Royal Mail Group

PATCHAM COURT FARM

Noise Impact Assessment

APRIL 2023

PUBLIC

Royal Mail Group

PATCHAM COURT FARM

Noise Impact Assessment

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1 INTRODUCTION

1.1.1 WSP has been appointed by Royal Mail Group to carry out a noise impact assessment of the mail delivery office proposed at Patcham Court Farm, Brighton. The scheme comprises a delivery office and areas for parking, of which the building covers an area of approximately 4,145 m^2. The total site area is 1.56 hectares. This report presents the methodology, results and conclusions of a noise impact assessment undertaken for the proposed scheme, based upon an environmental noise survey carried out on the site.

1.1.2 This version of the report supersedes earlier versions and addresses queries raised by Acoustic Associates Sussex Limited, on behalf of the Brighton and Hove Environmental Health department.

1.1.3 This report is necessarily technical in nature and a glossary is provided in Appendix A to assist the reader.

1.2 SITE LOCATION

1.2.1 The proposed development site is located off Vale Avenue, to the south of the A27 and to the east of the A23. The development site is currently occupied by abandoned farm buildings. There are residential buildings to the south-east and allotments to the east of the development site.

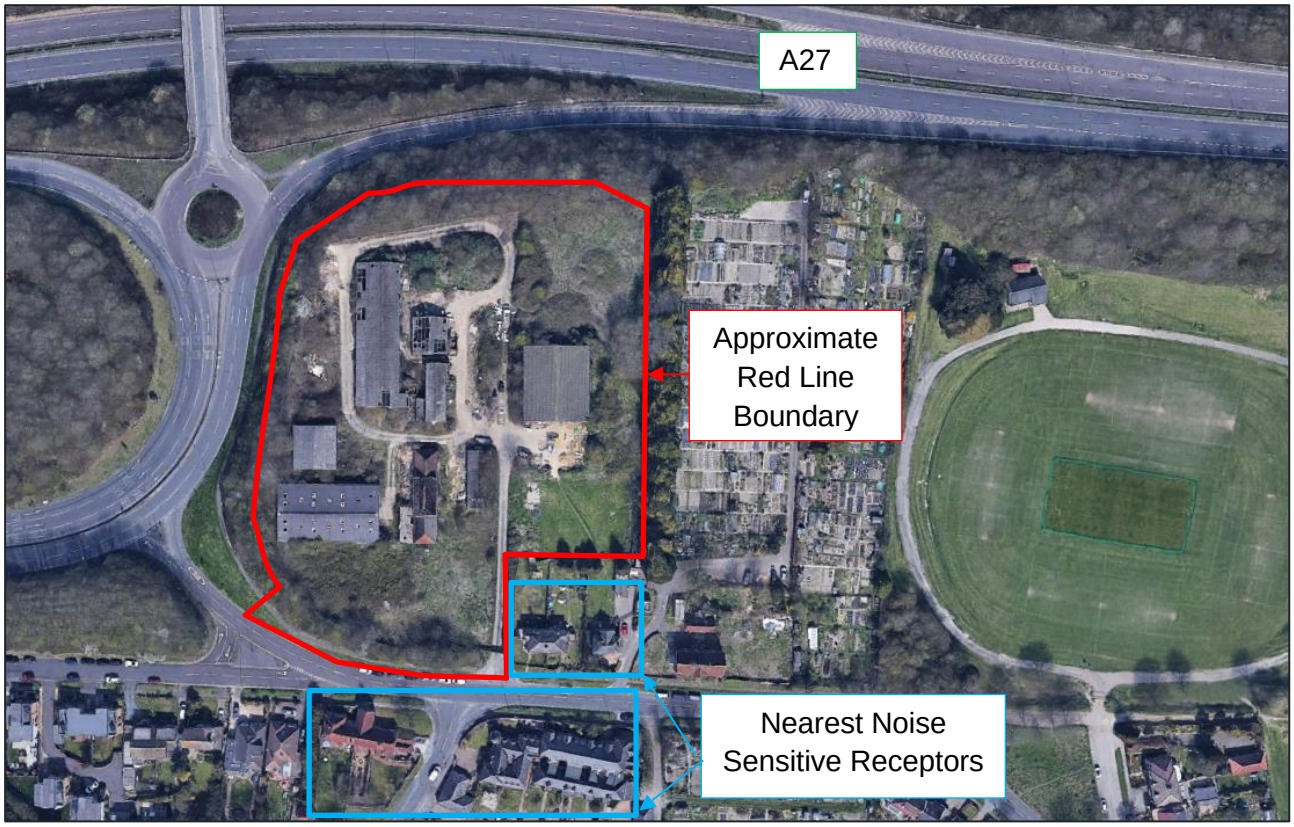
1.2.2 A site masterplan is included in Appendix B.

2 SITE DESCRIPTION

2.1.1 The proposed development consists of a delivery office building, site roads, loading bays and areas for parking. The building covers an area of approximately 4,145 m^2 of a total site area of 1.56 hectares. The building will be used to sort mail ready for deliveries to local houses.

2.1.2 The approximate extent of the development site relative to the nearest noise sensitive receptors is presented in Figure 2-1 below.

Figure 2-1 – Approximate Site Extent and Noise Sensitive Receptor Locations



2.1.3 The nearest noise sensitive receptor is a semi-detached dwelling, located approximately 8 m to the east of the existing entrance to the development site. There are additional dwellings to the east, with other residential dwellings located opposite the existing site entrance on the south side of Vale Avenue. These dwellings include 130,132,134 Vale Avenue, Patcham Court Farmhouse and The Village Barn.

2.1.4 Other properties in the area are located further away from the proposed development and it is expected that these properties will be less affected by any noise from the proposed delivery office. Therefore, only the receptors identified in paragraph 2.1.3 above have been considered in this assessment.

Typical activities that will occur in the vicinity of the delivery office building include:

- The loading and unloading of HGVs at dock levellers;
- HGVs moving around the yard; and
- Completing van checks in the yard (which is not considered to be a noisy activity).

3 PLANNING POLICY, GUIDANCE AND STANDARDS

3.1.1 This section outlines the British Standards, planning policy and guidance documents which have been used to assess the potential noise impacts from the proposed delivery office.

3.2 NATIONAL PLANNING POLICY

NATIONAL PLANNING POLICY FRAMEWORK 2021 (NPPF)

3.2.1 First published in 2012 and most recently updated in July 2021, the NPPF sets out the Government's planning policies for England and how these are expected to be applied. The NPPF superseded Planning Policy Guidance Note (PPG) 24: Planning and Noise amongst other PPG's and Planning Policy Statements (PPS's). In contrast to PPG 24, reference to noise is limited within the NPPF. Noise is referenced within the document as follows:

"174. Planning policies and decisions should contribute to and enhance the natural and local environments by: [inter alia]…

- *preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans;"*

and

"185. Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should: [inter alia]

a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life[65];

b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason;"

3.2.2 Footnote 65 to paragraph 185(a) refers to the Explanatory Note to the Noise Policy Statement for England (NPSE).

THE NOISE POLICY STATEMENT FOR ENGLAND (NPSE)

3.2.3 The NPSE seeks to ensure that noise issues are considered at the right time during the development of policy and decision making, and not in isolation. It highlights the underlying principles on noise management already found in existing legislation and guidance.

3.2.4 The NPSE sets out the long-term vision of Government noise policy as follows:

"Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development."

3.2.5 This long-term vision is supported by the following aims:

"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- *avoid significant adverse impacts on health and quality of life;*
- *mitigate and minimise adverse impacts on health and quality of life; and*
- *where possible, contribute to the improvement of health and quality of life."*

3.2.6 To assist in the understanding of the terms 'significant adverse' and 'adverse', the NPSE acknowledges that there are concepts that are currently being applied to noise impacts, for example, by the World Health Organisation (WHO). They are:

- NOEL - No Observed Effect Level - This is the level below which no effect can be detected and below which there is no detectable effect on health and quality of life due to noise.
- LOAEL - Lowest Observed Adverse Effect Level - This is the level above which adverse effects on health and quality of life can be detected.
- SOAEL - Significant Observed Adverse Effect Level - This is the level above which significant adverse effects on health and quality of life occur.

