Gatwick Airport Northern Runway Project

Supporting Ecology Technical Notes – Clean Version

Book 10

VERSION: 2.0

DATE: AUGUST 2024

Application Document Ref: 10.33

PINS Reference Number: TR020005

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

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1 Purpose of this Document

1.1.1 This document provides technical responses to a number of issues raised by the Joint Local Authorities (JLAs) during the Statement of Common Ground (SoCG) process, namely:

- Hedgerow Survey data/rationale; and
- Bats and Noise.

1.1.2 Queries with respect to raw survey data for hedgerows within the Project site were raised by Crawley Borough Council (CBC) in their SoCG (point 2.8.3.5, [REP1-032]). Such data are provided here.

1.1.3 Several stakeholders have also requested further information with respect to aircraft overflights (and associated engine noise) and bats using woodlands to the west of Gatwick. This has included Horsham District Council (see point 2.8.1.1 [REP1-040]).

1.1.4 The document sets out the technical details with respect to these two issues, including any relevant results, figures and references.

1.1.5 This document has been updated at Deadline 8 to reference the leylandii hedgerow (H34) located along the west of the A23 London Road in response to the Joint Local Authorities Deadline 6 submissions [REP7-103].

2 Hedgerow Survey Data

2.1.1 The following data are provided to clarify the results provided in the ES. The methodology for the survey of hedgerows within the Project site is summarised in section 2.3 of ES Appendix 9.6.2 Ecology Survey Report [APP-125] with full details in section A1.1.8 *et seq*.

2.1.2 All of the hedgerows >20m long and <5m at the base within the Project site were assessed as to whether they could qualify as Important (ie protected) Hedgerows if they displayed one or more of the following criteria:

- it had an average of seven or more woody species in the surveyed section(s);
- it had an average of six woody species in the surveyed section(s) and three or more features from:
  - a wall or bank along half or more of the length;
  - a ditch along half or more of the length;
  - an average of one standard tree or more per 50 metres of hedgerow;
  - gaps which do not add up to more than 10% of the hedge;
  - three woodland understorey species;
  - a parallel hedge within 15 metres; or
  - connections scoring four points. Connections to a hedge scores one point. Connections to a pond or wood score two points.
- it had six woody species and one of the following rare trees – black poplar, large leaved lime, small leaved lime, wild service tree;
- it had an average of five wood species on average in the surveyed section(s) and has four or more features listed above (bullet point two); and
- it had four woody species on average in the surveyed section(s); is adjacent to a footpath, bridleway, byway open to all traffic (but not necessarily a normal adopted vehicular highway unless it also is one of these) and has two or more features listed above (bullet point two).

2.1.3 A total of 33 hedgerows were recorded on site (the results are contained in Table 2.1 and Figure 1), all of which are species poor (four or less woody species) with many dominated by non-native species. A ditch feature was identified along half or more of the length of 7 hedgerows (out of the 33 recorded hedgerows), being the only additional feature present. No other additional features were identified to meet the criteria of more than three or four features to qualify as an Important Hedgerow.

2.1.4 As demonstrated by Table 2.1, no hedgerows were identified to meet the above criteria in terms of the number of species or features.

2.1.5 Therefore, as set out in section 3.3 of ES Appendix 9.6.2 Ecology Survey Report [APP-125], no Important Hedgerows were recorded on the Project site during any of the surveys.

Table 2.1 – Hedgerow survey results

Hedgerow number	Species present	Description	Hedgerow type	Additional features
H1	*Crataegus monogyna* (Hawthorn),*Quercus robur* (Common Oak),*Fraxinus excelsior* (Ash),*Corylus avellana* (Hazel)	Field boundary hedges either side of drainage ditch.	Native, species poor intact	Ditch
H2	*Crataegus monogyna* (Hawthorn),*Quercus robur* (Common Oak),*Fraxinus excelsior* (Ash),*Corylus avellana* (Hazel)	Field boundary hedges either side of drainage ditch.	Native, species poor intact	Ditch
H3	*Crataegus monogyna* (Hawthorn)	Maintained hedge on edge of drainage ditch.	Native, species poor intact	Ditch

