Submission ID: 3954

On behalf of our Client please find attached our DL6 Rep in relation to noise impact at Potters Farm which we plan to discuss at the forthcoming coming ISH on Noise

Regards Paul Zanna

TECHNICAL NOTE

Date: 5th August 2021

File Ref: PZ/VL/P21-2319/03TN

Subject: Potters Farm – Deadline 6 Noise

1.0 DEADLINE 6 SUBMISSION

1.1 Create Consulting Engineers Ltd (Create) have been appointed by our Client (LJ & EL Dowley) to provide a written submission for "Deadline 6" in line with the Planning Inspectorate timescale for Potters Farm.

1.2 Potters Farm is one of the closest dwellings to the Applicants planned borrow pit operations and is therefore expected to bear the brunt of the noise generated by the mechanical equipment used at the Borrow Pits.

1.3 The purpose of this submission is to provide further technical information to inform PINs on the shortfalls highlighted at Deadline 5 relating to noise matters only.

1.4 We would urge the Applicant to engage directly with our Client given the conflicting information we are receiving from their Agent and the time taken to receive the requested information, giving little or no time to respond. The Applicant's lack of engagement since 2019 has been lamentably minimal.

2.0 POTTERS FARM - NOISE

2.1 At ISH2, Mr Humphreys highlighted that there was to be a separate ISH on Noise. Create are pleased to see this has now been added to the ISHs on Wednesday 25th August 2021.

2.2 In summary, at DL5 Create stated the following.

Deadline 5 – Summary of Submission - Noise

2.3 The ES details a preliminary assessment of construction noise, undertaken in accordance with Method 1 of BS5228-1:2009+A1:2014. The aforementioned standard details two acceptable methodologies for assessment of construction noise. Method 1: the "ABC Method", and Method 2: the "2-5 dB(A) Change" method. Selecting an appropriate method is discretionary and whilst both are acceptable in broad terms, a distinction should be made based on the situational context at this rural location.

2.4 The threshold noise levels have also been stated incorrectly. Table 3.12 of LA111 (DMRB) suggests that the SOAEL is determined by Section E3.2 and Table E.1 of BS 5228-1. This would result in noise thresholds being set at 65 dB $L_{Aeq,T}$ for day times. It appears however that the thresholds have been set using Table E.2 of BS 5228-1 which is used for eligibility for noise insulation, or for determining the noise insulation trigger level.

2.5 The Assessment provided by the Applicant is considered preliminary only. Assessments of the anticipated works were not based on any contractor method statements, plant schedules or construction phase staging. The construction noise calculations (and in turn, the resultant effects), therefore, have been based on 'professional judgement' and assumptions on behalf of the acoustic consultants. Whereas this would be considered appropriate to assess a site's viability for development, it would not be considered representative of the actual resultant noise levels during phased works and thus on our Client's home and land interests.

2.6 To date, there has been no dedicated construction noise assessments conducted for the receptor sites. For example, the 'Enabling Works' Table (Appendix 4A1, Volume 6.5), has assessed the construction noise for this phase against the sound levels produced by a single excavator alone. It is not clear where the information for calculating the resultant impact at the Fordley Road *et al* residences originated; however, this assumptive approach would not be considered robust or exhaustive to assess any resultant impact in practice.

2.7 The Mitigation Route Map (8.12) details various measures of mitigation for specific works phases in broad terms, stipulating adherence to BPM 'Best Practicable Means' and the CoCP 'Code of Construction Practice'. These mitigative strategies have been based on the assumed construction activities (as discussed above) and have not been directly quantified at the receptor locations to judge their effectiveness.

2.8 The upper limit of the preparatory works has been calculated to be above the measured residual ambient by 11 dB, which has been deemed to be of a negligible impact. The upper limit of the main construction phase has been predicted to be 19 dB above the residual ambient, for which a moderate adverse significance has been determined (as detailed in the Applicants Table 4.16). Both exceedences would be considered excessive.

2.9 Create consider an appropriate assessment method is to use the 2-5 dB(A) change method. Noise levels generated by site activities are deemed to be potentially significant if the total noise (pre-construction ambient plus site noise) exceeds the pre-construction ambient noise by 5 dB or more, subject to lower cut-off values of 65 dB, 55 dB and 45 dB $L_{Aeq,T}$ from site noise alone, for the daytime, evening and night-time periods, respectively; and a duration of one month or more, unless works of a shorter duration are likely to result in an significant effect.

2.10 Section 4.3.26 states: "*For noise sensitive receptors where the magnitude of change in the short term is minor, moderate or major at noise sensitive buildings, local circumstances must also be considered to determine the final significance, as required by LA111.*" As the new road would be used by most/all of the construction traffic for the next 10+yrs, this would be indicative of a significant effect, in addition to the operational phase going forward beyond this point and should be assessed and mitigated.

2.11 To accurately gauge the ambient sound level for a day, industry guidance recommends to establish the typical sound level, which would be the most commonly occurring hour long measurement between the hours of 07:00h to 23:00h. That is simply not possible when you are working with one or two 30 minute readings.

3.0 NEW TECHNICAL INFORMATION – NOISE

3.1 Create, attach, at Appendix A the following information;

- New detailed noise monitoring records;
- New detailed noise assessment of background noise levels;
- New predicted noise levels during construction
- New predicted noise levels post construction

3.2 The results are clear and confirm that the baseline sound levels used for the previous noise assessment was approximately 2 dB above the most commonly occurring day time ambient sound level.

3.3 We are seeking a full and conclusive construction noise and vibration assessment be completed once the method statements have been finalised and suitable noise mitigation be implemented to reduce the impact of the construction noise.

3.4 The use of earth bunds are limited at best, and would be required to be positioned either close to the receptor or to the noise source to maximise their efficacy. Additional near field screening would be required around some of the noisier items of plant.

3.5 The use of Best Practicable Means (BPM) must be adhered to, which should include the use of mufflers or silencers, nearfield screening, considerate placement of noisy plant, starting the ignitions in a synchronised manner and not leaving engines running when not in use. These are examples only and are by no means an exhaustive list.

4.0 CONCLUSIONS

4.1 Our Client and Create have raised significant, legitimate concerns with respect to the Applicants Borrow Pit plans and the noise implications and it is requested that the Applicant responds accordingly which in turn could potentially lead to the introduction of mitigation measures and/or redesigned components of the overall scheme currently being put forward.

Note By: Paul Zanna - Technical Director

APPENDIX A

create
CONSULTING
ENGINEERS LTD

THEBERTON HOUSE ESTATE, SIZEWELL C – Potters Farm

Construction Noise Assessment

THEBERTON HOUSE ESTATE, SIZEWELL C – POTTERS FARM
Construction Noise Assessment

Client: LJ and EL Dowley

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Mat Tuora, BSc(Hons), PGDip IoA, MIOA

Checked By: Jody Blacklock, BEng(Hons), PGDip IoA, MIoA, MCIBSE

Reference: BD/VL/P21-2319/04

Date: August 2021

THEBERTON HOUSE ESTATE, SIZEWELL C – POTTERS FARM
Construction Noise Assessment

THEBERTON HOUSE ESTATE, SIZEWELL C – POTTERS FARM Construction Noise Assessment

Contents

Appendices

Registration of Amendments

Revision and Date	Amendment Details	Revision Prepared By	Revision Approved By

1.0 EXECUTIVE SUMMARY

About the Authors

1.1 This report has been compiled by, Ben Dixon , BA(Hons), PGDip IoA, AMIOA and Mat Tuora , BSc(Hons), PGDip IoA, MIOA, and checked by Jody Blacklock, BEng(Hons), PGDip IoA, MIoA, MCIBSE.

Jody Blacklock - Technical Director

1.2 Jody is a Chartered Engineer and Acoustic Consultant with over 20 years' experience. He is the Technical Director for the acoustics team across the business and is responsible for managing the Chelmsford office.