3.2.7 The NPSE states that:

"it is acknowledged within the NPSE that it is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available."

3.3 LOCAL AUTHORITY REQUIREMENTS

CONSULTATION

3.3.1 WSP liaised with Agon Hadri, a technical officer at Brighton and Hove City Council (BHCC). It was determined that WSPs proposed noise measurement locations were suitable and that a BS 4142 type assessment should be undertaken.

3.3.2 Additional comments were received from Acoustic Associates Sussex Limited, on behalf of the Brighton and Hove Environmental Health department, in October 2022, in response to an earlier version of this report. Those comments included 21 explicit questions which, where possible, have been addressed in this report.

3.4 BS 4142:2014+A1:2019 METHODS FOR RATING AND ASSESSING INDUSTRIAL AND COMMERCIAL SOUND (BS 4142)

3.4.1 BS 4142 includes two main elements; a numerical method by which to determine an initial estimation of the potential impact of sound of an industrial nature and a contextual method whereby the initial impact estimation may be modified to account for local circumstances.

3.4.2 The specific sound level from the source under investigation is measured or predicted and may then be corrected for acoustic characteristics using the penalties below, if appropriate:

- Tonality up to 6 dB
- Impulsivity up to 9 dB
- Intermittency up to 3 dB
- Other sound characteristics 3 dB

3.4.3 This resultant level is then termed the 'rating level' (denoted as $L_{Ar,Tr}$), whether or not any penalty is applied.

3.4.4 An initial estimate of the impact is obtained by subtracting the background sound level ($L_{A90,T}$) from the derived rating level. Typically, the greater the difference, the greater the magnitude of impact. In the context of the Standard, adverse impacts include, but are not limited to, annoyance and sleep disturbance. The Standard includes the following assessment scale:

- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on context.
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on context.
- Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

3.4.5 Modification of the initial impact estimation is then considered based on a wide ranging contextual assessment.

3.5 DESIGN MANUAL FOR ROADS AND BRIDGES (DMRB) LA 111 NOISE AND VIBRATION (REVISION 2), 2020

3.5.1 DMRB LA 111 was first published in November 2019, superseding DMRB HD213/11 which was withdrawn at that time. The document sets out methods for the assessment of potential noise and vibration impacts from road projects.

3.5.2 For operational road traffic noise, the magnitude of change can be defined in accordance with LA 111 Table 3.54a (short-term) and Table 3.54b (long term). These tables are combined below.

Table 3-1 – Magnitude of Change - Short and Long-term

Magnitude of change	Noise change (dB $L_{A10,18h}$ or L_{night})	
	Short-term	Long-term
Major	Greater than or equal to 5.0	Greater than or equal to 10.0
Moderate	3.0 – 4.9	5.0 – 9.9
Minor	1.0 – 2.9	3.0 – 4.9
No change or negligible	Less than 1.0	Less than 3.0

4 BACKGROUND SOUND LEVELS

4.1 SCOPE

4.1.1 A baseline noise survey was undertaken on the development site. The survey comprised a combination of attended and unattended measurements, at two locations on the development site.

4.1.2 Additional measurements were carried out at the Royal Mail Swindon Delivery Office in order to capture the noise levels from lorries of comparable type and size at a Royal Mail site similar to the proposed development.

4.2 NOISE MEASUREMENT POSITIONS

4.2.1 The monitoring locations were selected to obtain sound levels representative of the existing receptors closest to the proposed noise sources. The monitoring locations are shown in Appendix C and described in Table 4-1 below.

Table 4-1 – Noise Survey Positions

Measurement position	Measurement type Date and time	Description
1	Long-term monitoring (LT1) 12:15 Wednesday 12 January 2022 to 12:30 Friday 14 January 2022	Located approximately 13 metres north of Vale Avenue at a height of 1.5 metres above the local ground level.
2	1 hour attended measurement (SP1) 12:55 Wednesday 12 January 2022	Located approximately 24 metres north of the rear elevation of 132 Vale Avenue at a height of 1.5 metres above local ground level.
Various attended locations	Lorry measurements 21:00 to 2200 Thursday 03 March 2022	Royal Mail Swindon Delivery Office

4.3 EQUIPMENT DETAILS

4.3.1 The following sound measuring equipment was used to undertake the survey.

Table 4-2 – Equipment Details

Equipment name Position	Equipment description	Manufacturer and type number	Serial number	Calibration due date
Duo 1 Position 1	Sound level meter	01dB-Stell Duo 'Datalogging Integrating Sound Level Meter'	10616	01/06/2023
	Pre-amplifier	01dB-Stell PRE 21 S Preamplifier	10180	
	Microphone	G.R.A.S Type 40CD Condenser Microphone	154423	
	Calibrator	01dB Cal 21	34924053	27/05/2022

Equipment name Position	Equipment description	Manufacturer and type number	Serial number	Calibration due date
Solo 11 Position 2	Sound level meter	01dB-METRAVIB Blue Solo 'Datalogging Integrating Sound Level Meter'	060845	17/12/2022
	Pre-amplifier	01dB-MATRAVIB PRE 21 S Preamplifier	13164	
	Microphone	01dB MCE212 Condenser Microphone	182024	
	Calibrator	01dB-Stell Cal 21	51031216	20/12/2022
Cube 3 Positions 3 and 4	Sound level meter	01 dB CUBE 'Integrating-Averaging Sound Level Meter'	10630	21/10/2023
	Pre-amplifier	Acoem PRE 22 Preamplifier	10184	
	Microphone	GRAS Type 40CD Condenser Microphone	288065	
	Calibrator	01dB-Metravib Cal 21	34344461	01/09/2022

4.3.2 Each sound level meter was subject to field calibration tests prior to and on completion of each set of measurements using its field calibrator. No significant drift occurred at any position.

4.4 WEATHER

4.4.1 At the start of the survey and during the attended measurements, the weather was sunny with clear skies, no rain and little perceptible breeze. At the end of the survey, the weather was dry and still.

4.4.2 Historical data obtained from www.wunderground.com indicates that conditions were similar to these throughout the survey period. Wind conditions were generally no higher than 5 m/s.

4.4.3 These conditions are considered to be suitable for obtaining representative sound level measurements at this location.

4.5 ENVIRONMENTAL NOISE CLIMATE

4.5.1 Subjectively, the noise environment in the vicinity of the development site is dominated by constant road traffic on the A27 to the north. Vehicles on Vale Avenue also contributed to the road traffic noise levels at the measurement positions.

4.5.2 Other sound sources included vans entering and exiting the site as well as occasional banging from loading activities of the commercial fencing company currently operating on the site. Occasionally aircraft flew over the site including planes and helicopters.

4.6 NOISE MEASUREMENT RESULTS

4.6.1 Simultaneous one-hour measurements were carried out at LT1 and SP1 in order to provide an approximate differential between the sound levels representative of the front and rear of the nearest noise sensitive receptors (those immediately to the east of the existing site access – see Figure 2-1). Table 4-3 provides the results of the noise monitoring and identifies the differential between the two positions.