H4	*Crataegus monogyna* (Hawthorn)	Maintained hedge on edge of drainage ditch.	Native, species poor intact	Ditch
H5	*Crataegus monogyna* (Hawthorn)	Maintained hedge on edge of drainage ditch.	Native, species poor intact	Ditch
H6	*Crataegus monogyna* (Hawthorn)	Maintained hedge on edge of drainage ditch.	Native, species poor intact	Ditch
H7	*Crataegus monogyna* (Hawthorn)	Maintained hedge on edge of drainage ditch.	Native, species poor intact	Ditch
H8	*Prunus spinosa* (Blackthorn),*Salix caprea* (Goat Willow)	Unmaintained hedge, mainly blackthorn, brambles throughout.	Native, species poor intact	None
H9	*Prunus lusitanica* (Portugal Laurel),*Salix caprea* (Goat Willow)	Dense section of tall roughly maintained hedge.	Mixed native/non-native, species poor intact	None

H10	*Carpinus betulus* (Hornbeam),*Salix caprea* (Goat Willow),*Sambucus nigra* (Elder)	Maintained hedge.	Native, species poor intact	None
H11	*Carpinus betulus* (Hornbeam),*Salix caprea* (Goat Willow),*Sambucus nigra* (Elder)	Maintained hedge.	Native, species poor intact	None
H12	*Carpinus betulus* (Hornbeam),*Salix caprea* (Goat Willow),*Sambucus nigra* (Elder)	Maintained hedge.	Native, species poor intact	None
H13	*Prunus spinosa* (Blackthorn)	Unmaintained hedge growing just outside carpark boundary.	Native, species poor intact	None
H14	*Fagus sylvatica* (Beech)	Well maintained beech hedge.	Native, species poor intact	None
H15	*Taxus baccata* (Yew)	Small section of well maintained hedge.	Native, species poor intact	None

H16	*Prunus lusitanica* (Portugal Laurel)	Maintained hedgerow.	Non-native, species poor intact	None
H17	*Prunus lusitanica* (Portugal Laurel)	Maintained hedge with occasional gaps.	Non-native, species poor defunct	None
H18	*Prunus laurocerasus* (Cherry Laurel)	Maintained hedge.	Non-native, species poor intact	None
H19	*Taxus baccata* (Yew)	Well maintained hedge.	Native, species poor intact	None
H20	*Prunus laurocerasus* (Cherry Laurel)	Well maintained hedge.	Non-native, species poor intact	None
H21	*Taxus baccata* (Yew)	Well maintained hedge.	Native, species poor intact	None
H22	*Ligustrum* spp.	Well maintained hedge.	Native, species poor intact	None
H23	*Taxus baccata* (Yew)	Well maintained hedge.	Native, species poor intact	None

H24	*Prunus laurocerasus* (Cherry Laurel)	Area of various maintained small hedges.	Non-native, species poor intact	None
H25	*Ligustrum* spp (Privet), *Carpinus betulus* (Hornbeam)	Maintained boundary hedge.	Native, species poor intact	None
H26	*Ligustrum* spp (Privet), *Carpinus betulus* (Hornbeam)	Maintained boundary hedge.	Native, species poor intact	None
H27	*Ligustrum* spp (Privet), *Carpinus betulus* (Hornbeam)	Maintained boundary hedge.	Native, species poor intact	None
H28	*Ligustrum* spp (Privet), *Carpinus betulus* (Hornbeam)	Maintained boundary hedge.	Native, species poor intact	None
H29	*Crataegus monogyna* (Hawthorn)*,Prunus spinosa* (Blackthorn)	Field boundary hedge.	Native, species poor intact	None

H30	*Crataegus monogyna* (Hawthorn)*,Prunus spinosa* (Blackthorn)	Field boundary hedge.	Native, species poor intact	None
H31	*Crataegus monogyna* (Hawthorn),*Prunus spinosa* (Blackthorn)	Field boundary hedge.	Native, species poor intact	None
H32	*Crataegus monogyna* (Hawthorn),*Prunus spinosa* (Blackthorn)	Field boundary hedge.	Native, species poor intact	None
H33	*Crataegus monogyna* (Hawthorn),*Prunus spinosa* (Blackthorn)	Field boundary hedge.	Native, species poor intact	None
H34	*Leylandii* spp.	Non-native hedgerow along A23. Heavily managed	Non-native, species poor	None

3 Bats and Noise

3.1.1 The impact of noise on wildlife, including bats, was considered within section 9 of ES Chapter 9 - Ecology and Nature Conservation [APP-034]. However, several stakeholders have requested, through the Statement of Common Ground process, further information with respect to aircraft overflights and associated engine noise and bats using woodlands to the west of Gatwick. This has included Horsham District Council (see point 2.8.1.1 [REP1-040]).

Therefore, the following is provided as a technical note on the likelihood of any potential disturbance impacts on such bats from engine noise, taking account of the distances involved and the existing operational airport context.