1.3 Jody has experience as an Expert Witness and has been involved in a number of multidisciplinary projects since joining the Create in 2017. He has an extensive knowledge of acoustics and is adept at noise modelling and the completion of noise impact assessments. Recently Jody was voted by other acoustic professionals into the role of the Eastern Branch Secretary for the Institute of Acoustics.

1.4 Prior to joining Create Jody worked as a Senior Acoustic Consultant for 10 years at dB Attenuation Ltd.

Ben Dixon AMIOA – Principal Acoustic Consultant

1.5 Ben is a Principal Acoustics Consultant and Associate Member of the Institute of Acoustics. Prior to joining the acoustic industry in 2013, Ben worked as a Dryliner where he gained a wealth of practical knowledge in the construction environment. After working on site, Ben returned to university to complete his studies. The findings of his dissertation were presented at the Institute of Acoustics, and subsequently published in the Institute's monthly publication.

1.6 Ben joined Create in 2018. Prior to joining Create, he worked for BL Acoustics and Stroma Technology where he developed an extensive knowledge of architectural acoustics.

Mat Tuora - Senior Acoustic Consultant

1.7 Mat is a Senior Acoustics Consultant with over 7 years of experience, who recently joined Create. Prior to joining our team, Mat held several roles at Adrian James Acoustics, where he gained experience working on a wide range of projects for a variety of high profile local and national clients.

1.8 Over the first few years in the industry Mat was responsible for reverberation assessments and pre-completion testing. Since then, Mat was involved in far larger and complex schemes, becoming adept at carrying out detailed environmental assessments, acoustic modelling, and multistage building acoustic design. Mat has also supported several expert witnesses by carrying out calculations and drafting reports. He is a proactive Member of the Institute of Acoustics and recently spent time presenting on work undertaken in call centers for the Institute of Acoustics 2020 Conference.

Report Context and Executive Summary

1.9 The following assessment has examined the project specific documentation submitted by EDF Energy (specifically the Environmental Statement and its associated technical documentation) to evaluate the potentially negative acoustical effects of noise arising from the construction (specifically the 'borrow pits') of the Main Development Site, on the Potters Farm residence.

1.10 The EDF documentation contained the methodologies and works phasing that informed EDF's initial assessments.

1.11 The predicted results of these documents have been compared to the results of a baseline noise survey undertaken by Create Consulting Engineers Ltd (Create), as well as to local, national and international guidance.

1.12 This report has used the EDF documentation and industry standard empirical data (later described, herein) to predict and determine noise levels as they may be experienced at the Potters Farm residence.

1.13 The results from a noise survey carried out by Create have been used in support of this assessment, to compare against those presented within the EDF ES. The ES stated levels were found to be ≈ 2 dB of those recorded during the Create survey period.

1.14 Although indicative, the construction noise calculations provided by EDF should not be considered as robust or exhaustive, as they are suitable for outline scoping only. Primary, tertiary, and additional measures of mitigation have been determined to be necessary within the ES, however further assessment would be warranted to determine whether secondary mitigation be effective.

1.15 The ES does not consider loss of external amenity, for which it has been assumed would be significant. This should be considered when defining suitable measures of mitigation.

2.0 INTRODUCTION

2.1 Create Consulting Engineers Ltd (Create) have been commissioned by LJ and EL Dowley to undertake a detailed review of the EDF technical documentation pertaining to noise, as well as undertaking a construction noise assessment to assess proposed works processes for the construction (specifically the 'borrow pits') of the Main Development Site, on the Potters Farm residence.

2.2 This baseline assessment has defined the anticipated working noise limits for the construction and quantified the anticipated future noise levels arising from traffic increases at the property boundary of Potters Farm residence. The purpose of this was to ensure the amenity of the residents will be protected.

Site Context

2.3 The Potters Farm residence is approximately 150mtrs west of Area 3 'Temporary Construction area' (Figure 5.2, Book 6, 1 Non-Technical Summary) and review of the supporting documentation (Book 6.3, Chapter 11, Construction Noise and Vibration Appendix 11B) states that the construction has been comprised of 5 distinct phases (with anticipated, inevitable overlap):

- Phase 1: Site establishment and preparation for earthworks (Years 1 – 2);
- Phase 2: Main earthworks (Years 1 – 4);
- Phase 3: Main civils (Years 3 – 9);
- Phase 4: Mechanical and Engineering (M&E) fit out, instrumentation and commissioning (Years 4 – 11); and
- Phase 5: Removal of temporary facilities and restoration of the land (Years 10 – 12).

2.4 Phase 1 will see the site established for the commencement of mineral extraction from the 'borrow pit' sites, which along with other requirements, will be used to supply aggregate to the Main Development Site in Phase 2.

2.5 The Temporary Construction Area has been subdivided into Zones with the prefix 'C', for which the primary cause for concern for the Potters Farm residence would be zones C5, C6 and C7. The locations of which in relation to the Potters Farm residence has been shown in the following figure:

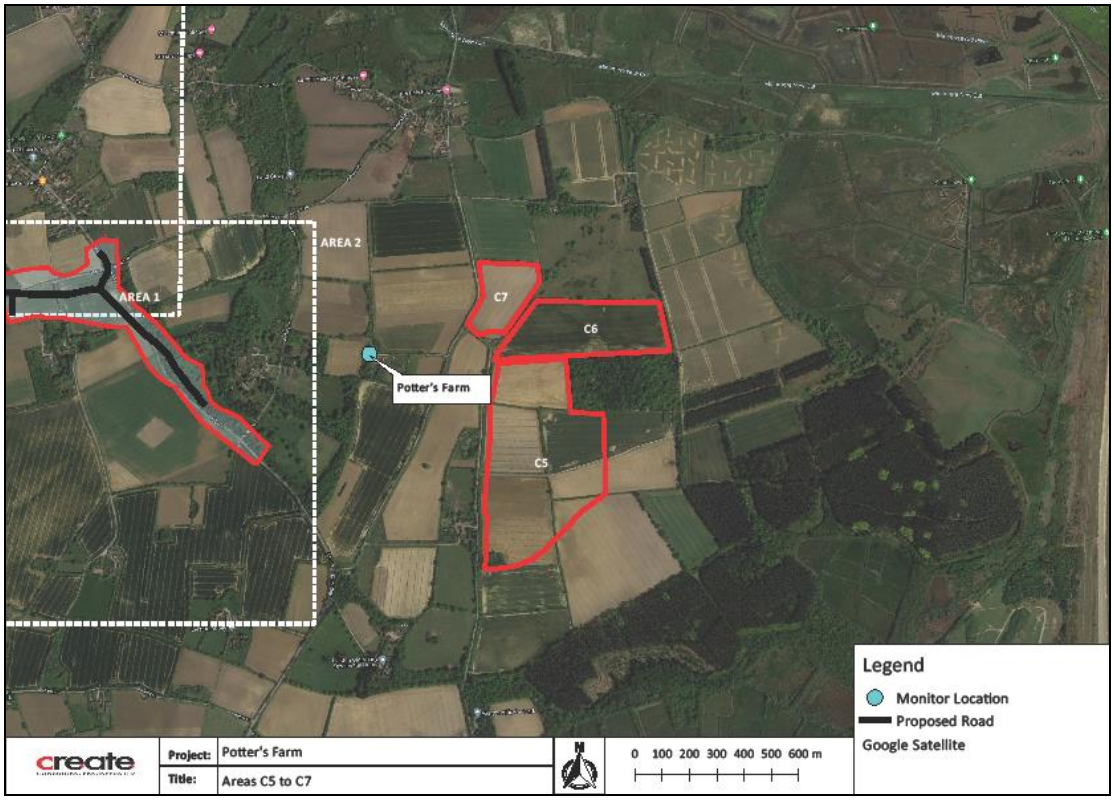

Figure 2.1: Construction Zones. *Reference Book 6.3, Volume 2, Chapter 3, Figure 3.1)*

2.6 The ES has provided details of a baseline noise survey undertaken at a location representative of the Potters Farm residence, which has been discussed at greater length in Chapter 5 of this report. Chapter 5 has also discussed the predicted construction levels, percentages and methodologies, and 3D sound propagation detailed within the ES, as well as the currently proposed mitigation.