Table 4-3 – Differentials between Measurement Positions

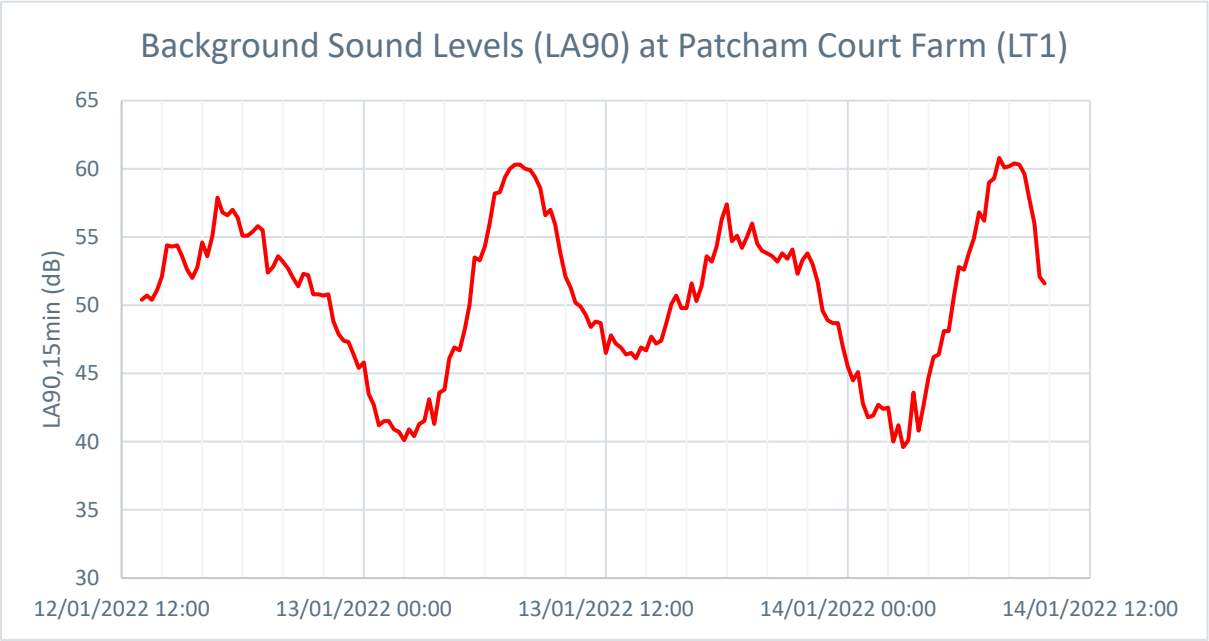
Position	Description	$L_{Aeq, 1hr}$ (dB)	$L_{A90, 1hr}$ (dB)
LT1	13 metres north of Vale Avenue	56	51
SP1	24 metres north of the rear elevation of 132 Vale Avenue	54	48
Differential between front and rear of receptors	-	-2	-3

4.6.2 Table 4-4 identifies the typical 15-minute background sound level (L_{A90}) during the busiest night-time period anticipated in terms of Royal Mail lorry movements at the proposed site (06:00 – 07:00) and the quietest night-time period that will have Royal Mail vehicle movements at the proposed site (03:00 – 04:00) as identified in Table 5-2. The background sound level at the rear of the nearest noise sensitive receptor has been determined using the differentials identified in Table 4-3. Figure 4-1 shows a time history of the background sound levels measured at LT1.

Table 4-4 – Summary of Noise Measurement Data from Position 1

Period	$L_{Aeq,15min}$ (dB) at LT1	$L_{Aeq,15min}$ (dB) at rear of receptor	$L_{A90,15min}$ (dB) at LT1	$L_{A90,15min}$ (dB) at rear of receptor
03:00 – 04:00	49	47	42	39
06:00 – 07:00	59	57	56	53
07:00 – 08:00	62	60	60	57
08:00 – 09:00	63	61	60	57

Figure 4-1 - Background Sound Levels



4.7 LORRY MEASUREMENTS

An additional noise measurement survey was carried out in order to quantify the noise levels of Royal Mail lorries arriving at, and departing from, an existing delivery office. Measurements included the use of air brakes when stopping at the junction to the main highway however reversing alarms were not used at this site when vehicles were reversing into the dock levellers.

Table 4-5 identifies the measured noise levels for a representative Royal Mail lorry pass-by. The highest maximum level (L_{max}) generated by the vehicle pass by has been used to calculate the sound power level of the pass by using standard point source distance correction formulae as a worst case. The derived sound power level of 103 dBA is considered comparable to existing sources of noise data such as the noise level tables in BS 5228[1]. The sound power level is comparable to the lower levels identified in BS 5228, which can be reasonably expected with fleet improvements over the time between the source measurements of BS 5228 and the measurements of this survey.

Table 4-5 – Lorry Pass by Noise Levels

Activity	Sound pressure level ($L_{Aeq,T}$) (dBA)	Maximum noise level ($L_{Amax,T}$) (dBA)	Distance (m)	Duration (s)	Derived event sound power level (dBA)
Double deck Royal Mail lorry pass-by	76	80	6	12	103

[1] BS 5228-1:2009+A1:2014 'Code of Practice for noise and vibration control on construction and open sites'

5 COMMERCIAL NOISE SOURCES

5.1 PLANT SOUND POWER LEVELS

5.1.1 It is understood that the following fixed plant items are currently proposed in the locations shown in Figure 5-1:

- 2no. Air Source Heat Pumps (ASHPs)
- 3no. Outdoor Condenser Units

5.1.2 Sound level data for the plant items outlined above have been provided by manufacturers as presented in Table 5-1 of this report. It is assumed that the plant will have a 100% on time.

Table 5-1 – Plant Sound Level Data

Plant	Sound power level (dBA)
Air Source Heat Pump	90
Outdoor Condenser Unit (Heating)	72

5.1.3 Only information of the total generated sound level has been provided, as such suitable frequency band spectra have been adopted based on prior experience with similar plant items, with the octave band levels adjusted to produce the overall levels provided by the manufacturers.

5.2 OPERATING SCHEDULE

5.2.1 Lorries that will service the site include 17 tonne vehicles, articulated lorries and double deck trailer lorries. Table 5-2 presents the number of lorry movements predicted during specific hours of the day. It is understood that the fixed plant will operate continuously.

Table 5-2 – Times of Operation

Time	Requirement per hour
00:00 – 01:00	1 x Articulated Lorry
03:00 – 04:00	1 x Double Deck Trailer Lorry
05:00 – 06:00	1 x Double Deck Trailer Lorry
06:00 – 07:00	2 x Articulated Lorry
07:00 – 08:00	2 x 17 Tonne Lorry
08:00 – 09:00	1 x 17 Tonne Lorry
13:00 – 14:00	1 x 17 Tonne Lorry
16:00 – 17:00	1 x 17 Tonne Lorry
18:00 – 20:00	1 x 17 Tonne Lorry

5.2.2 Table 5-3 shows the predicted traffic data for staff arrivals at the proposed site per hour as provided by Mott Macdonald. The period with the highest number of staff arrivals is 06:00 – 07:00. Nearby receptors will be more sensitive to noise impacts in the morning than the afternoon. As such, staff departures that will happen later in the day when background noise levels are higher have not been assessed.

Table 5-3 – Staff Arrival Times

Time Period	Number of staff arrivals
04:00 – 05:00	8
05:00 – 06:00	13
06:00 – 07:00	103
07:00 – 08:00	17
08:00 – 09:00	1
09:00 – 10:00	8
10:00 – 11:00	5
11:00 – 12:00	-
12:00 – 13:00	-
13:00 – 14:00	1
14:00 – 15:00	-
15:00 – 16:00	-

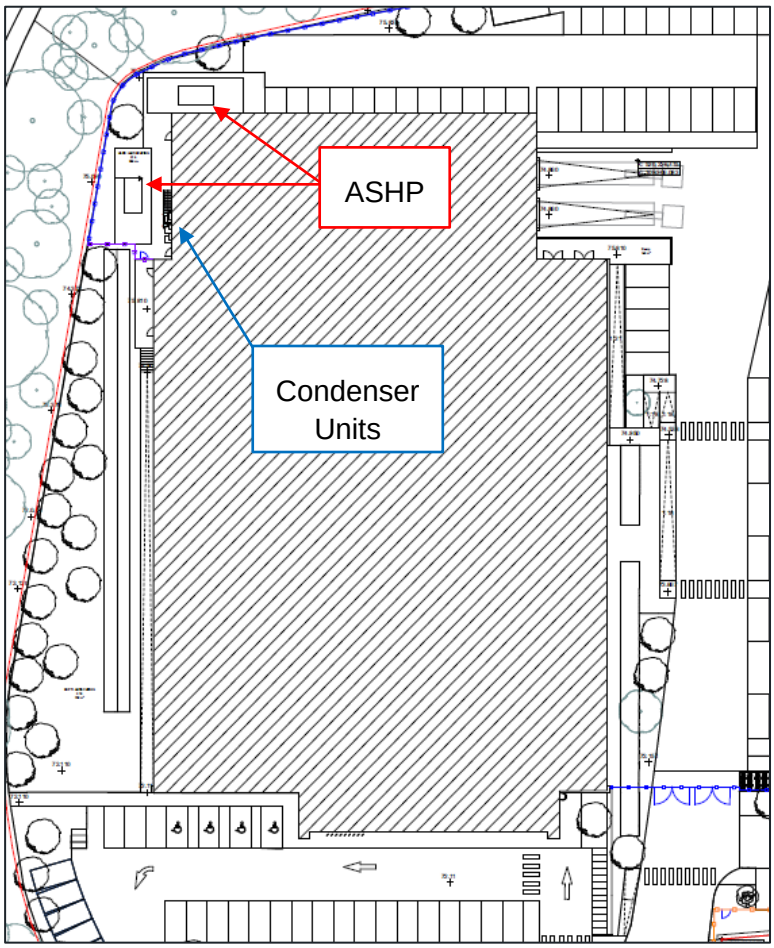
5.2.3 Based on the information provided in Table 5-2 and 5-3, the busiest period of the day, in terms of overall vehicle movements, will be 06:00-07:00. The period with the lowest background noise level, and therefore the most sensitive to noise, is 03:00-04:00. These periods will be assessed to determine the impact of staff arrivals along with HGV vehicles and fixed plant.

