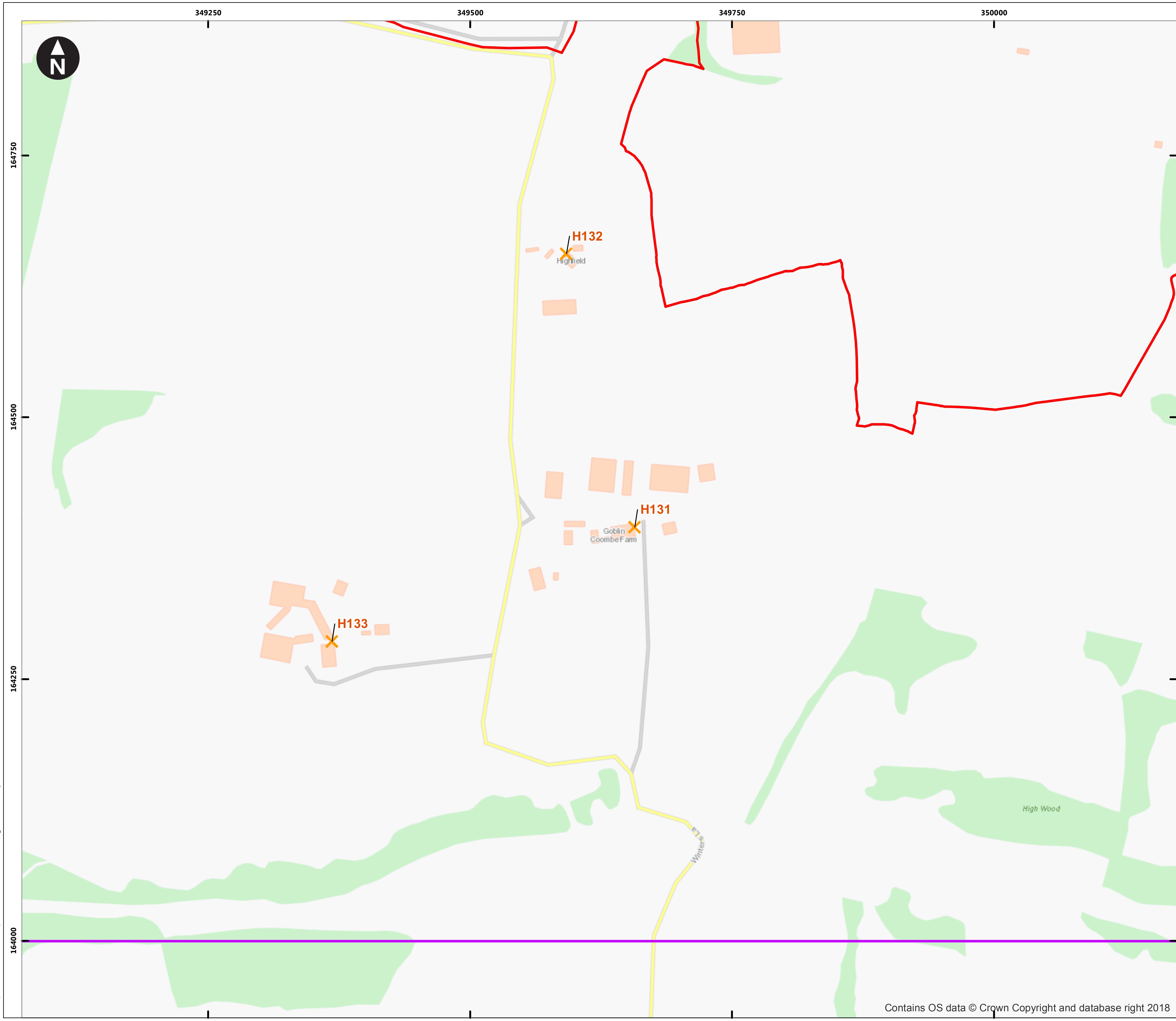
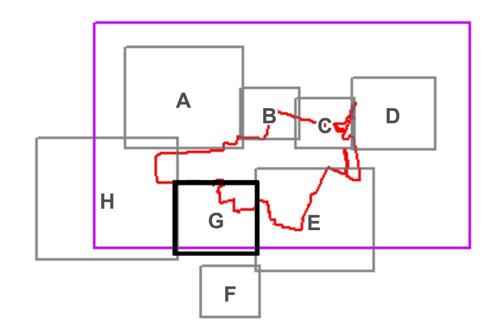


Key

- Red Line Boundary
- Core Assessment Area
- Human Receptors

0 50 100 150 200 m

Scale at A3: 1:3,500



Client

Bristol Airport
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Development of Bristol Airport to Accommodate 12 Million Passengers Per Annum

Figure 8.14
Human Receptors
Zone G

February 2019

wood.

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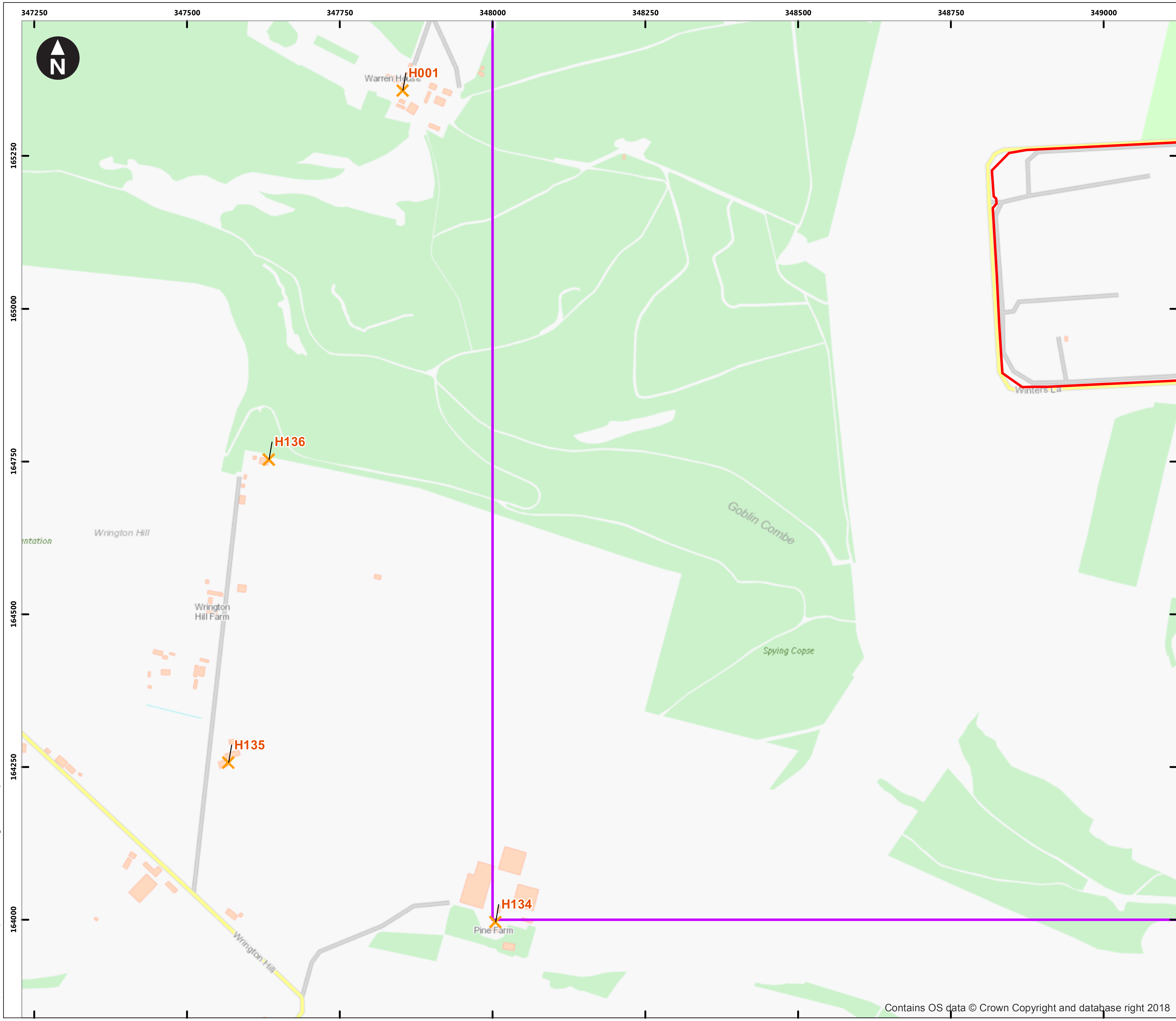

Key

Red Line Boundary

Core Assessment Area

Human Receptors

0 50 100 150 200 250 300 350 m

Scale at A3: 1:6,000

Client

Bristol Airport

Amazing journeys start here

Development of Bristol Airport to Accommodate 12 Million Passengers Per Annum

Figure 8.14
Human Receptors
Zone H

February 2019

wood.