3.0 ASSESSMENT METHODOLOGY AND CRITERIA

3.1 This section has outlined the assessment methodology and the significance criteria that have been used to assess the significance of risk associated with the proposed development.

Data Sources

3.2 The key data sources reviewed as part of this study have been listed in Table 3.2 below.

Data Source	Reference
British Standards Institute (BSI)	BSI (2009). BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites: Noise & Vibration
	BSI (2014). BS 8233:2014 Guidance on sound insulation and noise reduction for buildings
	BS6472-1:2008 Guide to Evaluation of Human Exposure to Vibration in Buildings
	BS7385-2:1993 Evaluation and Measurement for Vibration in Buildings
Design Manual for Roads and Bridges	LA 111 – Noise and Vibration

Table 3.1: Key Information Sources

3.3 This assessment has considered the existing ambient noise levels and the likely significant effects on existing and proposed human receptors within the site and surrounding area in terms of:

- existing baseline conditions;
- noise impacts expected during construction; and
- Vibratory impacts expected during construction.

BS5228-1 - Noise

3.4 Guidance relating to the prediction and assessment of the construction phase noise effects has been taken from BS 5228-1: 2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites' Part 1: 'Noise'[1] which provides recommendations for basic methods of noise control relating to construction and open sites where work activities/operations generate significant noise levels.

3.5 Amongst other things, the annexes to BS 5228 provide information on the following:

[1] British Standards Institute. (2009). BS 5228:-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites. Part 1: Noise. BSI, London.

- relevant legislation (Annex A);
- typical noise sources and advice on mitigating them (Annex B);
- sound level data for use in the prediction methods described in the standard (Annexes C and D);
- assessing the significance of noise effects (Annex E);
- estimating noise levels (Annex F); and
- implementing noise monitoring (Annex G).

BS5228-2 – Vibration

3.6 In a similar vain to the British Standard for noise, this refers to vibration levels and the requirement for consideration of the effect of vibration on persons living and working in the vicinity of construction sites.

3.7 It provides guidance for the protection from vibrational exposure for persons working on site, as well as neighbourhood nuisance from vibration.

3.8 This document also contains many useful annexes at the rear of the Standard, including the following areas:

- Relevant legislation – Annex A;
- Significance of Vibration Effects. This includes guidance on the human response to vibration, as well as threshold values for effects, structural damage and cosmetic damage – Annex B;
- Measured levels for piling – Annex C and D;
- Prediction of Vibration Levels – Annex E;
- Description of Piling – Annex F.

Design Manual for Roads and Bridges (DMRB LA 111)

3.9 This document sets out the requirements for assessing and reporting the effects of highways noise and vibration from construction, operation and maintenance projects.

3.10 The requirements in this document shall be applied to the assessment, reporting and management of environmental effects, specifically changes in noise and vibration emissions, from the delivery of projects.

BS6472-1:2008 Guide to Evaluation of Human Exposure to Vibration in Buildings

3.11 Structural vibration can often be detected within buildings by the occupants, potentially affecting their quality of life. This document provides guidance on predicting a human's response to vibration in buildings over the frequency range 0.5Hz to 80Hz.

3.12 BS6472 describes how to determine the vibration dose value (VDV) from frequency weighted vibration measurements.

BS7385-2:1993 Evaluation and Measurement for Vibration in Buildings

3.13 This document provides guidance on the assessment of the possibility of vibration-induced damage in buildings due to a variety of sources, including blasting, pilling, machinery and road/rail.

3.14 It provides guidance on the correct measurement of Peak Particle Velocity (PPV) whilst also providing within Table 1, the transient vibration guide values for cosmetic damage.

4.0 ACOUSTIC SURVEY PROCEDURE

4.1 To ascertain pre-existing sound levels in the immediate area, environmental noise monitoring was undertaken at the Potters Farm Noise Sensitive Receptor (NSR) between Monday 26th July and Wednesday 4th August 2021.

4.2 The microphones were secured to extendable fixtures and the meters were set to capture $L_{Aeq,T}$, $L_{AMAX,F}$ and $L_{feq,T}$ (from 6.3 Hz to 20 kHz) in one second logs and stored the data in 1hr file durations. The Norsonic software NorReview was used to evaluate, post process and calculate the $L_{A90,T}$ and $L_{A10,T}$ values.

4.3 The long-term monitor location was selected to measure the residual sound levels at the NSR, and the results of which have been deemed as representative. The location selected (herein referred to as MP1) has been shown in the following figure below with more details included in Appendix B:

Figure 4.1: Measurement Location

4.4 An incident occurred where the microphone was knocked over (assumed to be wildlife) on the 30th July and wasn't recovered until collection. It is for this reason that the data beyond this time has been discounted and has not been carried forward in calculation or presented in the appendices.

4.5 A weather station was also deployed during the monitor installation period and set to run continuously throughout. The weather station recorded intermittent periods of inclement

weather which have been omitted from calculations and have not been presented in the body of this report. Full Results (including the excluded time periods) can be found in the appendix of this document.

The omitted weather included any periods of substantial rainfall and where wind speeds exceeded >5m/s.

Equipment List

4.6 The sound level meters and acoustic calibrator detailed below were Class 1 standard in accordance with the British Standards 60942 and 61672. They were all within the laboratory calibration time-frame of 2yrs during the period of measurement.

4.7 The equipment detailed below was used for all measurements referenced in this report.

Equipment	Make	Model	Serial Number
Sound Level Meters	Norsonic	Nor 140	1406932
Pre-Amp	Norsonic	Nor-1209	21141
Microphone	Norsonic	Nor-1225	285519
Acoustic Calibrator	Norsonic	Nor 1251	34128
Outdoor Microphones	Norsonic	Nor-1217	12175401
UPS power supplies	Campbell	CA-1317	-
Weather Station	ClimeMET	3000	-

Table 4.1: Equipment Used

4.8 The equipment was calibrated with the same acoustic calibrator to the manufacturer's recommended levels at the beginning and end of the measurement periods and no significant drift in calibration was noted and have been detailed in the appendices of this report.

4.9 Calibration certificates have not been included but are available upon request.

5.0 NOISE MONITORING RESULTS

5.1 Whilst conducting the environmental noise survey professional judgement was used to identify the principal sources of noise across the entire site, these have been assessed to be:

- Traffic noises from vehicles travelling along the surrounding road network;
- Agricultural vehicles and operations in the area; &
- Occasional sounds such as wildlife and wind in the trees.

5.2 The following table and charts overleaf show the overall $L_{Aeq,T}$, $L_{A10,}$ $L_{A90,T}$ and highest recorded L_{AfMax} sound levels at the monitoring location (N.B. sound levels are exclusive of periods of inclement weather):

Potters Farm						
Date	Period	T	dB $L_{Aeq,T}$	dB $L_{A10,T}$	dB $L_{A90,T}$	dB L_{AFMax}
26/07/2021	Day	8hr	39.2	38.1	27	79.3
	Night	8hr	32.7	36.9	18.8	56.3
27/07/2021	Day	15hr	39.4	41.3	31.1	72.8
	Night	7hr	33.5	38.1	19.3	56.9
28/07/2021	Day	11hr	42.4	44.1	36.5	73.5
	Night	8hr	34.1	38.5	24.5	59
29/07/2021	Day	15.5hr	41.5	44.2	34.5	69.8
	Night	5.5hr	31.1	35.3	18.3	55.1