5.2.4 Mott Macdonald have carried out a sensitivity test for the staff arrival data, identifying a scenario where all arrivals occur 90 minutes later. This change would put the hour with the highest number of arrivals in a less noise sensitive period during the daytime as the background noise levels increase by 4 dB in the 07:00 – 08:00 and 08:00 – 09:00 periods as can be determined from the data in Table 4-4. This scenario would therefore have no impact over and above that identified in the worst case assessment that has been carried out in Section 6.

5.3 PLANT LOCATIONS

5.3.1 A mark-up of the proposed plant locations is included in Figure 5-1.

Figure 5-1 – Plant Locations



5.4 ACOUSTIC CHARACTERISTICS

5.4.1 Due to the location of the fixed plant being screened from the nearest noise sensitive receptors by the proposed building, the overall noise level produced by the ASHPs and condenser units are sufficiently low at the nearest noise sensitive receptors (more than 10 dB below the ambient noise level) that the plant will be inaudible. Therefore, an acoustic characteristic penalty has not been applied to plant noise for intermittency, tonality or impulsivity.

5.4.2 The lorry movements on site are considered not to have any particular intermittent or tonal characteristics however as individual lorry movements might be distinguishable above the more constant ambient noise level from more distant road traffic due to the use of air brakes on the lorries, an acoustic feature correction of 3 dB has been added to the specific sound level for impulsivity.

5.4.3 Vehicle movements from staff arriving at the proposed development will not be overtly distinguishable from the ambient noise climate and as such no acoustic penalty will be applied. Car

parking noise including door slams has the potential to be distinguishable from the ambient noise climate and will incur a 3 dB impulsivity penalty.

6 NOISE IMPACT ASSESSMENT

6.1 ENVIRONMENTAL NOISE MODEL

6.1.1 A 3D noise model of the site and its surroundings has been developed using CadnaA acoustic modelling software. This modelling software allows noise levels to be accurately predicted at nearby receptors, while considering acoustic attenuation from distance, topography, ground absorption and screening. This model also considers third order sound reflections from nearby reflective surfaces.

6.1.2 The plant items described in Section 5, the proposed new delivery office building and topography information for the site have been included, as provided within the site masterplan.

6.2 ASSESSMENT CONSIDERATIONS

6.2.1 Noise emissions from all items of plant and vehicle movements associated with the proposed delivery office have been assessed in order to ensure that acceptable noise levels can be achieved when the project is complete, and the delivery office is operational.

ASHP SOUND SOURCES

6.2.2 The ASHP's are represented by solid blocks with area sound sources added horizontally to the top and vertically to the sides of each unit. Their individual dimensions are consistent with those supplied by the Client.

6.2.3 The sound power levels applied to each area source have been calibrated so that each unit (e.g. solid block and associated area sources) radiates a sound pressure level equal to the value provided by the manufacturer when averaged from all sides, in free field conditions, at 1 m distance from the plant and at 1.5 m above reflective ground.

LORRY SOUND SOURCES

6.2.4 The lorry sound sources have been represented by line sources at 1 m above ground. The line source follows a path in which a lorry would follow such that it can reverse into the loading bay to the north of the site. Reversing beepers were not in use at the Swindon site and it is understood that they will not be used at the development site. Vehicle tests, such as horn tests, for larger vehicles are carried out at the Royal Mail parent office and won't be carried out at the delivery office, therefore have not been assessed. Measurements of double deck lorries have been used to assess noise from articulated lorries as a worst case.

CONDENSER UNIT SOURCES

6.2.5 The condenser units have been represented by point sources at a height of 2.5 m above the local ground height.

LOADING AND UNLOADING ACTIVITIES

6.2.6 Loading and unloading of vehicles will occur to the north of the development site, over 100 m away from the noise sensitive dwellings. The lorries will dock with the building at dock levellers, essentially creating an enclosed space where loading and unloading occurs. The dock leveller will be positioned such that the building envelope screens the loading area from the noise sensitive receptors. For these reasons it has been assumed that the noise levels from these operations would

be so low such at the receptor locations that they would not affect the predictions of noise from the HGV movements.

ROYAL MAIL FLEET VEHICLES

6.2.7 Royal Mail fleet vehicles entering and egressing the site will be electric vehicles which will generate significantly less noise than the petrol or diesel equivalents. At the relatively low speed these vehicles will be travelling, tyre and aerodynamic noise would remain low especially when considering the ambient noise levels in the area. Due to the low noise levels produced by slow moving electric vehicles, noise from these vehicle movements has not been quantitatively assessed.

OTHER NOISE SOURCE CONSIDERATIONS

6.2.8 An ancillary building is proposed in the northeast corner of the development site. It will consist of a lightweight structure to allow all weather light maintenance to vehicles such as adding air to tyres, topping up oil or water and light repairs that do not require a visit to a road maintenance workshop. It is thought that activities at this building will be intermittent and generate relatively low levels of noise and for that reason have been excluded from detailed assessment.