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Appendix B
Traffic and Transport Data

Table B.1 Traffic flows, 2017, vehicles/hour

Link name	Car	Taxi	LGV	Motorcycle	HGV	Bus
A38 North NB	269	0	254	4	21.3	2.1
A38 North SB	318	0	187	4	17.5	1.4
A38 South NB	179	0	183	4	14.8	1.7
A38 South SB	211	0	147	4	12.8	1.4
Downside Road EB	58	0	71	1	4.9	0.1
Downside Road WB	58	0	56	1	3.3	0.1
West Lane EB	103	0	12	1	1.4	0.4
West Lane WB	108	0	13	1	1.2	0.5
Northside Road	460	0	0	0	0.0	12.0

NB = northbound; SB = southbound; EB = eastbound; WB = westbound; LGV = light goods vehicle; HGV = heavy goods vehicle

Table B.2 Traffic flows, 10 mppa and 12 mppa, vehicles/hour

Link name	10 mppa		12 mppa	
	LDV	HDV	LDV	HDV
A38 North NB	734	29.3	883	24.9
A38 North SB	713	24.5	868	15.2
A38 South NB	470	18.7	522	20.6
A38 South SB	464	16.3	515	18.1
Downside Road EB	168	6.2	188	6.9
Downside Road WB	148	4.2	166	4.7
West Lane EB	162	1.9	194	2.3
West Lane WB	170	1.6	203	1.9
Northside Road	460	12.0	460	12.0

LDV = light duty vehicle; HDV = heavy duty vehicle

Table B.3 Traffic speeds, all cases, km/h

Link name	Speed
A38 North NB	58
A38 North SB	58
A38 South NB	73
A38 South SB	69
Downside Road EB	43
Downside Road WB	46
West Lane EB	44
West Lane WB	44
Northside Road	44

Table B.4 Diurnal profile factors, 2017

Hour	A38 North NB	A38 North SB	A38 South NB	A38 South SB	Downside Road EB	Downside Road WB	West Lane EB	West Lane WB	Northside Road
0	0.57	0.30	0.18	0.41	0.24	0.23	0.42	0.32	0.39
1	0.36	0.27	0.14	0.25	0.21	0.17	0.34	0.32	0.41
2	0.49	0.30	0.17	0.30	0.23	0.13	0.28	0.22	0.16
3	0.32	0.57	0.34	0.19	0.27	0.12	0.20	0.28	0.08
4	0.49	0.96	0.57	0.26	0.42	0.20	0.37	0.55	0.03
5	0.64	1.06	0.67	0.45	0.51	0.32	0.51	0.70	0.09
6	0.84	0.74	0.97	0.55	0.82	0.56	0.67	0.77	1.30
7	1.38	0.99	1.75	0.99	1.53	1.36	1.04	1.36	2.01
8	1.34	1.16	1.71	1.17	1.67	1.74	1.24	1.54	0.92
9	1.12	1.05	1.39	1.10	1.32	1.34	1.13	1.33	0.82
10	1.21	1.34	1.46	1.27	1.38	1.40	1.27	1.42	0.85
11	1.25	1.45	1.49	1.31	1.45	1.49	1.35	1.38	1.05
12	1.45	1.41	1.45	1.55	1.46	1.47	1.48	1.37	1.90
13	1.54	1.39	1.48	1.62	1.44	1.44	1.52	1.37	1.66
14	1.41	1.51	1.58	1.51	1.63	1.52	1.53	1.43	1.23
15	1.46	1.54	1.61	1.56	1.57	1.73	1.66	1.63	1.30

Hour	A38 North NB	A38 North SB	A38 South NB	A38 South SB	Downside Road EB	Downside Road WB	West Lane EB	West Lane WB	Northside Road
16	1.51	1.58	1.60	1.88	1.71	1.79	1.88	1.82	1.50
17	1.44	1.65	1.62	1.99	1.54	1.92	1.84	1.86	1.68
18	1.38	1.49	1.22	1.85	1.39	1.51	1.50	1.29	1.60
19	1.08	0.97	0.82	1.23	0.99	1.04	1.13	0.92	1.36
20	0.79	0.68	0.59	0.87	0.77	0.87	0.83	0.64	1.12
21	0.64	0.53	0.48	0.60	0.57	0.69	0.65	0.46	0.96
22	0.59	0.54	0.40	0.59	0.49	0.55	0.57	0.51	0.88
23	0.70	0.52	0.31	0.50	0.39	0.40	0.60	0.52	0.71

Table B.5 Diurnal profile factors, 10 mppa

Hour	A38 North NB	A38 North SB	A38 South NB	A38 South SB	Downside Road EB	Downside Road WB	West Lane EB	West Lane WB	Northside Road
0	0.90	0.70	0.41	0.50	0.36	0.48	0.60	0.70	0.39
1	0.30	0.22	0.13	0.22	0.18	0.15	0.28	0.26	0.41
2	0.43	0.27	0.17	0.27	0.21	0.13	0.24	0.21	0.16
3	0.26	0.47	0.30	0.17	0.24	0.11	0.16	0.23	0.08
4	0.40	0.78	0.50	0.23	0.37	0.17	0.30	0.45	0.03
5	0.63	0.97	0.65	0.46	0.52	0.35	0.53	0.67	0.09
6	0.82	0.74	0.95	0.67	0.92	0.58	0.87	0.77	1.30
7	1.29	0.96	1.65	1.01	1.48	1.29	1.06	1.27	2.01
8	1.21	1.06	1.59	1.14	1.59	1.61	1.19	1.38	0.92
9	1.07	1.01	1.33	1.07	1.27	1.28	1.08	1.24	0.82
10	1.29	1.41	1.49	1.27	1.36	1.43	1.25	1.47	0.85
11	1.15	1.32	1.42	1.29	1.40	1.41	1.28	1.26	1.05
12	1.56	1.53	1.52	1.64	1.57	1.55	1.64	1.49	1.90
13	1.75	1.63	1.61	1.71	1.55	1.59	1.68	1.60	1.66
14	1.38	1.47	1.56	1.45	1.55	1.50	1.40	1.40	1.23
15	1.25	1.31	1.48	1.44	1.44	1.57	1.40	1.40	1.30
16	1.32	1.37	1.47	1.75	1.59	1.63	1.64	1.58	1.50
17	1.35	1.52	1.55	1.95	1.55	1.81	1.81	1.70	1.68

Hour	A38 North NB	A38 North SB	A38 South NB	A38 South SB	Downside Road EB	Downside Road WB	West Lane EB	West Lane WB	Northside Road
18	1.60	1.69	1.36	1.96	1.56	1.62	1.76	1.52	1.60
19	1.47	1.39	1.07	1.40	1.19	1.29	1.45	1.33	1.36
20	0.91	0.82	0.68	0.85	0.76	0.93	0.82	0.78	1.12
21	0.54	0.45	0.44	0.54	0.52	0.62	0.54	0.39	0.96
22	0.52	0.49	0.38	0.54	0.45	0.52	0.49	0.46	0.88
23	0.59	0.43	0.28	0.47	0.37	0.36	0.52	0.44	0.71

Table B.6 Diurnal profile factors, 12 mppa

Hour	A38 North NB	A38 North SB	A38 South NB	A38 South SB	Downside Road EB	Downside Road WB	West Lane EB	West Lane WB	Northside Road
0	1.16	1.00	0.62	0.59	0.47	0.70	0.73	0.99	0.39
1	0.25	0.19	0.11	0.20	0.16	0.13	0.23	0.22	0.41
2	0.38	0.25	0.17	0.25	0.19	0.13	0.21	0.20	0.16
3	0.22	0.39	0.27	0.16	0.22	0.10	0.14	0.19	0.08
4	0.34	0.65	0.45	0.21	0.33	0.15	0.25	0.38	0.03
5	0.62	0.90	0.65	0.48	0.54	0.38	0.55	0.66	0.09
6	0.82	0.75	0.93	0.79	1.02	0.60	1.03	0.77	1.30
7	1.22	0.94	1.57	1.02	1.45	1.25	1.08	1.20	2.01
8	1.12	0.99	1.50	1.13	1.53	1.50	1.15	1.26	0.92
9	1.04	0.99	1.29	1.05	1.23	1.24	1.05	1.18	0.82
10	1.34	1.44	1.51	1.25	1.33	1.45	1.22	1.49	0.85
11	1.07	1.20	1.34	1.25	1.35	1.32	1.22	1.16	1.05
12	1.63	1.60	1.57	1.71	1.64	1.60	1.75	1.57	1.90
13	1.90	1.80	1.71	1.77	1.63	1.71	1.79	1.77	1.66
14	1.35	1.42	1.52	1.38	1.46	1.47	1.28	1.37	1.23
15	1.07	1.11	1.35	1.31	1.30	1.42	1.19	1.20	1.30
16	1.18	1.22	1.37	1.63	1.48	1.51	1.46	1.40	1.50
17	1.29	1.43	1.49	1.93	1.57	1.72	1.79	1.58	1.68
18	1.77	1.85	1.49	2.06	1.71	1.74	1.97	1.70	1.60
19	1.78	1.73	1.30	1.55	1.38	1.51	1.71	1.67	1.36