Table 5.1: Noise Monitor Results

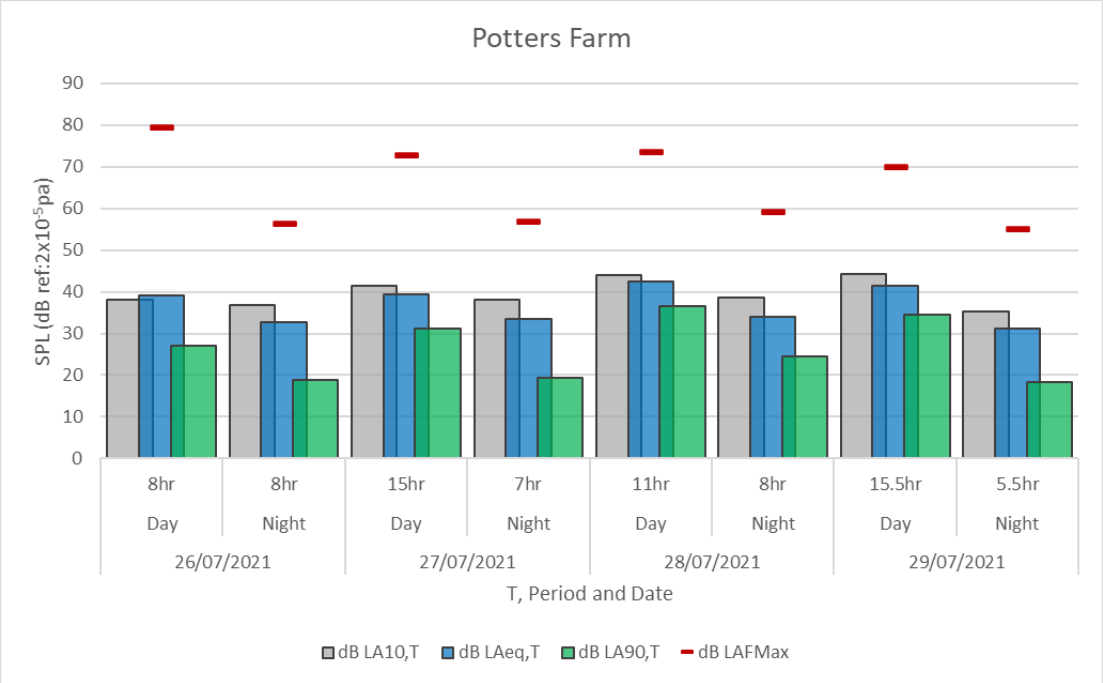

Chart 5.1: Noise Monitor Results

5.3 As can be seen in the table and chart above, the ambient levels remained very low, which is expected for this largely rural location. The averaged daytime level at this location was ≈ 40

dB $L_{Aeq,T}$ and the daytime background sound level was between 25 and 37 dB $L_{A90,Day\ Time}$. The night time background sound levels were far lower, between 18 and 27 dB $L_{A90,Night(8\ hours)}$

Comparison with EDF ES Levels

5.4 The most representative monitor location in the EDF ES for the Potters Farm Residence NSR would be MS4, which was stated to be a typical measured daytime level of around 43 dB $L_{Aeq,T}$. (Book 6.3, Chapter 11, Construction Noise and Vibration Appendix 11B).

5.5 Within the submitted document, the baseline sound levels were largely similar to those from the Create baseline sound monitoring for the daytime ambient sound level, differing by only 2 dB.

5.6 The stated measurement duration at MS4 was between the 11th – 14th and 19th – 23rd September 2016 (Page 37, Book 6.3, Volume 2, Chapter 11 Appendix 11A).

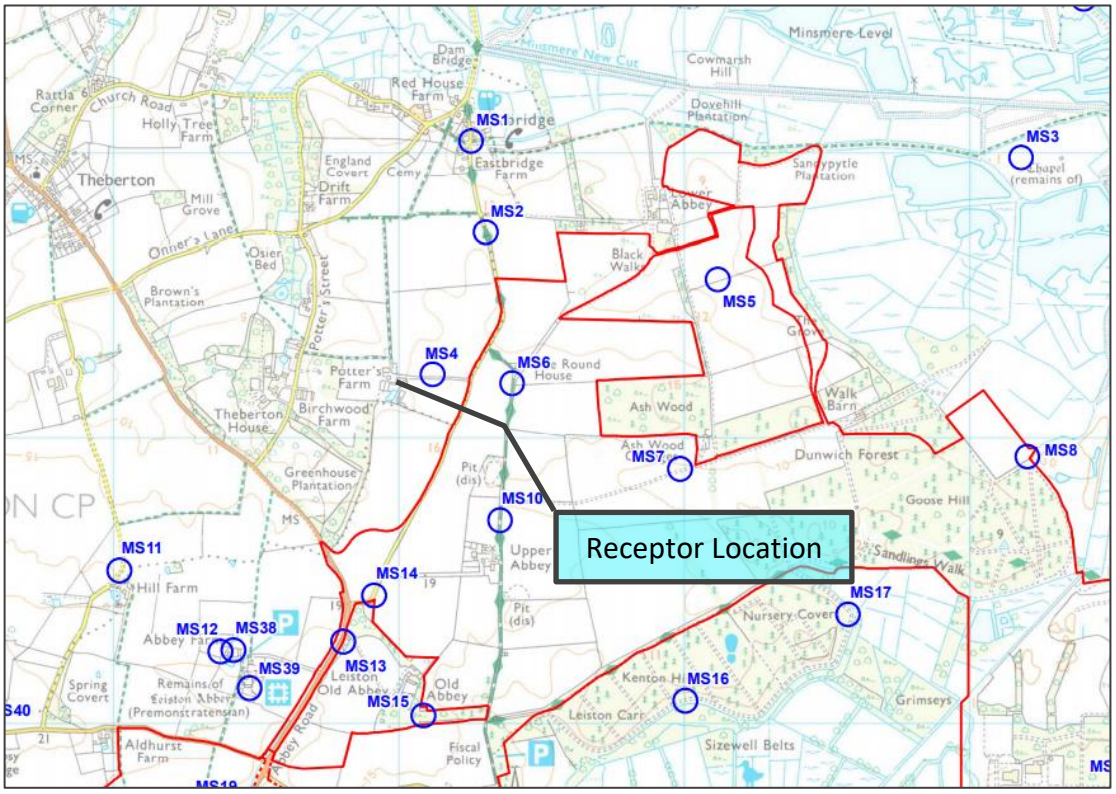

Figure 5.1: ES Measurement Location MS4

6.0 CONSTRUCTION NOISE – C5, C6 & C7.

6.1 Guidance to the prediction and assessment of the construction phase noise effects has been taken from BS5228-1:2009+A1:2014, which provides recommendations for basic methods of noise control relating to construction and open sites where work activities and operations could potentially generate significant noise levels.

BS5228-1 – Noise

6.2 The annexes to BS5228-1 provide information on the following:

- Relevant legislation – Annex A;
- Typical noise sources and advice on methods for mitigating the noise from these sources – Annex B;
- Sound level data for various phases – Table C.1 has been heavily referenced in this assessment as it relates to plant and equipment used for typical demolition activities;
- Methods of how to assess the significance of these noise effects including the ABC method and the 2-5dB(A) Change methods – Annex E;
- Methods for estimating the noise from these activities on sites, including adjustments for distance, percentage on time etc – Annex F; and
- Suggestions or noise monitoring – Annex G.

6.3 Other specific noise sources and considerations are also included but not relevant in this instance, for example, noise from piling, over pressure from materials falling from heights and blasting works.

BS5228-1:2009+A1:2014: "The ABC Method"

6.4 The 'ABC Method' as outlined in section E.3.2 of BS5228-1:2009+A1:2014 defines threshold values for permissible levels of noise generated by site operations. In essence, the residual ambient noise level ($L_{Aeq,T}$) is determined and rounded to the nearest 5 dB. This is then compared with the site generated noise and if the noise level exceeds the appropriate category value, then a potential significant effect is indicated.

Assessment category and threshold value period	Threshold value, in decibels ($L_{Aeq,T}$) (dB)		
	Category A	**Category B**	**Category C**
Daytime (07:00 – 19:00)	65	70	75

Table 6.1: ABC Method. ***(dB ref: 2 x 10^{-5} pa)*: *[Excerpt from BS5228-1:2009+A1:2014, Table E.1 p:125]***

6.5 In this instance, the lowest overall ambient sound level was measured to be ≈ 40 dB(A) $L_{Aeq,16hr}$ at MP1 (which has been deemed as representative) so the 65 dB(A) threshold (Category A) has been used in this assessment.