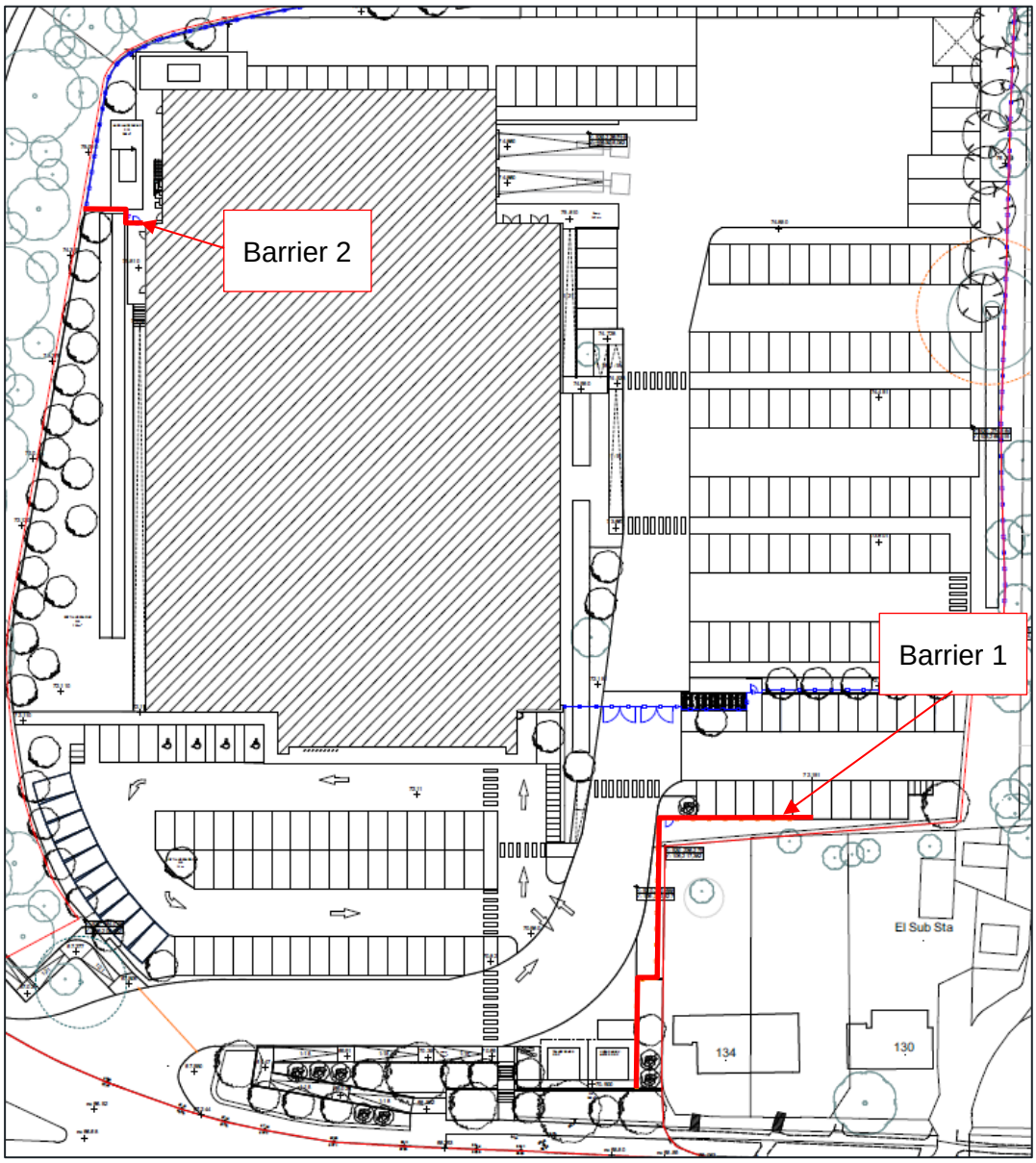
6.2.9 Information for the substation has been provided by Hulley and Kirkwood. Predictions based on the transformer sound power levels provided identifies a specific sound level of 18dB at the nearest noise sensitive receptor. That is 17 dB below the noise predicted from the HGV movements and more than 20 dB below the adopted background sound levels. Therefore, the substation is not considered to be a significant noise source.

6.2.10 The sound power levels provided for the substation do not include any allowance for an enclosure around the transformer. The proposed transformer will be enclosed, however, further reducing the specific sound level. Therefore, there should be no noise impact from the transformer.

ENVIRONMENTAL NOISE BARRIERS

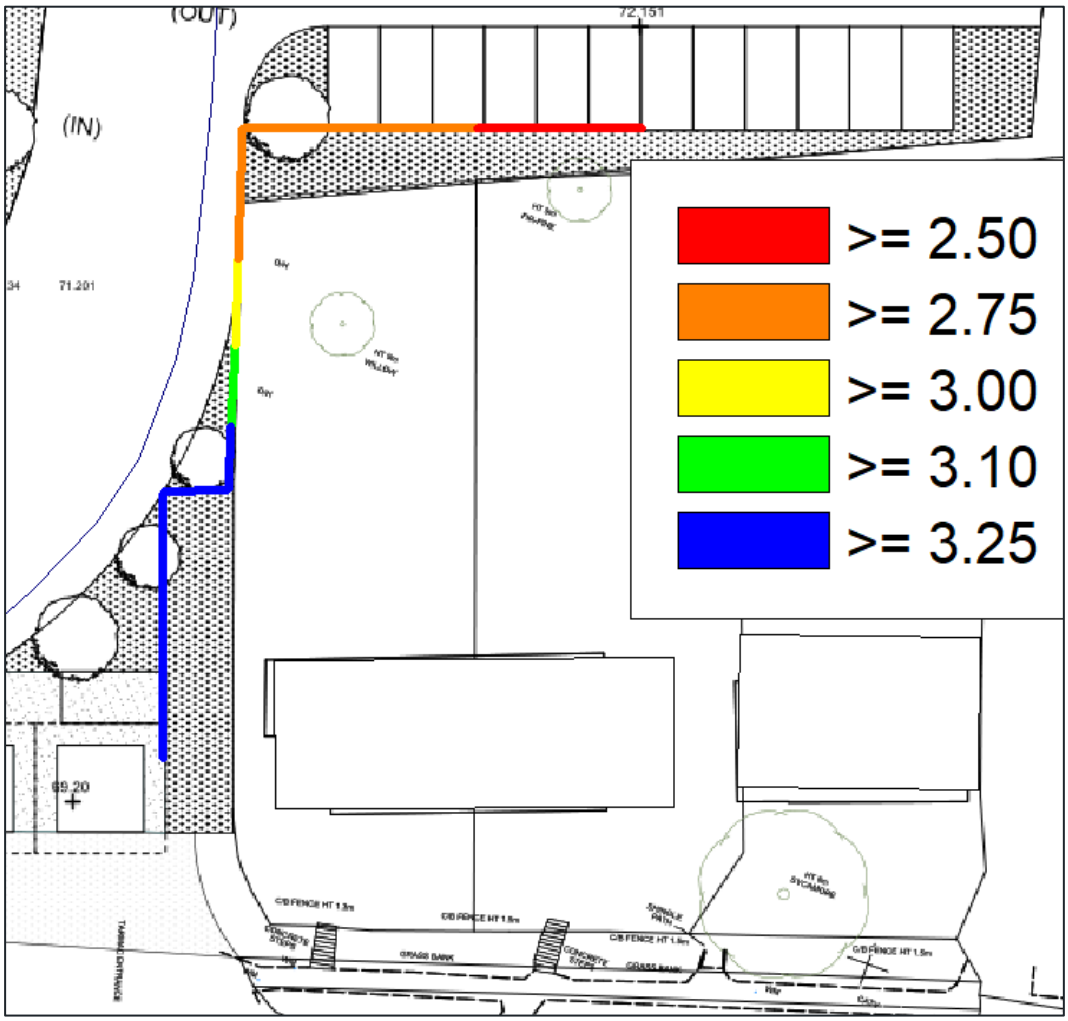
6.2.11 In order to reduce noise from the proposed commercial noise sources two environmental noise barriers have been added to the design of the scheme. The barrier locations are identified in Figure 6-1.

Figure 6-1 – Noise Barriers



6.2.12 Barrier 1 consists of a green noise barrier with varying height from 3.25 m at the southern end to 2.5 m at the northern end. A detailed graphic of the heights of the sections of Barrier 1 has been provided in Figure 6-2 which identifies the minimum heights of sections of the barrier in metres. The barrier has been designed such that noise impact initial estimation is low when assessed in line with BS 4142 and so that any visual impacts can be minimised for the residents of the sensitive dwellings. The exact product that will be used to form the green barrier has not been determined at this point, however any product used will have a minimum density of at least 10 kg/m^2.

Figure 6-2 – Barrier 1 Heights



6.2.13 Barrier 2 consists of a noise barrier with a height of 2.5 m and a surface density of at least 10 kg/m^2 running between the façade of the delivery office and the site boundary.

6.3 ASSESSMENT PERIODS

6.3.1 Due to the variation in noise generating activities across the night-time period, two time periods have been assessed to ensure all relevant noise sources have been assessed. Table 6.1 identifies the background noise levels and noise sources that have been assessed for each time period.

Table 6-1 – Time Periods Assessed

Time Period	$L_{A90,15min}$ (dB) at LT1	$L_{A90,15min}$ (dB) at rear of receptor	Included Noise Sources
03:00 – 04:00	42	39	• 1 Double deck Lorry • Air Source Heat Pumps
06:00 – 07:00	56	53	• 2 Double deck Lorries • Air Source Heat Pumps • Staff arrivals and parking

6.4 BS4142 ASSESSMENT

6.4.1 The specific sound levels from the noise sources identified in Table 6-1 have been calculated at 1 m from the windows of the nearest noise sensitive receptors. The values in Table 6-2 and Table 6-3 provide the noise levels experienced at a height of 4 m, which is representative of the worst affected first floor residential window for the 03:00 – 04:00 and 06:00 – 07:00 time periods respectively. A plan identifying the locations of these receptors is provided in Appendix D.