Hour	A38 North NB	A38 North SB	A38 South NB	A38 South SB	Downside Road EB	Downside Road WB	West Lane EB	West Lane WB	Northside Road
20	1.01	0.94	0.76	0.85	0.77	0.99	0.82	0.90	1.12
21	0.47	0.39	0.41	0.50	0.47	0.57	0.47	0.35	0.96
22	0.48	0.45	0.36	0.50	0.42	0.49	0.43	0.43	0.88
23	0.50	0.37	0.26	0.44	0.35	0.33	0.47	0.37	0.71

Table B.7 Monthly profile factors, all cases

Month	Northside Road
1	0.77
2	0.74
3	0.87
4	0.97
5	1.15
6	1.23
7	1.23
8	1.24
9	1.13
10	1.14
11	0.74
12	0.78

Table B.8 Queue lengths, metres, all cases, part 1

Hour	Queue1A1	Queue1A2	Queue1A3	Queue1B1	Queue1C1	Queue1C2	Queue1D1	Queue1D2
0	2	2	2	2	0	2	2	3
1	3	3	3	0	0	4	2	4
2	6	3	6	2	1	4	2	4
3	6	5	3	2	3	5	2	1
4	11	12	5	1	3	10	0	6
5	11	6	5	1	5	15	4	3
6	3	3	8	1	6	13	5	9

Hour	Queue1A1	Queue1A2	Queue1A3	Queue1B1	Queue1C1	Queue1C2	Queue1D1	Queue1D2
7	5	3	6	2	11	32	7	11
8	10	6	8	4	14	29	10	13
9	12	1	9	2	11	17	4	12
10	13	12	10	4	13	23	8	11
11	12	5	13	4	11	19	8	18
12	11	8	13	2	14	20	5	12
13	11	9	14	2	12	19	4	15
14	16	13	17	3	17	17	9	18
15	15	10	19	6	17	18	9	15
16	18	6	18	7	16	17	6	29
17	15	8	18	5	16	17	10	31
18	12	8	20	7	10	9	5	24
19	9	5	11	3	3	3	2	10
20	10	4	9	2	1	1	4	7
21	5	2	5	1	1	1	4	8
22	7	6	8	2	3	5	4	8
23	7	4	5	8	5	7	4	11

Queue identifiers are explained in Table B..

Table B.9 Queue lengths, metres, all cases, part 2

Hour	Queue2B1	Queue2B2	Queue2C1	Queue2C2	Queue2D1	Queue2E1	Queue2F1
0	1	3	3	0	0	2	4
1	0	1	0	0	0	1	6
2	1	2	1	1	5	1	5
3	4	3	3	1	8	2	5
4	1	6	13	1	7	4	16
5	2	11	12	3	8	4	17
6	2	10	22	4	21	9	23
7	12	25	54	14	72	15	54
8	9	26	59	23	110	15	65
9	7	21	23	15	34	11	33

Hour	Queue2B1	Queue2B2	Queue2C1	Queue2C2	Queue2D1	Queue2E1	Queue2F1
10	9	27	44	11	39	14	42
11	8	16	36	7	45	14	38
12	8	17	28	10	26	11	32
13	7	16	40	9	43	7	37
14	5	19	50	14	45	13	48
15	8	34	45	14	63	19	68
16	8	50	57	13	101	18	80
17	3	35	73	10	146	15	88
18	6	39	60	11	59	18	69
19	4	9	24	6	27	4	27
20	3	7	10	2	9	4	20
21	1	4	7	2	6	2	9
22	2	5	6	1	9	3	13
23	4	6	7	1	10	2	10

Queue identifiers are explained in Table B..

Table B.10 Queue identifiers used in Table B. and Table B.

Identifier	Description
Queue1A1	A38 southbound approaching Northside Road, lane 3
Queue1A2	A38 southbound approaching Northside Road, lane 2
Queue1A3	A38 southbound approaching Northside Road, lane 1
Queue1B1	"Easirent" road
Queue1C1	A38 northbound approaching Northside Road, lane 2
Queue1C2	A38 northbound approaching Northside Road, lane 1
Queue1D1	Northside Road, lane 2
Queue1D2	Northside Road, lane 1
Queue2B1	West Lane westbound, lane 2
Queue2B2	West Lane westbound, lane 1
Queue2C1	A38 northbound approaching Downside Road, lane 2
Queue2C2	A38 northbound approaching Downside Road, lane 1
Queue2D1	Downside Road

Identifier	Description
Queue2E1	A38 northbound approaching West Lane
Queue2F1	A38 southbound approaching Downside Road

Appendix C
Source Apportionments

Table C.1 Source apportionment for NO_x, 2017 (percent)

Receptor	Background	Airport	Roads
H001	90.8	7.1	2.1
H002	78.0	6.7	15.4
H003	71.0	7.1	21.9
H004	80.2	13.2	6.5
H005	78.1	12.6	9.3
H006	57.3	9.4	33.3
H007	35.6	6.8	57.7
H008	29.1	5.9	64.9
H009	41.0	9.5	49.5
H010	36.6	9.0	54.4
H011	33.2	8.3	58.5
H012	42.8	11.2	46.0
H013	33.3	9.4	57.2
H014	40.2	9.9	49.9
H015	38.7	9.8	51.5
H016	39.3	10.4	50.3
H017	38.7	10.6	50.8
H018	57.8	39.1	3.0
H019	57.8	38.8	3.3
H020	64.4	32.1	3.5
H021	65.5	30.6	3.8
H022	69.4	25.6	4.9
H023	69.5	21.8	8.6
H024	67.6	19.9	12.5
H025	59.3	16.3	24.4
H026	65.9	27.3	6.8

Receptor	Background	Airport	Roads
H027	34.1	9.7	56.1
H028	36.0	10.4	53.6
H029	44.9	12.7	42.4
H030	44.7	12.9	42.4
H031	55.3	15.7	29.0
H032	43.2	12.9	43.9
H033	50.7	15.3	34.1
H034	49.5	15.1	35.4
H035	48.6	15.3	36.0
H036	48.1	15.7	36.2
H037	32.3	12.6	55.1
H038	64.4	21.0	14.6
H039	53.1	26.0	20.9
H040	57.0	25.5	17.5
H041	58.6	25.2	16.2
H042	41.0	27.7	31.3
H043	35.4	28.2	36.5
H044	37.4	30.2	32.4
H045	24.5	21.9	53.6
H046	28.7	25.8	45.5
H047	31.3	27.9	40.8
H048	26.8	30.8	42.4
H049	26.9	31.2	41.9
H050	26.5	30.9	42.6
H051	25.9	30.3	43.8
H052	25.4	29.8	44.9
H053	25.1	29.5	45.5
H054	26.0	30.3	43.8
H055	26.2	30.4	43.3
H056	26.1	30.2	43.8

Receptor	Background	Airport	Roads
H057	25.2	29.0	45.8
H058	19.4	22.2	58.4
H059	31.9	44.8	23.3
H060	31.8	45.1	23.1
H061	31.7	45.3	23.0
H062	31.6	43.8	24.6
H063	31.4	42.2	26.5
H064	31.1	41.2	27.7
H065	30.9	40.7	28.4
H066	30.7	40.2	29.1
H067	30.3	39.3	30.4
H068	37.4	36.5	26.0
H069	35.2	36.2	28.7
H070	36.7	36.5	26.7
H071	36.7	36.5	26.8
H072	36.6	36.4	27.0
H073	36.3	36.3	27.4
H074	34.0	35.6	30.4
H075	36.6	35.9	27.4
H076	37.7	35.8	26.5
H077	38.6	36.1	25.3
H078	15.7	16.0	68.3
H079	20.9	15.6	63.5
H080	14.4	6.8	78.8
H081	16.4	6.5	77.0
H082	20.6	7.8	71.7
H083	25.3	8.7	65.9
H084	26.5	8.8	64.7
H085	26.5	8.7	64.8
H086	21.3	6.7	72.0