3.1.2 The location of the woodlands where bats were recorded during the survey work reported in the ES (especially the rare Bechstein's bat) are circa 1.2-1.6km to the west of Gatwick Airport (Glovers Wood, Skragg Copse etc). Full details of bat locations and associated survey work are described in ES Appendix 9.6.3 Bat Trapping and Radio Tracking Surveys [APP-131, APP-132].

3.1.3 Bat calls are generally in the range of 20-100kHz. When considering the potential impact of changes in noise levels on bats, it is not necessarily just the echolocation frequency range of the bats that is important. There is also a phenomenon known as 'the upward spread of masking' which means that lower frequency sounds can physically affect the hearing thresholds at higher frequencies such that the auditory system is unable to hear sounds with the lower frequency sounds present. It should be noted that this phenomenon in humans is generally limited to masking sounds within 1 octave of the frequency range of the masking noise and the frequency range of bat calls covers more than 2 octaves.

3.1.4 It can be useful to consider the full range of frequencies that may be audible to the animal in order to understand the potential impacts. Whilst there is nothing specific to UK bat species, Geipel *et al*. (2021) found that the European bat species studied have an audible range which starts to significantly drop away below 9 kHz and we might reasonably expect to see similar ranges for UK bats.

3.1.5 In terms of the noise output within the echolocation frequencies, there is actually very little noise output from aircraft engines within these ranges (that typically start from 20 KHz upward as noted at paragraph 3.1.3). A graph showing some measurements of an engine testing run for a B777 aircraft is provided at Figure 2. This is used as a proxy for aircraft noise more broadly as it provides

information on the sort of noise levels experienced close to a large jet engine operating above 'flight idle' thrust settings. This shows the overall weighted L_{Aeq} sound pressure level in blue and the unweighted sound pressure level (L_{eq}) in the 20 kHz third-octave band in orange. It should be noted that when the jet engines are operating above 'flight idle' thrust settings, this can be generally considered representative of a greater power (and noise) output than would be required for the aircraft to maintain a steady altitude.

3.1.6 It is clear that in the middle of the graph (Figure 2) there is a section where the overall level sits around 90 dB L_{Aeq} for around 10 minutes and jumps up to a peak of 96 dB immediately before dropping down to around 70 dB. This 10-min section represents a period where the engine was run at a fairly constant high-power throttle setting above 'flight idle' before a change (reduction) in the throttle setting. There is a peak in the 20 kHz data of around 35 dB which corresponds to the peak of 96 dB in the overall L_{Aeq} data occurring when there is a change in the throttle setting. For frequencies above 20 kHz, the noise output of the jet engines is likely to be lower than this.

3.1.7 There are a few other lesser peaks in the 20 kHz data which also coincide with changes in throttle settings. This indicates that the steady output of the engine under a constant throttle setting produces next to nothing in the 20 kHz band but you could potentially get a peak of up to around 35 dB for a change in a high throttle setting. This peak is also measured at 150m and at the distances the woodlands are located from the airport, levels this low would have attenuated well below the level of any other background noise.

3.1.8 It is possible that noise from jet engines in the region of 8 – 10 kHz could be in the region of 60 dB at distances of 150m but high frequency sounds attenuate rapidly with distance. At 8 kHz standard modelling assumptions indicate an atmospheric absorption rate of 0.12 dB per m (this rate increases with frequency so greater attenuation could be expected for higher frequencies). Aircraft taking off on westerly departure routes could be as close as 500m to areas of woodland where bats have been identified as important and therefore, the expected atmospheric absorption over this distance would be 60 dB. There is also geometrical spreading of the sound which results in an additional 10 dB of attenuation between 150m and 500m distance and the level of 8 – 10 kHz noise would therefore be reduced to no higher than -10 dB L_{eq} for westerly departures. The attenuation at a distance of 500m therefore brings the level below human hearing thresholds (and probably also therefore below those of bats).