Table 6-2 – Calculated Sound Levels and Assessment at the Nearest First Floor Residential Windows 03:00 – 04:00

Receptor location	Background sound level ($L_{A90, 15min}$) (dB)	Specific sound level at nearest noise sensitive receptor ($L_{Aeq\ 15\ min}$) (dB)	Acoustic feature correction	Rating sound level (dB)	Excess of rating sound level over background sound level
R1: 134 Vale Avenue	39	40	+3	43	+4
R2: 132 Vale Avenue	39	37	+3	40	+1
R3: 130 Vale Avenue	39	38	+3	41	+2
R4: The Village Barn	42	37	+3	40	-2
R5: Patcham Court Farmhouse	42	40	+3	43	+1

6.4.2 These results indicate that the rating sound level will be within 2 dB of the background sound level at the R2 – R5 during the 03:00 – 04:00 period. Based on the methodology outlined in BS 4142, this result is an initial impact estimation of the proposed operations having a low impact. The rating sound level at R1 is 4dB above the background sound level which would result in an initial impact estimation of an adverse impact depending on the context of the noise.

Table 6-3 – Calculated Sound Levels and Assessment at the Nearest First Floor Residential Windows 06:00 – 07:00

Receptor location	Background sound level ($L_{A90, 15min}$) (dB)	Specific sound level at nearest noise sensitive receptor ($L_{Aeq\ 15\ min}$) (dB)	Acoustic feature correction	Rating sound level	Excess of rating sound level over background sound level
R1: 134 Vale Avenue	53	46	+3	49	-4
R2: 132 Vale Avenue	53	44	+3	47	-6
R3: 130 Vale Avenue	53	44	+3	47	-6
R4: The Village Barn	56	44	+3	47	-9
R5: Patcham Court Farmhouse	56	47	+3	50	-6

6.4.3 These results indicate that the rating sound level will be equal to or below the background sound level at the assessment locations during the 06:00 – 07:00 period. Based on the methodology outlined in BS 4142, this result is an indication of the proposed operations having a low impact.

6.5 CONTEXT

6.5.1 When carrying out an assessment in line with BS 4142:2014, it is necessary to understand the context of the site that is being assessed and the initial impact estimation. The site is located in proximity to the A27 and A23 and road traffic on those roads dominate the existing noise climate.

6.5.2 The existing ambient noise levels due to road traffic are relatively high during the 03:00 – 04:00 period which will reduce the significance of the impact from vehicle-based noise sources.

6.5.3 The absolute noise level from activities during the 03:00 – 04:00 period is not particularly high. Assuming, as a worst case, that the nearby receptors have windows partially open for cooling and that a partially open window would provide a sound reduction of 15 dB, internal noise levels at R1 would be 25 dB. This is below the internal noise level criteria in bedrooms provided by ProPG for the night-time period (30 dB).

6.5.4 A further contextual factor is that the initial impact estimations described are representative of worst case conditions whereas for the majority of the time it is anticipated that noise would be far less impactful.

6.5.5 Taking these contextual factors into account it is considered that a downward modification of the initial impact estimation is justified, and it is therefore unlikely that the development will have a significant impact on nearby residential receptors.

6.6 UNCERTAINTY

6.6.1 Uncertainty has been reduced by measuring Royal Mail vehicles that are of the same type that will be used for the proposed development. The measurements of the vehicles were carried out in proximity to those vehicles in order to reduce the uncertainty of intervening ground conditions. The measurements were carried out at such a time that other noise sources were less likely to influence the measurements. The sound power level used to calculate the specific sound level was determined from data that was representative of the source and conditions under which the source is expected to operate. Uncertainties in all aspects of this assessment have been minimised as far as possible and their consideration is set out in more detail in **Appendix E**.

6.7 MAXIMUM NOISE LEVELS

6.7.1 As the lorries will be operating during the night-time period, an assessment of the maximum noise levels has been carried out. Internal maximum noise levels should not exceed 45 dB more than 10 times per night as referenced in the ProPG. A partially open window for ventilation is assumed to provide a sound reduction of 15 dB. Therefore, an external maximum sound level of 60 dB is the target level.

6.7.2 Table 6-4 identifies the maximum noise levels predicted from lorry movements at receptor locations during the night-time period. The L_{max} event level in Table 6.2 has been derived from measurements of a drive by of a double deck trailer lorry which is the nosiest of the HGVs that will enter the site and therefore a worst case.

Table 6-4 – Maximum Noise Levels - Lorry Movements

Receptor location	Maximum noise level due to lorry movement (L_{Amax}) (dB)
R1: 134 Vale Avenue	61
R2: 132 Vale Avenue	58
R3: 130 Vale Avenue	58
R4: The Village Barn	58
R5: Patcham Court Farmhouse	62

6.7.3 It can be determined from the results in Table 6-4 that the external maximum noise level target is exceeded at two locations (134 Vale Avenue and Patcham Court Farmhouse) by up to 2 dB. This is considered not to be a significant exceedance over the target noise level.

6.7.4 It can be determined from the schedule of lorry movements in Table 5-2 that five movements will occur during the night-time period (23:00 – 07:00) and therefore it is unlikely that there will be a significant impact on the residents of those properties.

6.7.5 It should be noted that with closed windows, the internal noise levels would be below the target noise level at all receptors, even assuming single-pane glazing, which would be considered worst case.

7 ROAD TRAFFIC NOISE

7.1 CHANGES TO OVERALL ROAD TRAFFIC NOISE

7.1.1 The development will increase the number of vehicles on the local road network. This has the potential to alter the road traffic noise in the local area.

7.1.2 The Calculation of Road Traffic Noise (CRTN) describes procedures for predicting and measuring noise levels (in dB) from road traffic in terms of the L_{A10} – the level exceeded for 10% of the time – and is suitable for the environmental assessment of schemes, which might affect road traffic noise.

7.1.3 In accordance with CRTN the Basic Noise Level (BNL)[2] has been calculated for each road link with and without the proposed delivery office.

7.1.4 The 18-hour BNL has been calculated for each link in accordance with CRTN and based on traffic data supplied by Mott Macdonald. The larger vehicles, staff movements and royal mail fleet vehicles have all been included within this assessment.

7.1.5 Table 7-1 identifies the noise level change on each of the major local roads in proximity to the development site between a predicted future level with and without the proposed development.

Table 7-1 – Calculated Change in Road Traffic Noise

Road	BNL change (dB) as a result of the proposed development
Vale Avenue East	0.2
Vale Avenue West	0.2
Church Hill	0.1
A27 Link Road North	0.0
A27 Link Road South	0.0
London Road	0.0
Mill Road	0.1
A23 North	0.0
A27 Bridge	0.0
A27 WB Onslip	0.0
A27 WB Offslip	0.0
A27 EB Onslip	0.0
A27 EB Offslip	0.1
A27 East	0.0
A27 West	0.0

[2] The Basic Noise Level (BNL) does not relate to any specific receptor, but rather is a measure of source noise, at a reference distance of 10 metres from the nearside carriageway edge of a specific length of highway. It is determined by obtaining the estimated noise level from the 18-hour traffic flow and then applying corrections for vehicle speed, percentage of heavy vehicles and sometimes gradient and road surface, as described in the CRTN.

7.1.6 By comparing the results in Table 7-1 to the short term and long term values identified in Table 3-1, it can be determined that there will not be a noise impact as a result of changes in road traffic flows on the wider road network.

8 CONCLUSIONS

8.1.1 WSP has been appointed by Royal Mail Group to undertake a noise assessment for a proposed mail delivery office at Patcham Court Farm, Vale Avenue, Brighton. The noise assessment has been undertaken to accompany a planning application for the proposed development and updated following comments received on behalf of the Brighton and Hove Environmental Health department.

8.1.2 The assessment draws upon the results of a detailed noise survey undertaken by WSP. Measurements of existing Royal Mail lorries at a comparable facility have been carried out to ensure that representative noise data have been utilised in the assessment of noise from lorry movements.

8.1.3 The BHCC Environmental Health Department was consulted as part of the assessment process, in order to understand local requirements and the consultation response has been considered as part of the assessment.