Receptor	Background	Airport	Roads
H087	19.5	6.4	74.0
H088	27.0	9.5	63.5
H089	26.9	9.8	63.3
H090	26.8	10.3	62.9
H091	19.4	9.4	71.2
H092	12.2	11.3	76.5
H093	14.3	13.4	72.2
H094	16.8	16.0	67.2
H095	19.8	20.6	59.6
H096	10.9	12.4	76.7
H097	11.0	13.2	75.7
H098	18.0	22.7	59.3
H099	13.9	18.4	67.7
H100	14.2	19.6	66.3
H101	14.0	19.9	66.2
H102	26.2	37.3	36.6
H103	23.7	33.3	43.0
H104	26.4	35.6	38.0
H105	57.8	21.7	20.5
H106	44.9	33.0	22.2
H107	51.2	29.8	18.9
H108	55.2	21.0	23.9
H109	74.5	11.4	14.1
H110	78.4	7.8	13.8
H111	38.5	4.1	57.4
H112	78.2	7.3	14.4
H113	30.7	2.6	66.7
H114	31.0	2.6	66.4
H115	32.7	2.7	64.6
H116	37.1	3.1	59.9

Receptor	Background	Airport	Roads
H117	30.9	2.4	66.7
H118	25.8	1.4	72.8
H119	19.0	0.9	80.1
H120	21.2	1.0	77.8
H121	21.6	1.0	77.3
H122	21.1	1.0	77.9
H123	21.8	1.0	77.2
H124	22.8	1.1	76.1
H125	22.2	1.0	76.7
H126	24.4	1.1	74.5
H127	23.6	1.1	75.3
H128	16.4	0.7	82.8
H129	28.3	1.4	70.3
H130	86.1	4.7	9.1
H131	81.5	13.4	5.1
H132	75.5	20.3	4.2
H133	84.9	11.0	4.1
H134	93.5	4.6	1.9
H135	94.5	3.9	1.6
H136	93.8	4.4	1.8
H137	34.6	28.5	36.9
H138	98.0	1.4	0.7
E01	98.4	0.9	0.7
E02	97.4	1.6	1.0
E03	98.5	0.7	0.8
E04	98.6	0.7	0.7
E05	98.5	1.1	0.4
E06	92.0	5.5	2.6
E07	95.7	2.8	1.5
E08	97.0	1.9	1.1

Receptor	Background	Airport	Roads
E09	90.9	5.9	3.2
E10	98.8	0.7	0.5
E11	86.7	9.7	3.6
E12	83.1	13.1	3.8
E13	89.7	7.5	2.8
E14	93.0	4.9	2.1
E15	8.1	7.1	84.8
E16	40.2	32.9	27.0
E17	61.2	19.4	19.4
E18	65.7	19.5	14.8
E19	76.1	14.0	9.9
E20	68.1	11.1	20.8
E21	71.4	16.5	12.1
E22	73.0	16.2	10.8
E23	80.3	11.3	8.4
E24	67.9	20.0	12.0
E25	85.0	7.7	7.3
E26	73.0	6.8	20.2
E27	78.1	6.0	15.9
E28	72.3	13.5	14.2
E29	85.1	7.4	7.5
E30	85.7	9.0	5.4
E31	88.1	8.1	3.9
E32	89.5	7.2	3.3
E33	89.5	7.2	3.2
E34	92.6	4.9	2.5
E35	81.8	9.9	8.3
E36	65.8	20.9	13.3
E37	78.1	13.5	8.4
E38	76.6	9.6	13.8

Receptor	Background	Airport	Roads
E39	77.8	10.9	11.4
E40	76.9	7.6	15.5
E41	73.1	17.1	9.8
E42	90.5	6.7	2.8
M01	26.9	51.5	21.6
M02	13.4	82.7	3.9
M03	32.5	63.4	4.1
M04	72.1	25.4	2.5
M05	59.6	27.9	12.5
M06	39.4	42.3	18.3
M07	43.5	34.6	21.9
M08	26.8	51.4	21.9
M09	20.8	48.4	30.8
M10	32.0	36.4	31.6
M11	33.6	10.2	56.2
M12	15.2	23.7	61.1
M13	43.5	31.9	24.6
M14	20.6	24.9	54.5

Table C.2 Source apportionment for NO_x, 10 mppa and 12 mppa (percent)

Receptor	10 mppa			12 mppa		
	Background	Airport	Roads	Background	Airport	Roads
H001	85.5	12.9	1.6	81.8	16.4	1.8
H002	75.8	12.7	11.5	71.8	15.9	12.3
H003	69.7	13.6	16.7	65.3	17.0	17.7
H004	72.0	23.3	4.7	66.4	28.6	5.0
H005	70.9	22.4	6.7	65.4	27.5	7.1
H006	56.5	18.2	25.4	51.7	22.1	26.3
H007	38.1	14.2	47.7	34.4	17.1	48.5
H008	32.0	12.9	55.2	28.8	15.4	55.9

Receptor	10 mppa			12 mppa		
	Background	Airport	Roads	Background	Airport	Roads
H009	41.8	19.2	39.0	37.5	22.9	39.5
H010	38.0	18.4	43.6	34.0	22.0	44.0
H011	34.9	17.3	47.8	31.3	20.6	48.1
H012	42.6	21.9	35.4	38.1	26.1	35.8
H013	34.6	19.3	46.0	30.8	22.9	46.2
H014	39.7	20.2	40.1	35.5	24.1	40.4
H015	38.3	20.2	41.5	34.2	24.1	41.7
H016	38.5	21.3	40.2	34.3	25.3	40.4
H017	37.9	21.5	40.6	33.7	25.5	40.7
H018	40.4	57.8	1.9	33.6	64.7	1.8
H019	39.9	58.1	2.0	32.8	65.4	1.9
H020	47.8	49.9	2.3	40.8	57.0	2.2
H021	49.3	48.2	2.5	42.2	55.4	2.4
H022	54.6	42.1	3.4	47.6	49.0	3.4
H023	56.8	37.2	6.0	50.2	43.8	6.0
H024	56.6	34.6	8.7	50.2	41.0	8.8
H025	52.3	30.0	17.7	46.6	35.6	17.8
H026	50.9	44.4	4.6	44.2	51.2	4.6
H027	34.1	20.2	45.7	30.3	23.9	45.8
H028	35.5	21.4	43.2	31.5	25.3	43.2
H029	42.2	24.9	32.9	37.6	29.4	33.0
H030	41.9	25.3	32.8	37.3	29.7	32.9
H031	49.4	29.2	21.4	44.1	34.4	21.6
H032	40.6	25.3	34.1	36.1	29.7	34.2
H033	45.8	28.7	25.5	40.8	33.6	25.6
H034	44.9	28.5	26.5	40.0	33.4	26.6
H035	44.1	28.9	27.0	39.2	33.8	27.0
H036	43.5	29.5	27.0	38.6	34.4	27.1
H037	31.1	25.2	43.7	27.5	29.1	43.5

Receptor	10 mppa			12 mppa		
	Background	Airport	Roads	Background	Airport	Roads
H038	53.5	36.0	10.4	47.7	41.9	10.5
H039	42.9	42.5	14.6	37.7	48.0	14.3
H040	45.9	41.8	12.3	40.4	47.5	12.1
H041	47.2	41.4	11.4	41.6	47.1	11.3
H042	33.1	45.1	21.8	29.0	49.7	21.3
H043	28.6	46.1	25.3	25.0	50.3	24.7
H044	29.5	48.5	22.1	25.8	52.7	21.5
H045	21.5	39.0	39.5	18.9	42.4	38.8
H046	23.9	43.9	32.2	20.9	47.6	31.4
H047	25.4	46.3	28.3	22.2	50.2	27.6
H048	21.9	49.6	28.5	19.0	53.4	27.6
H049	21.9	50.0	28.1	19.0	53.8	27.2
H050	21.6	49.8	28.6	18.7	53.6	27.7
H051	21.2	49.2	29.5	18.4	53.0	28.6
H052	20.9	48.7	30.4	18.1	52.5	29.4
H053	20.7	48.5	30.8	17.9	52.2	29.9
H054	21.2	49.3	29.5	18.3	53.1	28.6
H055	21.4	49.5	29.1	18.5	53.3	28.2
H056	21.3	49.2	29.4	18.4	53.0	28.6
H057	20.9	48.1	31.1	18.0	51.9	30.1
H058	17.5	40.3	42.1	15.5	44.7	39.8
H059	22.6	62.8	14.6	19.4	66.8	13.9
H060	22.3	63.3	14.4	19.1	67.2	13.7
H061	22.2	63.5	14.4	19.0	67.4	13.6
H062	22.4	62.3	15.3	19.2	66.2	14.6
H063	22.5	60.9	16.5	19.3	64.8	15.9
H064	22.6	60.1	17.3	19.3	64.0	16.7
H065	22.5	59.7	17.8	19.2	63.6	17.2
H066	22.4	59.3	18.3	19.1	63.1	17.7