Construction Activities - Overview

6.6 As previously stated, the proposed construction timings have been comprised of 5 distinct phases (with anticipated, inevitable overlap). Given the nature of the works and the locality of the NSR, the works in zones C5, C6 & C7, in phases 1 and 2 pose the greatest risk.

Working Hours

6.7 Section 3.3.12 and Table 3-1 of Book 6.3, Volume 2, Chapter 3 – Description of Construction outlines the anticipated working patterns, although it is unclear what times pertain to the zones in question:

"The majority of workers are expected to be working on either an early shift or a late shift. Most of the remaining employees would work to office hours." – Section 3.3.12

Shift	Start Time	End Time
Early Shift	06:00–08:30	14:00–18:30
Late Shift	13:30–15:00	22:00–00:00
Night Shift	20:30–22:00	06:00–08:00
Office Shift	07:30–09:00	17:30–19:00

Table 6.2: Construction Shift Patterns *Table 3-1 Book 6.3, Volume 2, Chapter 3*

6.8 As the NSR location falls within the East Suffolk district, the working hours would be required to be agreed by the local authority. In accordance with East Suffolk Council, the standard working hours for construction projects is between 07:30 – 18:00 Monday to Friday and 08:00 to 13:00 on Saturdays and no working on Sundays or Bank Holidays. Whilst this time difference is minor, it is unclear whether this has been reconciled with the local authority.

6.9 The ES chapter goes on to state activities which would generally be undertaken during the night shift, which includes 'removal of excavated material', although this has been assumed to be at the coastline.

EDF Construction Noise Calculations

6.10 The Temporary Construction Area (TCA) refers to the main area of land that would be required largely on a temporary basis to facilitate the construction of the proposed development. This land would primarily be located to the north of the Sizewell Marshes SSSI between the B1122 and the coast, to the north-west of the main platform, and is the closest area of the site to the NSR.

6.11 The table blelow shows calculation of the stated equipment to be used (as defined in Annex 11B/B of Book 6, Volume 2, Chapter 11). It has been assumed the sound levels presented in the ES have been taken from the empirical evidence in BS5228-1:2009+A1:2014, which is a common practice and suitable for this application.

6.12 These noise levels have been corrected for relevant attenuation (distance, ground, barrier, air, meteorological *where applicable*) but do not include any other aspects of mitigation, including site hoarding, bunding etc.

6.13 In Book 6, Volume 2, Chapter 11, the EDF ES also recognises and states that predictions pertaining to construction related activities at this stage are not based on method statements or confirmed works processes:

"Chapter 3 of this volume sets out the assumed indicative approach to construction. This represents the most likely approach to construction given the site constraints and Sizewell C project requirements. The proposals do enable a robust assessment of the likely effects, although the absence of final, confirmed construction details creates some challenges for noise prediction." – Section 1.3.1.2

6.14 Whereas this would be considered appropriate for an indicative assessment at the outline stages, we disagree that it would be regarded as a robust assessment. A robust assessment would include assessment from confirmed method statements and be inclusive of cumulative effects from all works stages. An example of indicative calculations for the stated phases, equipment, quantities and percentage-on-times has been shown in the following table:

<table>
<tr><th>Works Area</th><th>Distances (m)</th><th>Activity</th><th>SPL at NSR</th><th colspan="5">Cumulative SPL at NSR for Phase</th><th>Averaged Daytime SPL at NSR</th></tr>
<tr><td>SITE</td><td>150</td><td>Phase 1-1a 'Felling'</td><td>68</td><td rowspan="3">74</td><td colspan="3" rowspan="3"></td><td rowspan="12">74</td><td rowspan="12">41 dB $L_{Aeq,T}$</td></tr>
<tr><td>SITE</td><td>150</td><td>Phase 1-1b 'Stripping/Levelling'</td><td>73</td></tr>
<tr><td>SITE</td><td>150</td><td>Phase 1-1c 'Water Management Zone'</td><td>54</td></tr>
<tr><td>C6</td><td>385</td><td rowspan="2">Phase 1-2a-ii 'Borrow Pit Excavation'</td><td>49</td><td rowspan="2">53</td><td rowspan="2">54</td><td rowspan="3">55</td><td rowspan="6">55</td></tr>
<tr><td>C7</td><td>320</td><td>51</td></tr>
<tr><td>C6</td><td>385</td><td>Phase 1-2a-iii 'Borrow Pit Excavation'</td><td>46</td><td></td><td></td></tr>
<tr><td>C5</td><td>390</td><td rowspan="2">Phase 1-2a-iv 'Borrow Pit Excavation'</td><td>46</td><td colspan="2" rowspan="2"></td></tr>
<tr><td>C6</td><td>385</td><td>46</td></tr>
<tr><td>C5</td><td>390</td><td rowspan="3">Phase 1-2b 'Borrow Pit Stockpiling'</td><td>47</td><td colspan="3" rowspan="3"></td></tr>
<tr><td>C6</td><td>385</td><td>47</td></tr>
<tr><td>C7</td><td>320</td><td>49</td></tr>
</table>

Table 6.3: Construction Noise at Potters Farm (No Mitigation)

6.15 The table above shows that without mitigation, Phase 1 would be predicted to exceed the Category A threshold as defined in BS5228-1 (as described in section 6.4 of this report). Whereas assessment against this criterion has shown all activities from the borrow pits to be below this threshold, it does not factor the considerable loss of amenity that would be experienced at the NSR, for which the residual ambient would be exceeded in all instances. Given the proposed works duration for these phases of 4 years (section 2.3 of this report), this equates to a considerable degree of change in ambient levels.

6.16 The calculations show that all activities are predicted to be in excess of the residual ambient level at this location without significant mitigation. The cumulative level of the 'borrow pits' alone (55 dB) would be 15 dB over the residual ambient.

6.17 Book 6, Volume 2, Chapter, Appendices 11B includes the 3D noise propagation model used to determine the effects at the NSR. The following images can be found in the aforementioned document on pages 203 – 206. Note the residual ambient measured at the location (40 dB) is below the lowest contour in the legends (<= 42).

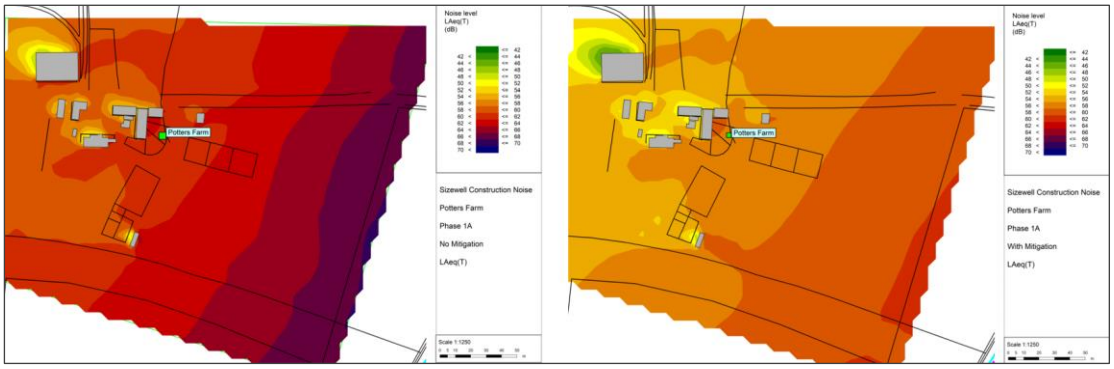

Figure 6.1: Phase 1a: No Mitigation *Left* **& Phase 1a: With Mitigation** *Right*