8.1.4 The acceptability of the noise likely to be generated by activities on the proposed site has been assessed. The worst case rating sound level when assessed in line with BS 4142 is 4 dB above the existing background sound level at one receptor location during the most sensitive period. When considered in the context of the existing ambient noise climate it has been concluded that noise anticipated from the fixed plant items and vehicle movements on the proposed site is likely to result in a low impact.

8.1.5 An assessment of maximum night-time noise levels from lorry movements on the proposed site has identified that night-time maximum noise levels from lorry movements would not result in a significant impact. An assessment of the change in noise levels due to development generated traffic has identified that there will not be any significant change in Basic Noise Level and therefore no impact on nearby noise sensitive receptors is anticipated.

9 LIMITATIONS

9.1.1 This report has been prepared for the titled project or named part thereof and should not be used in whole or part and relied upon for any other project without the written authorisation of WSP UK Limited. WSP UK Limited accepts no responsibility or liability for the consequences of this document if it is used for a purpose other than that for which it was commissioned.

9.1.2 Persons wishing to use or rely upon this report for other purposes must seek written authority to do so from the owner of this report and/ or WSP UK Limited and agree to indemnify WSP UK Limited for any and all loss or damage resulting therefrom. WSP UK Limited accepts no responsibility or liability for this document to any other party other than the person by whom it was commissioned.

9.1.3 The findings and opinions expressed are relevant to the dates of the site works and should not be relied upon to represent conditions at substantially later dates. Opinions included therein are based on information gathered during the study and from our experience. If additional information becomes available which may affect our comments, conclusions or recommendations WSP UK Limited reserve the right to review the information, reassess any new potential concerns and modify our opinions accordingly.

Appendix A

GLOSSARY OF ACOUSTIC TERMINOLOGY

GLOSSARY OF ACOUSTIC TERMINOLOGY

Noise is defined as unwanted sound. Human ears are able to respond to sound in the frequency range 20 Hz (deep bass) to 20,000 Hz (high treble) and over the audible range of 0 dB (the threshold of perception) to 140 dB (the threshold of pain). The ear does not respond equally to different frequencies of the same magnitude, but is more responsive to mid-frequencies than to lower or higher frequencies. To quantify noise in a manner that approximates the response of the human ear, a weighting mechanism is used. This reduces the importance of lower and higher frequencies, in a similar manner to the human ear.

Furthermore, the perception of noise may be determined by a number of other factors, which may not necessarily be acoustic. In general, the impact of noise depends upon its level, the margin by which it exceeds the background level, its character and its variation over a given period of time. In some cases, the time of day and other acoustic features such as tonality or impulsiveness may be important, as may the disposition of the affected individual. Any assessment of noise should give due consideration to all of these factors when assessing the significance of a noise source.

The most widely used weighting mechanism that best corresponds to the response of the human ear is the 'A'-weighting scale. This is widely used for environmental noise measurement, and the levels are denoted as dB(A) or L_{Aeq}, L_{A90} etc., according to the parameter being measured.

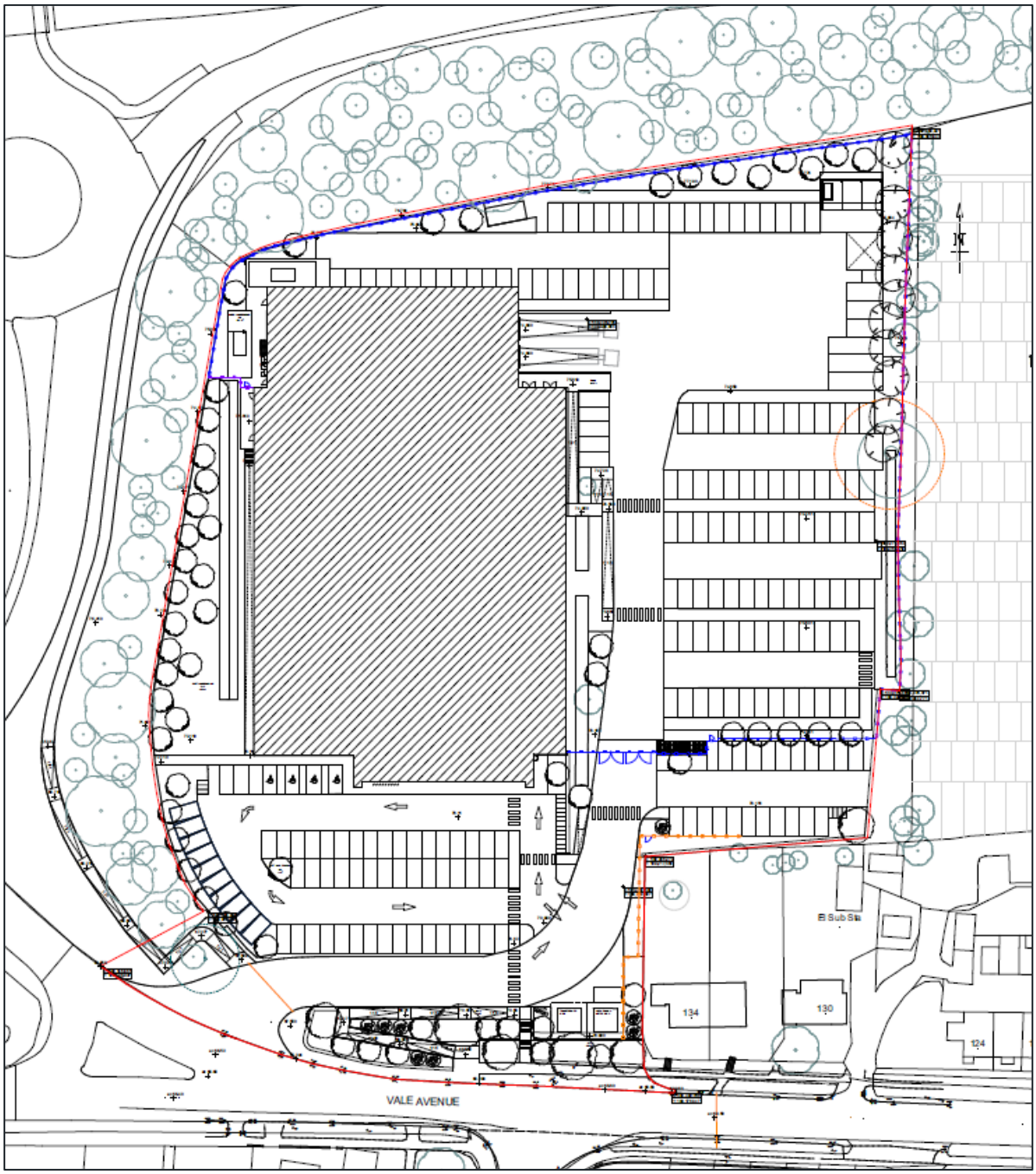
The decibel scale is logarithmic rather than linear, and hence a 3 dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective, but as a general guide a 10 dB(A) increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3 dB(A) is generally regarded as the minimum difference needed to perceive a change under normal listening conditions.

Table A-1: Terminology relating to noise

Terminology	Description
A-weighting, dB(A)	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
Ambient Noise Level	The prevailing sound in a given situation at a given time, usually composed of sound from many sources near and far
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s1 and s2 is given by $20 \log_{10} (s1 / s2)$. The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20μPa.
Façade	At a distance of 1 m in front of a large sound reflecting object such as a building façade.
Fast/Slow Time Weighting	Averaging times used in sound level meters.
Free-Field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5 m.
$L_{90,T}$	A noise level index. The noise level exceeded for 90% of the time over the period T. L_{90} can be considered to be the "average minimum" noise level and is used to describe the background noise in BS 4142.
$L_{eq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,T}$	A noise level index defined as the maximum noise level during the period T. L_{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
Noise Level Indices	Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out.
Octave Band	A range of frequencies whose upper limit is twice the frequency of the lower limit.
Rating Level	Specific sound level plus any adjustment for the characteristic features of the sound
Sound Pressure	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
Sound Pressure Level (Sound Level)	The sound level is the sound pressure relative to a standard reference pressure of 20μPa (20×10^{-6} Pascals) on a decibel scale.
Specific Noise Level	Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, Tr