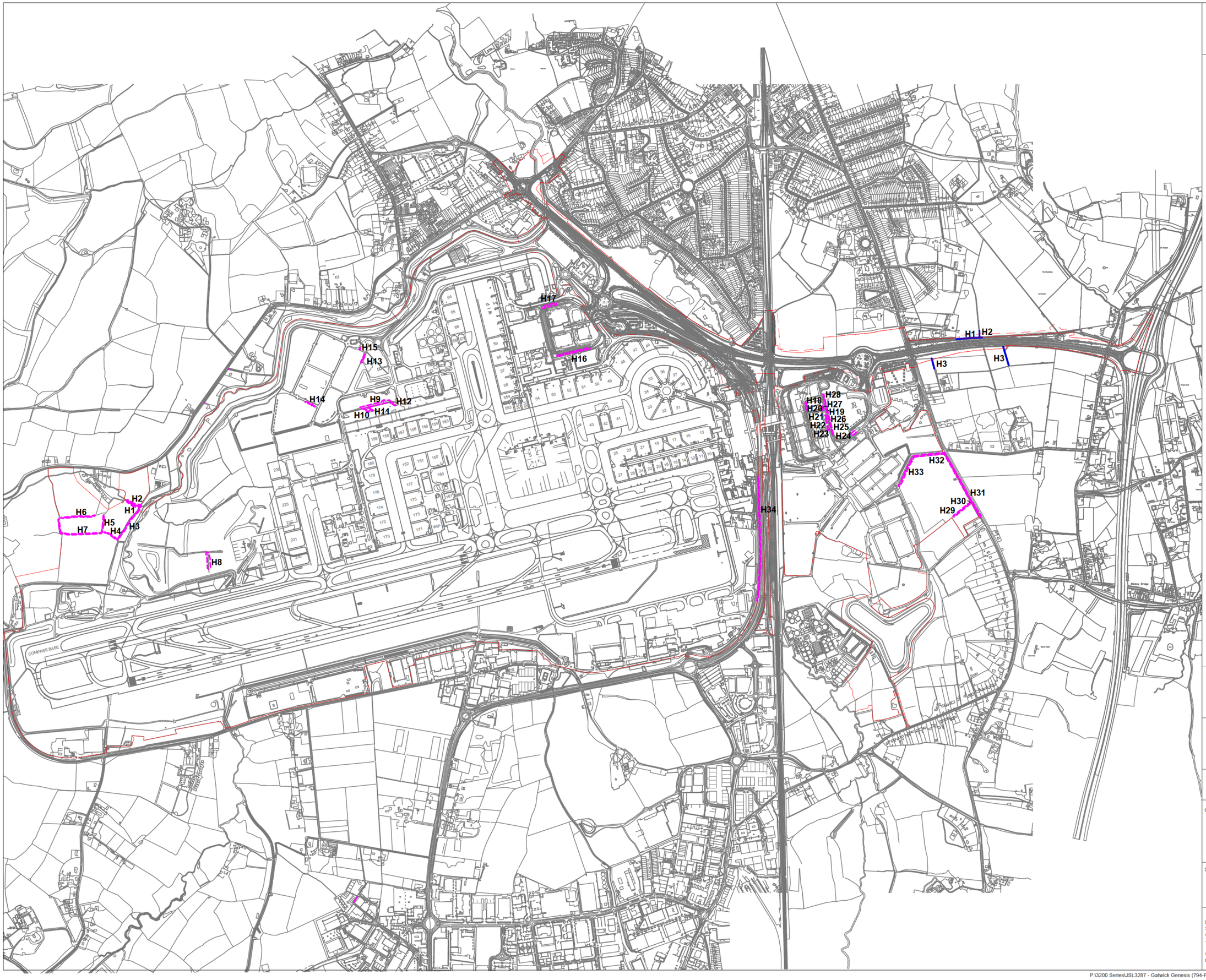
3.1.9 For easterly arrivals, it is possible that aircraft could be as close as 100m above areas of woodland where bats have been identified as important (Horleyland Wood). The proposed development will only use the northern runway for departures so there will be no change to noise levels generated during arrivals.

3.1.10 As such, given that it is highly unlikely that noise changes due to increased flights on the Northern Runway 100m north of the current main runway would be perceptible to bats at the distances involved from the airport to the woodlands they utilise, there would be no impact on bats using woodlands surrounding the airport from changes in noise levels.

3.1.11 Any bats using roosts closer to the airport (such as those identified using trees in Museum Field (Figure 3.2.2 from **Appendix 9.6.3: Bat Trapping and Radio Tracking Surveys – Part 2** [APP-132]) will be circa 35m closer to the revised taxiway location. This would make an insignificant change to the noise environment any bats that are using these roosts would experience. Further, such bats are already using land adjacent to the airport, including foraging across the airfield. As such, they are already adapted to a high-noise environment and such a small change would not have any effect on such bats.

References

Geipel I., Lattenkamp E.Z., May Dixon M., Weigrebe L. & Page R.A. (2021) *Hearing sensitivity: An underlying mechanism for niche differentiation in gleaning bats*. Proceedings of National Academy of Sciences. 118 (36) No. 36 e2024943118.