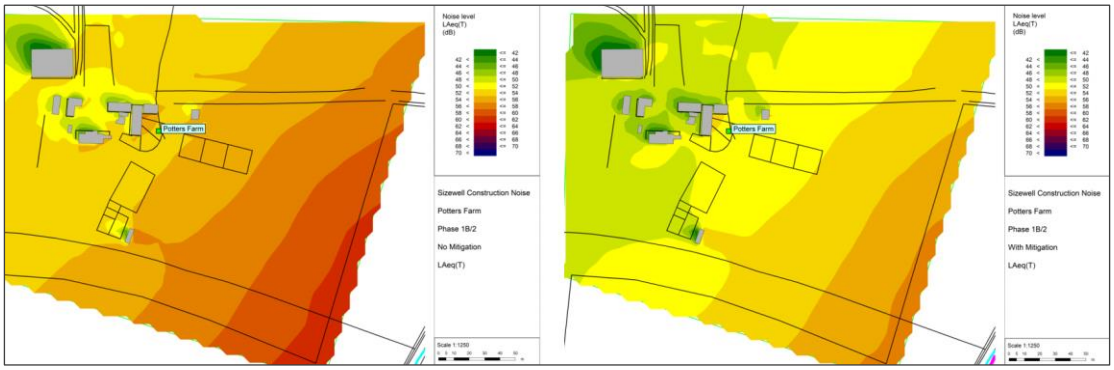

Figure 6.2: Phase 1b/2: No Mitigation *Left* **& Phase 1b/2: With Mitigation** *Right*

6.18 It can be seen in the figures above that in all instances (both with and without mitigation), the predicted ambient would exceed the residual ambient measured. Given the works duration of >4 years, this change would be regarded as considerable.

6.19 Table 11.32 in Book 6, Volume 2, Chapter 11 defines the residual effects following mitigation at the various receptors around the site, for which receptor 17 is Potters Farm. The following table shows the assessment of effects following primary, tertiary and additional mitigation measures during the works phases 1a and 1b:

Receptor	Impact	Primary or Tertiary Mitigation	Assessment of Effects	Additional Mitigation	Residual Effects
Potters Farm (17)	Phase 1a	Embedded landscape bunds and/or acoustic screens as described in section 11.5 and listed in Appendix 11B Best practice measures set out within the CoCP (Doc Ref 8.11).	Moderate Adverse	Secondary acoustic screens as described in section 11.7 and Appendix 11B. Noise mitigation scheme to be applied as appropriate.	Moderate Adverse (**Significant**)
	Phase 1b/2				Moderate Adverse (**Significant**)

Table 6.4: Summary of Effects for Construction Phase

6.20 We agree with the classification of a significant effect at the NSR during Phase 1, however it appears that the mineral extraction from the borrow pits has not been considered.

In Summary

6.21 The results and predictions presented in the EDF ES would be considered suitable for the ES stage in the development, however we strongly urge that a more detailed and exhaustive construction noise and vibration assessments should be undertaken once works processes have been finalised. This should include assessment of the efficacy of all additional mitigation measures.

6.22 This level, subsequently the magnitude of change, is representative of the level at 1mtr from the residence's façade and does not consider the level in any external amenity spaces within the property boundary. As can be seen in Figure 4.1, the grounds of Potters Farm extend further eastward towards the main development site and would therefore be exposed to greater sound levels than at the residence. Any stated sound levels therefore, would typically increase the closer to the Main Development Site, should the residents choose to use their entire grounds.

6.23 A level of annoyance for external amenity spaces is stated in WHO community noise guidelines and has been reflected in the BS8233:2014 guidance for external amenity spaces. Typical design targets for new dwellings are 50 dB $L_{Aeq,T}$, but do not apply to sounds with definable characteristics (this is commonly exclusive of most sources except for traffic noise). As the residence is pre-existing, it would not be regarded as appropriate to assess any resultant impact against these targets, but should prove to be a useful indicator for any potential loss of amenity. It must be noted that the measured sound level show that the external amenity spaces currently falls below this threshold.

7.0 CONSTRUCTION NOISE - MAIN DEVELOPMENT ROUNDABOUT

7.1 The Potters Farm residence lies northwards of the newly proposed five-arm roundabout on the B1172 Abbey Road to the East of Leiston Abbey. This is approximately 700mtrs from the NSR's residence and approximately 675mtrs from their amenity space.

7.2 As this was part of the Main Development site, it was not considered as part of the SLR submission. Evaluation of the main development documentation appears to show that this was not 'screened in' as part of the assessment. Review of the Yoxford roundabout documentation provides some rationale which may be applicable to why this site was not assessed. The following has been quoted from the Yoxford Roundabout documentation in section 4.3.12, Book 6, Volume 7, Chapter 4:

"All receptors within 300 metres (m) of the proposed development (for the highway improvement works screened into the assessment) have been considered, where there is a potential for the level of construction noise or vibration to exceed a negligible effect."

7.3 Should this be the reason, then the new Main Development Roundabout would have been 'screened out', given the distance. This screening however only includes NSR dwellings and does not include amenity spaces, which in the case of Potters Farm, would be negatively impacted as it closer still to the proposed roundabout.

7.4 The following tables show the ES stated works phases (both singularly and cumulatively) at the NSR dwelling distance of 700mtrs and external amenity minimum distance of 675mtrs:

Works Phase	Activity	SPL at NSR	Cumulative SPL at NSR for Phase	Averaged Daytime SPL at NSR
Preparatory	Site set up and Clearance	45	45	40 dB $L_{Aeq,T}$
Construction	Earthworks	44	52	
	Drainage	42		
	Pavements	46		
	Kerbs, Footways and Paved Areas	45		
	Bridges and Civil Structures	45		
	Road Restraints	39		
	Fencing	39		
	Traffic Signs	37		
	Road Lighting	36		

Table 7.1: Level at NSR Dwelling - 700mtrs (- $A_g + A_a + A_{met}$ or $A_b + A_a + A_{met}$ = 6 dB)

Works Phase	Activity	SPL at NSR	Cumulative SPL at NSR for Phase	Averaged Daytime SPL at NSR
Preparatory	Site set up and Clearance	46	46	40 dB $L_{Aeq,T}$
Construction	Earthworks	44	53	
	Drainage	42		
	Pavements	47		
	Kerbs, Footways and Paved Areas	45		
	Bridges and Civil Structures	46		
	Road Restraints	39		
	Fencing	39		
	Traffic Signs	38		
	Road Lighting	36		

Table 7.2: Level at NSR External Amenity - 675mtrs (- $A_g + A_a + A_{met}$ or $A_b + A_a + A_{met}$ = 6 dB)

7.5 The above tables show that most the works processes would be audible at the dwelling distance, whereas the level at the external amenity would be most negatively impacted. ambient and are indicative of a significant adverse impact which would warrant mitigation.

7.6 When this is considered cumulatively with the sound levels as described in the previous chapter of this report, all works processes for the external amenity area have been predicted to exceed the residual sound levels.

8.0 CONCLUSIONS

8.1 Create Consulting Engineers have undertaken a review of the Environmental Noise statement associated with the Sizewell Link Road (SLR) for the Sizewell C development plans.

8.2 The results from a noise survey carried out by Create have been used in support of this assessment, to compare against those presented within the EDF ES. The ES stated levels were found to be marginally greater than those measured by Create, although not directly comparable in terms of location.

8.3 Although indicative, the construction noise calculations provided by EDF should not be considered as robust or exhaustive, as they are suitable for outline scoping only. Primary measures of mitigation have been determined to be necessary within the ES, however further assessment would be warranted to determine whether the proposed additional mitigation would be effective.

8.4 The ES does not consider loss of external amenity, for which it has been assumed would be potentially significant, depending on the context as the extent of the amenity spaces . This should be considered when defining suitable measures of mitigation.

8.5 We are seeking a full and conclusive construction noise and vibration assessment be completed once the method statements have been finalised and suitable noise mitigation be implemented to reduce the impact of the construction noise.

8.6 The use of earth bunds are limited at best, and would be required to be positioned either close to the receptor or to the noise source to maximise their efficacy. Additional near field screening would be required around some of the noisier items of plant.