Receptor	10 mppa			12 mppa		
	Background	Airport	Roads	Background	Airport	Roads
H067	22.3	58.5	19.2	18.9	62.3	18.7
H068	28.4	54.7	16.9	24.6	59.1	16.3
H069	26.9	54.6	18.5	23.3	58.8	17.9
H070	27.9	54.8	17.3	24.1	59.2	16.7
H071	27.9	54.8	17.3	24.1	59.2	16.7
H072	27.8	54.8	17.5	24.0	59.1	16.9
H073	27.6	54.7	17.7	23.8	59.0	17.1
H074	26.1	54.2	19.7	22.5	58.5	19.1
H075	27.9	54.4	17.8	24.0	58.7	17.3
H076	28.7	54.1	17.2	24.7	58.5	16.7
H077	29.3	54.3	16.4	25.3	58.7	16.0
H078	15.0	30.9	54.1	11.6	30.3	58.0
H079	19.3	28.9	51.9	15.4	29.3	55.3
H080	14.7	14.0	71.3	12.5	15.2	72.3
H081	17.2	13.4	69.4	14.6	14.6	70.7
H082	21.1	15.5	63.4	18.0	17.0	64.9
H083	25.5	17.2	57.3	22.0	18.9	59.1
H084	26.6	17.3	56.0	22.9	19.1	57.9
H085	26.7	17.2	56.2	23.0	19.0	58.1
H086	22.1	13.5	64.5	18.9	14.8	66.2
H087	20.1	13.0	66.8	17.3	14.3	68.5
H088	26.7	18.5	54.7	23.0	20.4	56.5
H089	26.6	19.0	54.4	22.9	21.0	56.1
H090	26.4	19.8	53.7	22.7	21.8	55.4
H091	19.0	18.5	62.5	16.2	20.2	63.6
H092	12.0	22.5	65.5	11.5	27.4	61.1
H093	13.8	26.2	60.0	12.9	31.1	55.9
H094	15.7	30.4	53.8	14.4	35.5	50.1
H095	17.6	37.1	45.3	15.8	42.2	42.1

Receptor	10 mppa			12 mppa		
	Background	Airport	Roads	Background	Airport	Roads
H096	10.7	24.6	64.7	11.0	31.9	57.1
H097	10.6	25.9	63.5	10.9	33.9	55.2
H098	15.5	39.8	44.8	13.8	45.2	40.9
H099	12.4	33.6	54.1	11.4	39.2	49.4
H100	12.5	35.2	52.4	11.3	40.3	48.4
H101	12.3	35.6	52.1	11.0	40.6	48.4
H102	19.6	56.6	23.8	16.3	59.6	24.1
H103	18.4	52.6	29.1	15.1	54.5	30.3
H104	20.0	55.0	24.9	16.7	57.9	25.4
H105	48.0	35.2	16.8	42.4	40.2	17.4
H106	34.3	51.0	14.7	29.4	56.2	14.4
H107	40.1	47.1	12.8	34.7	52.7	12.6
H108	47.1	36.2	16.7	41.6	41.8	16.6
H109	68.1	21.3	10.6	63.0	26.0	11.0
H110	74.5	14.9	10.6	70.2	18.5	11.3
H111	40.4	9.2	50.4	37.1	11.1	51.8
H112	73.9	14.6	11.5	69.6	18.2	12.2
H113	33.9	5.9	60.2	31.1	7.2	61.7
H114	34.2	5.9	59.8	31.4	7.2	61.4
H115	36.0	6.1	57.9	33.0	7.4	59.6
H116	40.3	6.8	52.9	37.1	8.3	54.7
H117	34.2	5.5	60.3	31.4	6.7	62.0
H118	29.3	3.1	67.6	27.0	3.8	69.3
H119	21.8	2.1	76.1	20.0	2.5	77.5
H120	24.3	2.3	73.4	22.2	2.8	74.9
H121	24.8	2.3	72.9	22.7	2.9	74.4
H122	24.2	2.3	73.5	22.2	2.8	75.0
H123	25.0	2.3	72.7	22.9	2.8	74.3
H124	26.0	2.4	71.5	23.9	3.0	73.1

Receptor	10 mppa			12 mppa		
	Background	Airport	Roads	Background	Airport	Roads
H125	25.4	2.4	72.2	23.3	2.9	73.8
H126	27.8	2.6	69.6	25.6	3.1	71.3
H127	26.9	2.5	70.6	24.7	3.0	72.3
H128	19.0	1.7	79.3	17.4	2.1	80.5
H129	32.4	3.1	64.4	29.8	3.8	66.3
H130	83.6	9.2	7.2	80.4	11.8	7.9
H131	72.5	23.8	3.7	66.8	29.3	3.9
H132	63.3	33.8	2.9	56.4	40.7	3.0
H133	77.0	19.9	3.1	71.8	24.9	3.2
H134	89.9	8.7	1.5	87.2	11.2	1.6
H135	91.5	7.3	1.3	89.2	9.4	1.4
H136	90.3	8.3	1.4	87.8	10.7	1.6
H137	27.8	46.1	26.1	23.9	50.7	25.4
H138	96.6	2.8	0.6	95.7	3.6	0.7
E01	97.6	1.8	0.6	97.0	2.3	0.7
E02	96.2	2.9	0.8	95.2	3.8	0.9
E03	98.0	1.4	0.6	97.5	1.8	0.7
E04	98.1	1.3	0.6	97.6	1.7	0.6
E05	97.5	2.1	0.3	96.8	2.8	0.4
E06	87.9	10.1	2.0	84.8	12.9	2.2
E07	93.5	5.3	1.3	91.7	6.8	1.5
E08	95.4	3.7	0.9	94.1	4.8	1.1
E09	86.5	11.0	2.5	83.2	14.0	2.8
E10	98.3	1.3	0.4	97.9	1.7	0.4
E11	80.0	17.3	2.7	75.5	21.6	2.9
E12	74.4	22.8	2.8	68.9	28.1	3.0
E13	84.2	13.6	2.2	80.4	17.2	2.4
E14	89.2	9.1	1.7	86.4	11.7	1.9
E15	8.2	14.6	77.2	8.7	19.6	71.7

Receptor	10 mppa			12 mppa		
	Background	Airport	Roads	Background	Airport	Roads
E16	31.1	51.5	17.4	26.5	56.8	16.7
E17	52.5	33.7	13.7	46.9	39.3	13.8
E18	55.9	33.5	10.6	50.2	39.0	10.8
E19	68.2	24.4	7.4	63.0	29.2	7.8
E20	64.3	20.5	15.2	59.2	24.9	15.9
E21	62.8	28.7	8.5	56.8	34.5	8.7
E22	64.5	27.6	7.8	58.7	33.1	8.2
E23	73.6	20.0	6.4	68.6	24.5	6.8
E24	57.7	33.5	8.8	51.8	39.0	9.1
E25	80.0	14.1	5.9	75.9	17.5	6.5
E26	70.6	13.3	16.1	66.5	16.6	17.0
E27	75.6	11.7	12.7	71.8	14.7	13.5
E28	64.2	25.1	10.7	58.6	30.3	11.1
E29	80.2	13.9	5.8	76.1	17.6	6.3
E30	79.7	16.2	4.0	75.2	20.4	4.4
E31	82.3	14.7	3.0	78.2	18.5	3.2
E32	84.2	13.2	2.6	80.5	16.7	2.8
E33	84.4	13.2	2.5	80.6	16.7	2.7
E34	88.9	9.1	2.0	86.1	11.7	2.2
E35	76.0	17.8	6.1	71.3	22.1	6.6
E36	55.6	35.0	9.3	49.4	41.1	9.5
E37	69.8	23.8	6.4	64.4	28.7	6.9
E38	71.7	17.3	11.0	66.9	20.9	12.2
E39	71.4	19.5	9.0	66.5	23.6	9.9
E40	73.2	14.6	12.2	68.9	18.2	12.9
E41	63.4	29.6	7.0	57.3	35.6	7.1
E42	85.6	12.3	2.2	82.0	15.6	2.4
M01	17.6	68.6	13.7	15.1	72.4	12.5
M02	7.2	90.9	1.8	6.0	92.3	1.7

Receptor	10 mppa			12 mppa		
	Background	Airport	Roads	Background	Airport	Roads
M03	20.5	77.0	2.5	17.8	79.8	2.3
M04	58.2	40.2	1.6	51.0	47.4	1.6
M05	46.5	44.9	8.6	40.5	51.1	8.4
M06	27.7	58.7	13.6	24.3	63.5	12.3
M07	32.9	52.0	15.1	29.0	56.5	14.5
M08	17.6	68.5	13.9	15.0	72.3	12.7
M09	13.5	66.1	20.4	11.5	70.6	18.0
M10	24.0	55.6	20.4	20.3	60.2	19.5
M11	31.7	24.6	43.7	28.5	27.7	43.8
M12	12.8	40.9	46.2	11.2	45.2	43.7
M13	33.5	49.9	16.6	29.3	54.6	16.1
M14	18.0	43.3	38.7	15.7	46.7	37.7

Development of Bristol Airport to Accommodate 12 Million Passengers Per Annum: Further Response to Comments on Air Quality

1. Introduction

This technical note has been prepared in response to comments received from North Somerset Council (NSC)[1] on the air quality chapter (Chapter 8) of the Environmental Statement (ES) submitted as part of Bristol Airport Limited's (BAL) planning application for the development of Bristol Airport to accommodate 12 million passengers per annum (mppa) ('the proposed development') (Application No. 18/P/5118/OUT). It follows an earlier technical note[2] submitted by BAL to NSC concerning air quality, providing a response to NSC 's comments regarding road traffic and the study area adopted in the air quality assessment.