Appendix B

MASTERPLAN


VALE AVENUE
El Sub Sta
134
130
124

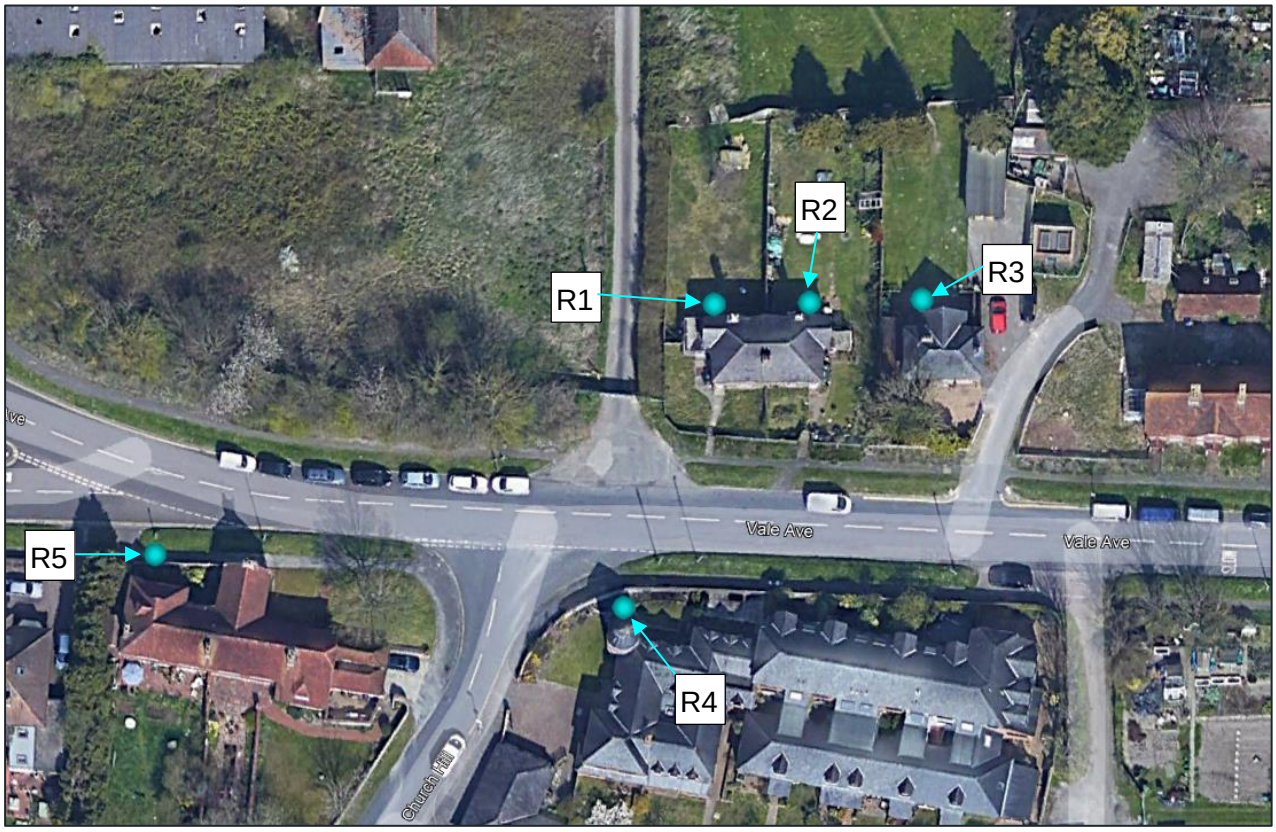
Appendix C

NOISE MONITORING LOCATIONS


SP1
LT1
Vale Ave
Vale Ave

Appendix D

RECEPTOR LOCATIONS


R1
R2
R3
R4
R5
Vale Ave
Vale Ave
Church Hill

Appendix E

UNCERTAINTY MATRIX

WSP UNCERTAINTY ASSESSMENT MATRIX

Uncertainty Control Measures	Applicable?	Adopted?/Comments
Measurement		
Only use in calibration Type/Class 1 equipment and check (and record) calibration level before and after measurements	✓	Yes
Take measurements using the time and frequency weighting specified by the relevant standard	✓	Yes
Make detailed notes, including details of the equipment, weather, survey positions (including approximate distances), contributing noise sources, presence of screening etc.	✓	Yes
Take photographs, and record survey locations	✓	Yes
Avoid standing waves/interference – listen for effects, take spatial average from several locations or conduct a sweep	✓	External Measurements only
Take measurements at different distances to establish propagation	×	Not considered necessary for the measurement locations
Take measurements at different heights where relevant	×	N/A
Don't just measure at the "noisiest" parts of site, but establish how "quiet" it is, too, where relevant to the assessment	✓	Yes, range of locations
Measure under different operating conditions relevant to your assessment / adopt worst case if known	×	N/A
Measure more than one cycle/ event (ideally at least three)	×	N/A
Determine state of repair of any associated source, where relevant	×	N/A
Use a windshield and avoid windy conditions (i.e. gusts regularly exceeding 5 m/s)	✓	Yes
Avoid wet conditions (particularly in terms of rain on the windshield/mic and on neighbouring surfaces)	✓	Yes
Avoid electrical and electromagnetic interference (such as from power cables and radio transmitters)	×	N/A
Avoid extreme temperatures – traffic conditions can be different in freezing conditions, whilst meters can overheat and fail in a case when in direct sunlight during the summer.	✓	Yes
Make measurements during different weather conditions (particularly relevant in terms of wind direction for sites affected by aircraft movements, but also for sites affected by other distant, but significant, sources of noise, in different directions	×	N/A
Where only one source is dominant (such as a main road), as a minimum, measure during conditions favourable to propagation (i.e. when wind direction is within +/-45º of the line between the source and receiver or during temperature inversion, such as on clear calm nights)	×	
Avoid tree/leaf (movement) sound where possible – ideally take measurements at comparable distance to receptor locations	✓	Some foliage close by, but not significant given low wind speeds

Uncertainty Control Measures	Applicable?	Adopted?/Comments
Avoid dawn chorus sound where possible – ideally take measurements the same distance from trees and bushes as any receptors of interest	✓	No significant dawn chorus – monitoring locations representative of receptor locations
Measure outside the receptor in question where possible; however, it is worst case typically to measure under free-field conditions and apply +3 dB correction to convert to "façade" where applicable – for most planning (new residential development) assessments, free-field is preferable	×	NA - Commercial noise assessed via prediction
Where it is not possible to install a meter outside the receptor in question, install a meter elsewhere and undertake additional attended measurements, either outside the receptor or at a representative location (when not adequately covered by the installed meter)	×	NA - Commercial noise assessed via prediction
Avoid atypical traffic conditions (such as during school holidays and road works – road traffic incidents can significantly affect flows, but which can't be predicted, and their occurrence can't always be established after the survey – check the data for anomalies)	✓	Yes
Avoid presence of you and/or the microphone resulting in atypical conditions.	✓	Yes
Data handling		
Download data immediately after survey and process promptly whilst details are fresh in your head	✓	Yes
Use digital transfer methods and double check data read-off manually	✓	Yes
Look at the time-history (in as fine a resolution as possible) for any unexpected events – preferably with active spectral data (i.e. in dBTRAIT)	✓	Yes – undertaken in Excel
If removing any data (due to an atypical event, for example), 'save as' a new file and provide a note to the data.	✓	Yes
Prediction		
Use measurement data at different distances to verify propagation	×	N/A
Different height measurements to verify screening effects, if relevant	×	N/A
Use propagation calculation procedure relevant to source and distance	✓	Yes
Use detailed traffic flow data applicable to the methodology	✓	Yes – and verified against monitoring data
Use detailed sound source data (including octave-bands levels), accounting for size, height and directivity, where known	✓	Measured data used

Uncertainty Control Measures	Applicable?	Adopted?/Comments
Use detailed topographical data and base mapping	✓	Yes
Identify different ground types	✓	Yes, differing ground conditions used
Apply an order of reflections of at least one	✓	Yes
Use 3D view feature to check model accuracy of the model	✓	Yes
Produce contour plots as a further means of identifying any abnormalities or errors in the model	✓	Yes

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