LONDON GATWICK

Legend

Project Site Boundary

Hedgerow Locations

DOCUMENT

Environmental Statement

DRAWING TITLE

Hedges Overview

DATE

January 2024

ORIENTATION	DRAWING NO.	REVISION
N	FIGURE 1	For ES Issue
	DRAWN BY: RC	PM / CHECKED BY: DC

SCALE @ A2

NTS

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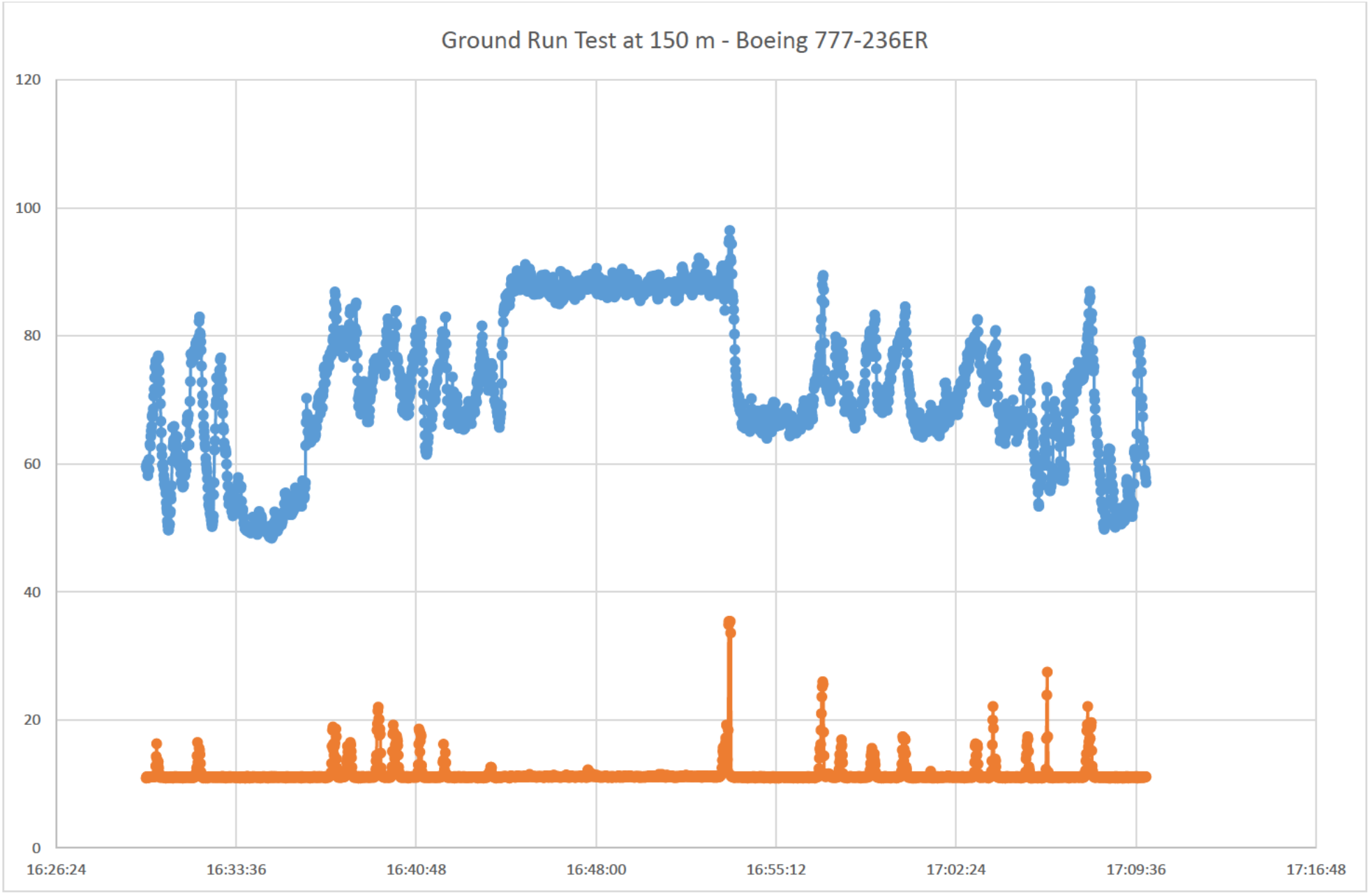
Figure 2. Measurements of an engine testing run for a B777 aircraft


Ground Run Test at 150 m - Boeing 777-236ER
120
100
80
60
40
20
0
16:26:24
16:33:36
16:40:48
16:48:00
16:55:12
17:02:24
17:09:36
17:16:48