2. Response to North Somerset Council Comments

Summary of NSC comment

NSC states in its comments that consideration should be given in the air quality assessment to junctions included in the Transport Assessment (TA) beyond the adopted study area where traffic numbers are predicted to increase.

BAL response

As noted in the Environmental Impact Assessment (EIA) Scoping Report[3], airport-related traffic potentially extends hundreds of kilometres from Bristol Airport, but as traffic disperses with distance the risk of significant air quality impacts declines. The greatest amount of traffic will be on roads directly linked to the airport, and the Scoping Report suggested that only selected roads within a few kilometres of Bristol Airport would be assessed; this was agreed by NSC in its Scoping Opinion[4]. Notwithstanding this, the information requested by NSC has been prepared and is presented below.

Traffic flows on the wider network are given in **Table 2.1** for the 10 mppa and 12 mppa scenarios described in the ES. Total flows were obtained from the traffic and transport assessment. **Table 2.1** also shows which road links have been screened out from detailed assessment. The screening criteria are those recommended by the Institute of Air Quality Management (IAQM) and Environmental Protection UK (EPUK)[5], which are that

[1] Dated 28.01.19.
[2] Wood (2019) Development of Bristol Airport to Accommodate 12 Million Passengers Per Annum: Response to Comments on Air Quality.
[3] Wood (2018) Development of Bristol Airport to Accommodate 12 Million Passengers Per Annum - Environmental Impact Assessment: Scoping Report
[4] Dated 17.08.18.
[5] EPUK and IAQM (2017). Land-use Planning and Development Control: Planning for Air Quality, v1.2. http://www.iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf

a detailed assessment is likely to be required if the development will increase traffic on a link by at least 500 light duty vehicles (LDVs) annual average daily traffic (AADT) outside an air quality management area (AQMA), or by at least 100 LDVs AADT in or close to an AQMA. The "A38 (North of West Lane)" and "West Lane" links were omitted from the present assessment since they were included in the ES. No information on heavy duty vehicles (HDVs) was available, so Department for Transport (DfT) survey data[6] was examined (for those links not screened out), and the HDV fraction was assumed to be the same as in DfT's 2017 count data.

Table 2.1 Traffic data (AADT)

Link description	In or near AQMA?	10 mppa		12 mppa		Screened out?
		LDV	HDV	LDV	HDV	
A38 Bridgwater Road (North) Two Way	Yes	14,031	663	15,178	717	**No**
A38 Bridgwater Road (North) northbound	Yes	7,235	342	7,809	369	**No**
A38 Bridgwater Road (North) southbound	Yes	6,796	321	7,369	348	**No**
A368 Dinghurst Road	No	8,925		8,925		Yes
A38 New Road	No	17,831	780	18,830	824	**No**
A368 Bath Road	No	6,209		6,209		Yes
A38 (North of Dinghurst Road)	No	20,549	899	21,548	943	**No**
Brockley Lane	No	1,757		1,826		Yes
A370 Main Road (North)	No	15,097		15,203		Yes
A370 Main Road (South)	No	18,640		18,733		Yes
A370 (North of Colliters Way)	Yes	37,309	2,172	38,468	2,239	**No**
A4174 Colliters Way (North)	Yes	26,559	1,546	27,718	1,613	**No**
A4174 Colliters Way (South)	Yes	19,518		19,518		Yes
A38 (North of West Lane)	No	32,060		34,487		No, but assessed in ES
Barrow Street	No	5,131		5,131		Yes
West Lane	No	7,546		8,316		No, but assessed in ES
Downside Road	No	7,296		7,602		Yes
A38 (South of Silver Zone)	No	20,854	913	21,853	956	**No**

[6] DfT, Traffic counts. https://www.dft.gov.uk/traffic-counts/cp

Link description	In or near AQMA?	10 mppa		12 mppa		Screened out?
		LDV	HDV	LDV	HDV	
Barrow Lane	No	3,661		3,661		Yes
Hyatt's Wood Road	No	2,000		2,155		Yes

The links screened in were modelled as follows.

- Emissions were calculated using emission factors from DfT's Emission Factors Toolkit[7] version 8.0.1 and Air Quality Consultant's CURED tool[8] version 3A. ADMS-Roads was used for dispersion modelling. The links modelled are shown in **Figure 2.1** and **Figure 2.2**.
- Receptors were chosen to represent the most exposed properties alongside the modelled road links, numbering 247 receptors in total. These are also shown in **Figure 2.1** and **Figure 2.2**.
- The same roads verification factor for NO_x was used as in the main ES. The contribution from sources other than the modelled roads was taken from Defra forecast background concentrations for 2026[9]. Concentrations of NO_2 were calculated from NO_x concentrations using Defra's NOx to NO2 Calculator[10].
- Only annual mean NO_2 concentrations have been assessed, since this is expected to be the most onerous evaluation criterion; other pollutants and other averaging periods are expected to have a smaller impact.

[7] Defra, Emissions Factors Toolkit. https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html
[8] Air Quality Consultants (2018). Updated CURED to V3A. http://www.aqconsultants.co.uk/News/January-2018/UPDATED-CURED-TO-V3A.aspx
[9] Defra, Background Mapping data for local authorities. https://uk-air.defra.gov.uk/data/laqm-background-home
[10] Defra, NOx to NO2 Calculator. https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc

Figure 2.1 Links and receptors used in this assessment: northern A38

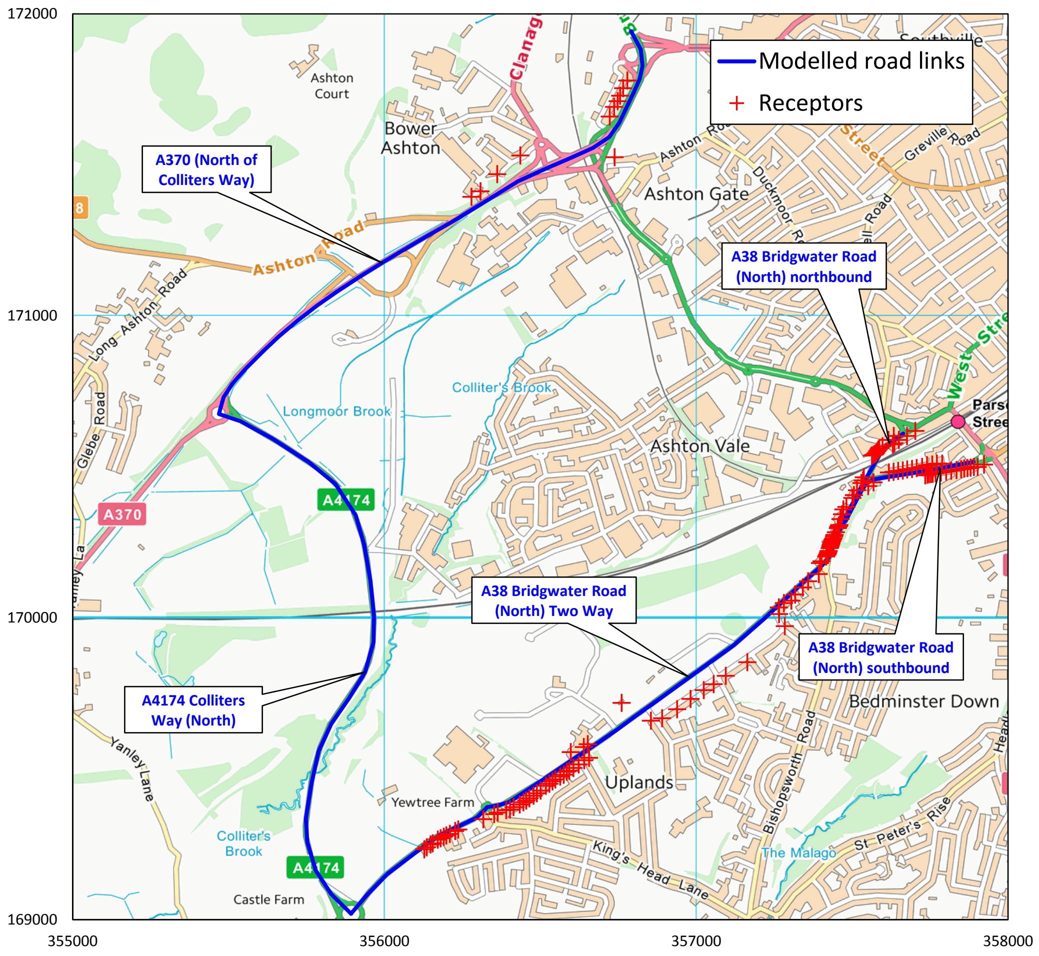
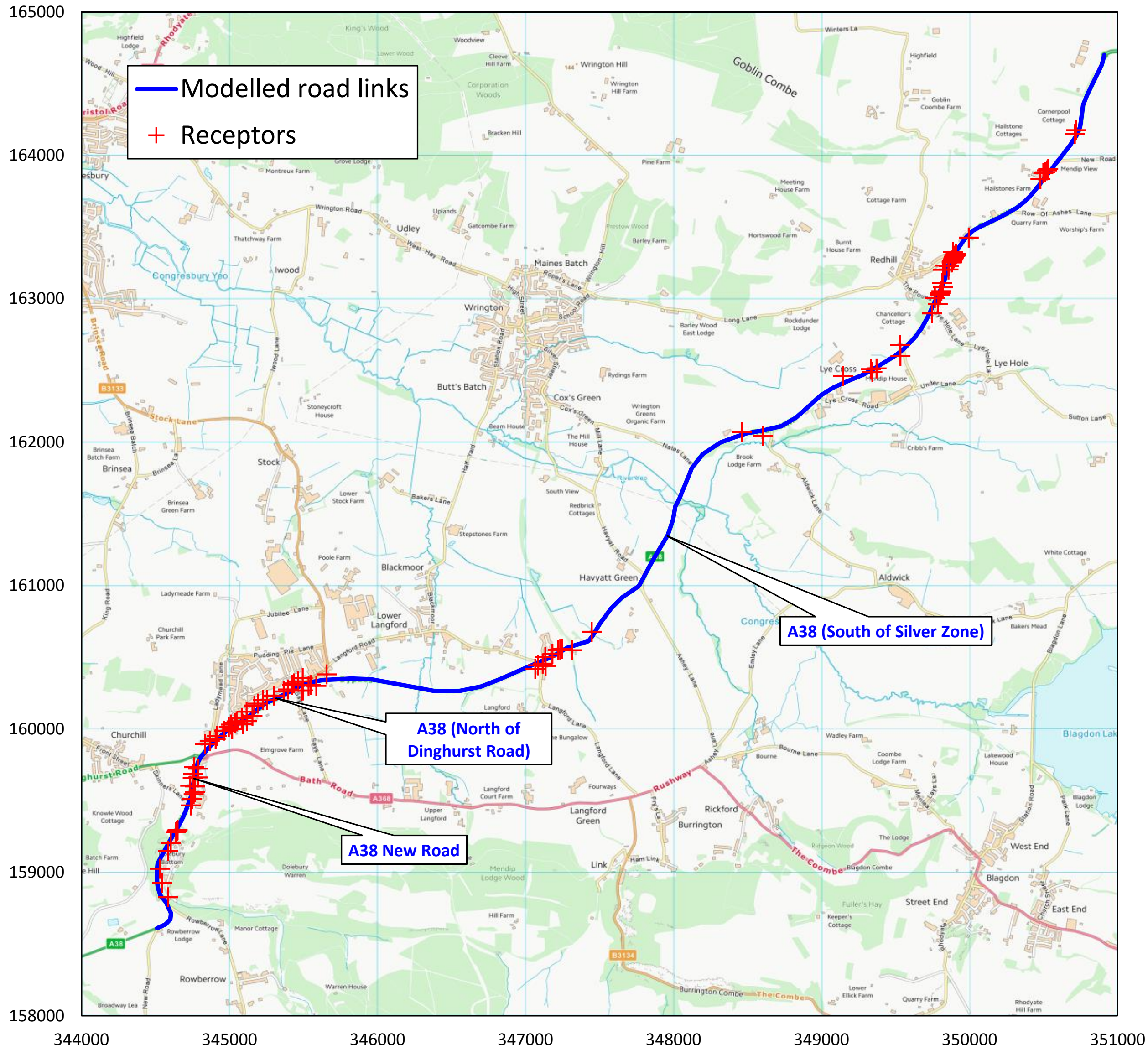


Figure 2.2 Links and receptors used in this assessment: southern A38



Full results of the modelling are given in **Appendix A**, which presents the modelled annual mean NO_2 concentrations for the 12 mppa scenario, along with the increase relative to the baseline 10 mppa scenario.

The assessment shows that, relative to the 10 mppa baseline, the proposed development has a negligible impact at all the assessed receptors using assessment criteria from IAQM and EPUK[5]. The greatest increase in annual mean NO_2 at any of the modelled receptors is 0.9 µg m^{-3} at grid reference 349861,163227, representing a property facing the A38 in Redhill. The same receptor experiences the highest total NO_2 concentration in the 12 mppa scenario, at 26.6 µg m^{-3}. This property's facade is separated from the kerb of the road only by the pavement (approximately 1.5 m), which is why the concentrations are relatively high here. Nonetheless, the impact at this receptor is classified as negligible.

It is therefore concluded that the proposed development will have a negligible air quality impact due to associated road traffic on the wider network.

Issued by

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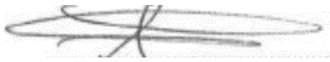
Martin Peirce

Approved by



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Alex Melling

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Management systems

This document has been produced by Wood Environment & Infrastructure Solutions UK Limited in full compliance with the management systems, which have been certified to ISO 9001, ISO 14001 and OHSAS 18001 by LRQA.

Appendix A
Model results

Modelled annual mean NO_2 concentrations are given in Table A.1. This presents the increment relative to the 10 mppa baseline scenario, referred to as the Process Contribution or PC for consistency with the ES, alongside the total concentration for the 12 mppa scenario, referred to as the Predicted Environmental Concentration or PEC for consistency with the ES, for each receptor.

Table A.1 Annual mean NO_2 concentrations

Easting (m)	Northing (m)	PC (µg m^{-3})	PEC (µg m^{-3})	Easting (m)	Northing (m)	PC (µg m^{-3})	PEC (µg m^{-3})
356128	**169233**	0.72	18.98	**357785**	**170481**	0.25	15.63
356136	**169240**	0.77	19.66	**357802**	**170484**	0.25	15.55
356148	**169249**	0.79	19.78	**357818**	**170487**	0.24	15.48
356155	**169253**	0.73	19.06	**357835**	**170489**	0.23	15.25
356171	**169265**	0.75	19.23	**357850**	**170492**	0.23	15.18
356180	**169270**	0.70	18.47	**357860**	**170494**	0.22	15.11
356190	**169275**	0.67	17.91	**357870**	**170496**	0.21	15.01
356199	**169279**	0.64	17.54	**357880**	**170497**	0.20	14.78
356210	**169284**	0.62	17.28	**357891**	**170499**	0.18	14.54
356227	**169294**	0.68	18.07	**357903**	**170499**	0.14	14.10
356237	**169299**	0.68	18.07	**357923**	**170507**	0.11	13.70
356317	**169333**	0.46	14.80	**356279**	**171394**	0.26	20.63
356352	**169350**	0.37	13.52	**356308**	**171412**	0.26	20.68
356363	**169355**	0.37	13.50	**356362**	**171469**	0.19	18.17
356391	**169363**	0.34	13.23	**356436**	**171531**	0.16	16.95
356403	**169365**	0.32	12.92	**356738**	**171525**	0.15	16.64
356414	**169373**	0.36	13.37	**356723**	**171660**	0.24	19.90
356434	**169382**	0.34	13.20	**356737**	**171692**	0.21	19.19
356446	**169389**	0.34	13.18	**356748**	**171711**	0.22	19.29
356455	**169395**	0.35	13.22	**356756**	**171729**	0.21	19.13
356465	**169402**	0.35	13.27	**356766**	**171754**	0.21	18.84
356478	**169411**	0.36	13.31	**356779**	**171779**	0.21	19.05

Easting (m)	Northing (m)	PC (µg m^{-3})	PEC (µg m^{-3})	Easting (m)	Northing (m)	PC (µg m^{-3})	PEC (µg m^{-3})
356489	**169419**	0.36	13.37	**350722**	**164175**	0.32	16.45
356501	**169428**	0.37	13.47	**350713**	**164148**	0.37	17.63
356518	**169444**	0.41	14.05	**350533**	**163906**	0.32	13.01
356529	**169450**	0.39	13.83	**350525**	**163896**	0.32	12.92
356539	**169458**	0.41	13.99	**350511**	**163881**	0.30	12.41
356548	**169465**	0.41	14.10	**350500**	**163877**	0.25	11.28
356564	**169474**	0.39	13.79	**350480**	**163836**	0.32	12.98
356575	**169480**	0.37	13.57	**350011**	**163498**	0.26	11.56
356585	**169490**	0.40	13.96	**349996**	**163426**	0.44	15.76
356593	**169493**	0.38	13.62	**349888**	**163326**	0.32	12.86
356606	**169503**	0.38	13.73	**349908**	**163312**	0.68	21.99
356623	**169514**	0.38	13.63	**349906**	**163305**	0.59	19.76
356641	**169528**	0.39	13.83	**349902**	**163298**	0.59	19.50
356656	**169536**	0.37	13.53	**349895**	**163288**	0.61	20.27
356598	**169555**	0.38	13.86	**349893**	**163283**	0.58	19.56
356639	**169572**	0.53	15.88	**349890**	**163275**	0.54	18.47
356652	**169581**	0.53	15.86	**349884**	**163265**	0.54	18.59
356855	**169659**	0.26	11.91	**349884**	**163259**	0.49	16.98
356761	**169718**	0.20	11.14	**349880**	**163253**	0.50	17.47
356891	**169667**	0.20	11.16	**349861**	**163227**	0.84	26.54
356939	**169697**	0.19	11.00	**349859**	**163204**	0.61	20.23
356982	**169731**	0.20	11.05	**349835**	**163231**	0.25	11.18
357024	**169760**	0.19	11.61	**349820**	**163202**	0.21	10.24
357056	**169780**	0.19	11.51	**349815**	**163111**	0.49	16.90
357095	**169808**	0.18	11.47	**349821**	**163080**	0.62	20.34
357164	**169853**	0.16	11.30	**349811**	**163053**	0.59	19.62
357284	**169972**	0.19	11.64	**349805**	**163040**	0.59	19.80
357266	**170012**	0.40	17.87	**349799**	**163026**	0.58	19.50
357265	**170034**	0.85	24.51	**349767**	**163005**	0.44	15.51
357281	**170049**	0.82	24.08	**349786**	**162963**	0.35	13.56

Easting (m)	Northing (m)	PC (µg m^{-3})	PEC (µg m^{-3})	Easting (m)	Northing (m)	PC (µg m^{-3})	PEC (µg m^{-3})
357305	**170057**	0.48	18.97	**349747**	**162898**	0.46	16.31
357317	**170077**	0.62	21.04	**349533**	**162678**	0.23	10.76
357342	**170100**	0.60	20.74	**349534**	**162600**	0.30	12.44
357359	**170121**	0.72	22.59	**349372**	**162514**	0.62	20.27
357393	**170145**	0.55	19.93	**349345**	**162490**	0.41	15.05
357397	**170181**	0.61	20.95	**349335**	**162509**	0.66	21.52
357402	**170187**	0.60	20.69	**349146**	**162460**	0.22	10.38
357417	**170203**	0.65	21.45	**348604**	**162045**	0.20	9.69
357420	**170208**	0.66	21.62	**348461**	**162070**	0.41	14.79
357422	**170212**	0.67	21.74	**347447**	**160678**	0.36	13.11
357423	**170216**	0.64	21.31	**347314**	**160548**	0.29	11.67
357425	**170221**	0.65	21.29	**347247**	**160557**	0.56	18.40
357428	**170231**	0.61	20.73	**347236**	**160554**	0.48	16.45
357430	**170235**	0.62	20.97	**347221**	**160550**	0.41	14.62
357431	**170240**	0.59	20.43	**347182**	**160524**	0.46	16.02
357433	**170244**	0.60	20.65	**347134**	**160502**	0.47	16.10
357434	**170248**	0.58	20.34	**347137**	**160440**	0.21	9.62
357436	**170253**	0.58	20.34	**347117**	**160456**	0.36	13.26
357438	**170258**	0.58	20.34	**347086**	**160444**	0.37	13.69
357440	**170263**	0.58	20.35	**347067**	**160418**	0.24	10.46
357442	**170269**	0.57	20.15	**345657**	**160381**	0.26	11.53
357444	**170274**	0.57	20.15	**345587**	**160301**	0.23	10.60
357448	**170283**	0.58	20.34	**345550**	**160306**	0.32	13.02
357454	**170297**	0.57	20.26	**345534**	**160302**	0.34	13.42
357456	**170301**	0.58	20.27	**345495**	**160355**	0.20	10.22
357458	**170304**	0.59	20.51	**345464**	**160331**	0.25	11.09
357459	**170307**	0.57	20.24	**345497**	**160269**	0.22	10.58
357463	**170327**	0.43	18.20	**345486**	**160266**	0.23	10.82
357468	**170343**	0.40	17.63	**345437**	**160318**	0.24	11.01
357472	**170359**	0.35	16.96	**345423**	**160308**	0.25	11.27

Easting (m)	Northing (m)	PC (µg m^{-3})	PEC (µg m^{-3})	Easting (m)	Northing (m)	PC (µg m^{-3})	PEC (µg m^{-3})
357482	**170367**	0.42	18.01	**345395**	**160276**	0.36	14.11
357501	**170397**	0.49	18.98	**345367**	**160262**	0.35	13.90
357506	**170406**	0.50	19.11	**345300**	**160232**	0.32	12.97
357516	**170422**	0.54	19.77	**345252**	**160203**	0.37	14.30
357552	**170436**	0.62	20.97	**345226**	**160203**	0.25	11.27
357569	**170448**	0.55	19.79	**345194**	**160177**	0.26	11.45
357530	**170446**	0.57	20.27	**345168**	**160163**	0.23	10.72
357535	**170455**	0.57	20.10	**345155**	**160091**	0.44	15.79
357538	**170465**	0.47	18.81	**345116**	**160120**	0.24	10.90
357564	**170537**	0.24	15.59	**345120**	**160054**	0.32	12.76
357569	**170539**	0.27	15.94	**345089**	**160033**	0.32	12.81
357574	**170542**	0.29	16.31	**345083**	**160077**	0.36	13.78
357577	**170546**	0.30	16.38	**345048**	**160053**	0.36	13.77
357581	**170552**	0.30	16.38	**345037**	**160043**	0.38	14.44
357584	**170557**	0.29	16.27	**345018**	**160000**	0.52	17.79
357587	**170561**	0.29	16.24	**345009**	**160030**	0.33	13.02
357598	**170568**	0.34	16.97	**344995**	**160016**	0.37	13.21
357617	**170589**	0.31	16.62	**344964**	**159989**	0.40	14.13
357631	**170574**	0.43	18.28	**344916**	**159951**	0.33	12.49
357636	**170578**	0.42	18.20	**344907**	**159928**	0.53	17.45
357634	**170602**	0.31	16.66	**344867**	**159915**	0.24	10.45
357650	**170589**	0.41	18.02	**344836**	**159894**	0.20	9.31
357676	**170602**	0.25	15.76	**344760**	**159733**	0.26	10.10
357703	**170619**	0.15	14.26	**344790**	**159723**	0.51	15.39
357618	**170481**	0.43	18.12	**344753**	**159686**	0.29	10.68
357633	**170483**	0.42	17.98	**344752**	**159659**	0.35	11.96
357648	**170486**	0.40	17.71	**344788**	**159662**	0.36	12.23
357663	**170488**	0.40	17.66	**344735**	**159604**	0.25	10.03
357677	**170491**	0.38	17.42	**344769**	**159599**	0.47	14.43
357692	**170493**	0.38	17.40	**344766**	**159560**	0.41	13.32

Easting (m)	Northing (m)	PC (µg m^{-3})	PEC (µg m^{-3})	Easting (m)	Northing (m)	PC (µg m^{-3})	PEC (µg m^{-3})
357707	**170496**	0.37	17.24	**344759**	**159544**	0.46	14.38
357725	**170499**	0.36	17.17	**344747**	**159512**	0.50	15.39
357740	**170505**	0.32	16.58	**344739**	**159466**	0.38	12.74
357757	**170507**	0.32	16.64	**344649**	**159296**	0.64	18.39
357772	**170510**	0.32	16.53	**344644**	**159288**	0.66	18.82
357789	**170510**	0.35	16.96	**344639**	**159279**	0.65	18.68
357735	**170472**	0.27	15.80	**344604**	**159203**	0.46	14.52
357742	**170474**	0.27	15.87	**344586**	**159149**	0.35	12.01
357747	**170475**	0.27	15.87	**344529**	**159025**	0.41	13.47
357753	**170476**	0.27	15.84	**344544**	**158928**	0.31	10.62
357759	**170477**	0.27	15.81	**344586**	**158826**	0.29	10.45
357768	**170478**	0.26	15.70				