8.7 The use of Best Practicable Means (BPM) must be adhered to, which should include the use of mufflers or silencers, nearfield screening, considerate placement of noisy plant, starting the ignitions in a synchronised manner and not leaving engines running when not in use. These are examples only and are by no means an exhaustive list.

9.0 DISCLAIMER

9.1 Create Consulting Engineers Ltd disclaims any responsibility to the Client and others in respect of any matters outside the scope of this report.

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APPENDICES

APPENDIX A
Glossary of Acoustic Terminology

dB(A)

The human ear is less sensitive to low (below 125Hz) and high (above 16kHz) frequency sounds. A sound level meter can be used to duplicate the ear's variable sensitivity to sound across a spectrum of frequencies. This is achieved by building a filter into the instrument with a similar frequency response to that of the average ear. This is called an "A-weighting filter". Measurements of sound made with this filter are called A-weighted sound level measurements and the unit is dB(A).

$L_{eq,T}$

The sound from noise sources often fluctuates widely during a given period of time. An average value can be measured, the equivalent sound pressure level L_{eq}. The L_{eq} is the equivalent sound level which would deliver the same sound energy as the actual fluctuating sound measured in the same time period (T).

$L_{10,T}$

This is the minimum level exceeded for not more than 10% of the time period (T). This parameter is often used as a "not to exceed" criterion for noise.

$L_{90,T}$

This is the minimum level exceeded for not more than 90% of the time period (T). This parameter is often used as a descriptor of "background noise" for environmental impact studies.

L_{fmax}

This is the maximum sound pressure level that has been measured over a period using a fast time constant.

Octave Bands

In order to completely determine the composition of a sound it is necessary to determine the sound level at each frequency individually. Usually, values are stated in octave bands. The audible frequency region is divided into 10 such octave bands whose centre frequencies are defined in accordance with international standards.

Addition of noise from several sources

Noise from different sound sources combine, on a logarithmic scale, to produce a sound level higher than that from any individual source. Two equally intense sound sources operating together produce a sound level which is 3dB higher than one alone and 3 identical sources produce a 5dB higher sound level.

Attenuation by distance

Sound which propagates from a point source in free air attenuates by 6dB for each doubling of distance from the noise source. Sound energy from line sources (e.g. stream of cars) drops off by 3dB for each doubling of distance.

Sound Exposure Level (SEL)

This is the level at the reception point which, if maintained constant for a period of 1 second, would cause the same A weighted sound energy to be received as is actually received from a given noise event. The SEL is used to categorise and quantify the noise generated by individual railway vehicles and individual trains. As such, it serves as a "building block" to determine the L_{Aeq} for the total flow of trains over a given time period.

Subjective impression of noise

Sound intensity is not perceived directly at the ear; rather it is transferred by the complex hearing mechanism to the brain where acoustic sensations can be interpreted as loudness. This makes hearing perception highly individualised. Sensitivity to noise also depends on frequency content, time of occurrence, duration of sound and psychological factors such as emotion and expectations. The following table is a reasonable guide to help explain increases or decreases in sound levels for many acoustic scenarios.

Change in sound level (dB)	Change in perceived loudness
1	Imperceptible
3	Just barely perceptible
6	Clearly noticeable
10	About twice as loud
20	About 4 times as loud

Barriers

Outdoor barriers can be used to reduce environmental noises, such as traffic noise. The effectiveness of barriers is dependent on factors such as its distance from the noise source and the receiver, its height and its construction.

Reverberation control

When sound falls on the surfaces of a room, part of its energy is absorbed and part is reflected back into the room. The amount of reflected sound defines the reverberation of a room, a characteristic that is critical for spaces of different uses as it can affect the quality of audio signals such as speech or music. Excess reverberation in a room can be controlled by the effective use of sound-absorbing treatment on the surfaces, such as fibrous ceiling boards, curtains and carpets.

APPENDIX B
Survey Results

Project title	Theberton House Estate - Sizewell C (Potters Farm)				
Project number	P21-2319				
Date & Time of Deployment	26/07/21 - 14:30		**Duration**		8d 21h 44m 2s
Sound level meter and calibrator model	Nor140 RTA with Environmental Kit & C1251 Calibrator				
Calibration ref. level	113.8	**Before**	113.8	**After**	113.9
Person in charge of measurements	Sam Ward				
Other people present	n/a				
Weather station make and model	ClimeMet CM3000				

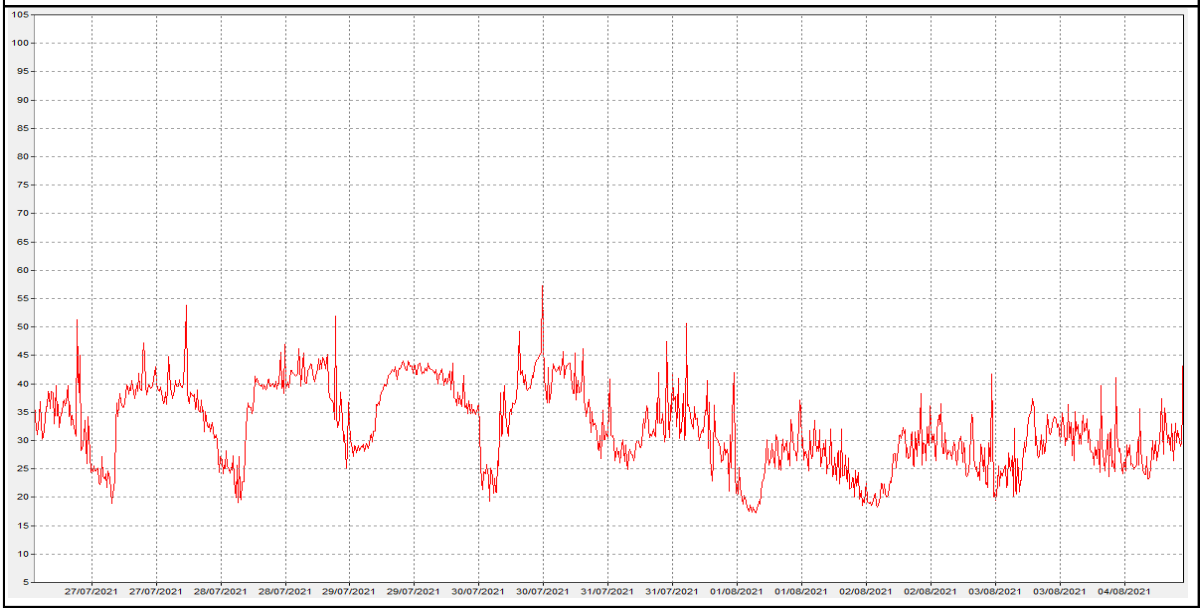
Site description:

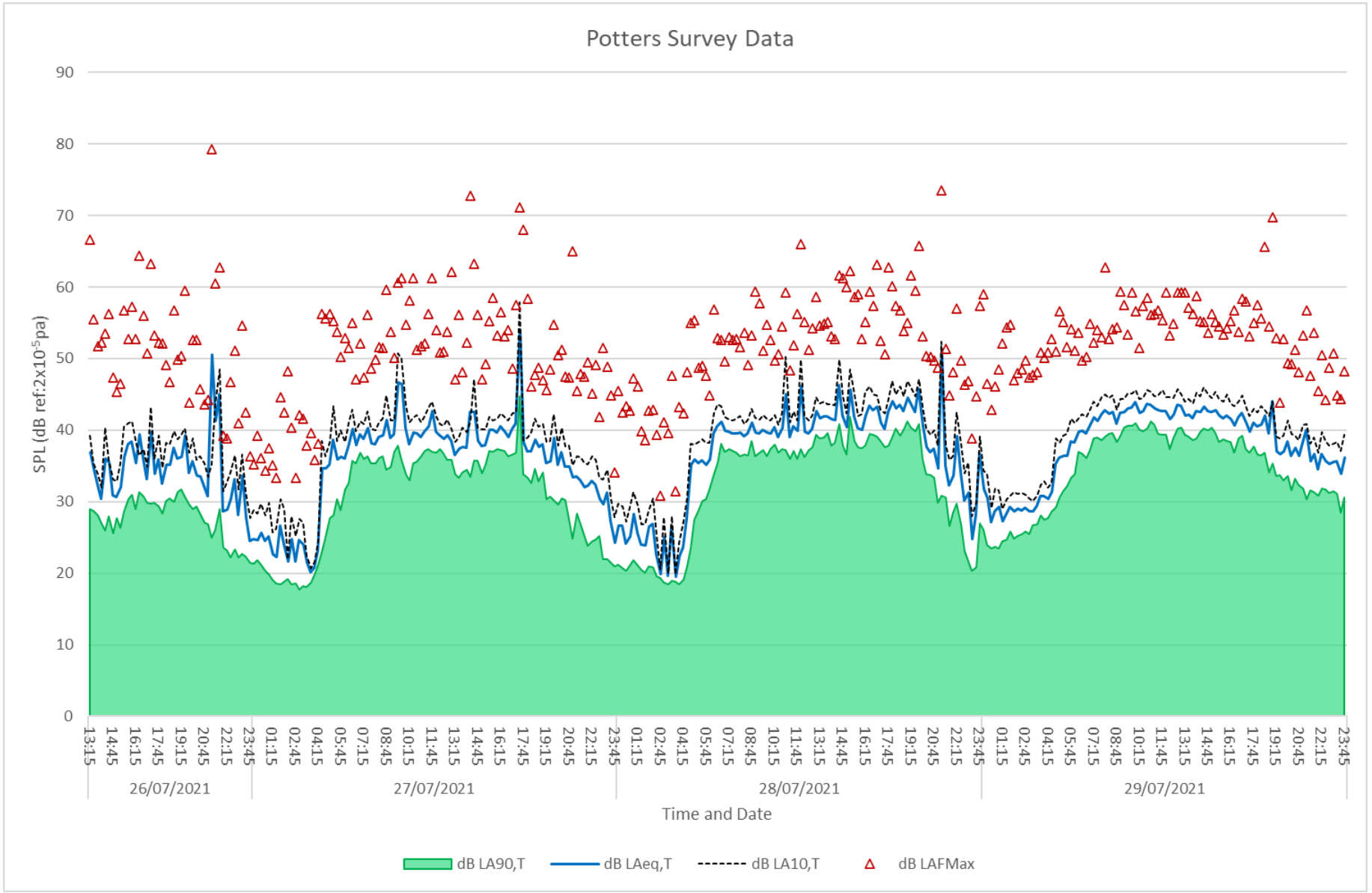
Site was in a rural setting, surrounded by agricultural lands. High density of trees in the surrounding area, with no direct line of sight to any roads. However, the B1122 (approx 750m south) not perceptible at this location. No other major roads in vicinity of the site. Surrounding area usually used for rearing birds, however this was not taking place due to Covid restriction. Dominant noise source was wildlife and foliage.

Measurement location(s)	**Ref No:**		**Photo(s)**

Survey note summary (inc. notes from residents on any periods that could potentially be excluded)

Sound level meter positioned so as to avoid ground nesting birds in the area. Sound Level meter retrieved and found to be on the floor. Likely fallen over due to wildlife or inclement weather.




Potters Survey Data
SPL (dB ref:2x10-5pa)
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80
70
60
50
40
30
20
10
0
13:15
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20:45
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01:15
02:45
04:15
05:45
07:15
08:45
10:15
11:45
13:15
14:45
16:15
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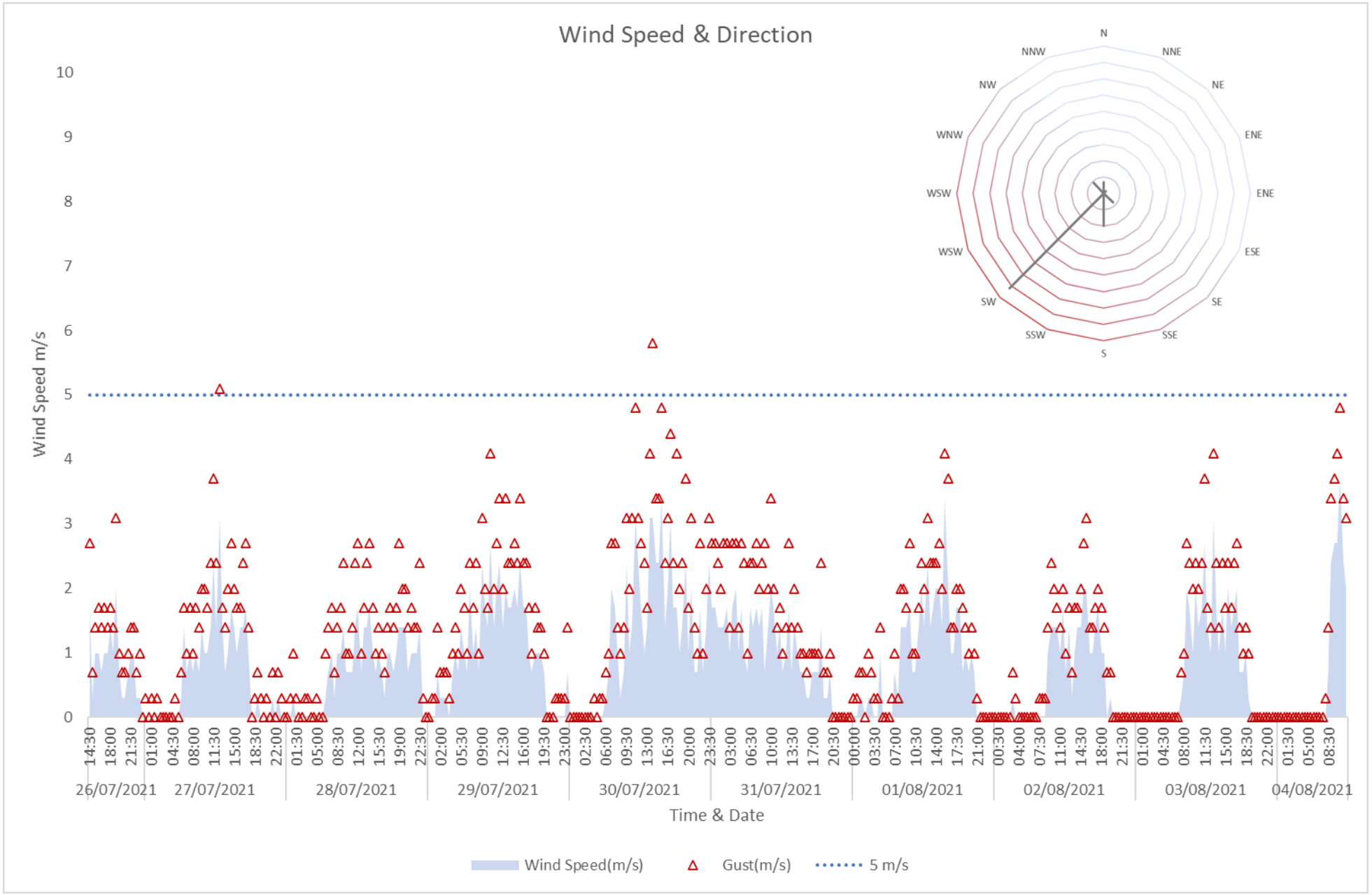
08:45
10:15
11:45
13:15
14:45
16:15
17:45
19:15
20:45
22:15
23:45
26/07/2021
27/07/2021
28/07/2021
29/07/2021
Time and Date
dB LA90,T
dB LAeq,T
dB LA10,T
dB LAFMax

APPENDIX C
Weather Results


Wind Speed & Direction
N
NNE
NE
ENE
ENE
ESE
SE
SSE
S
SSW
SW
WSW
WSW
WNW
NW
NNW
Wind Speed m/s
10
9
8
7
6
5
4
3
2
1
0
14:30
18:00
21:30
01:00
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05:00
08:30
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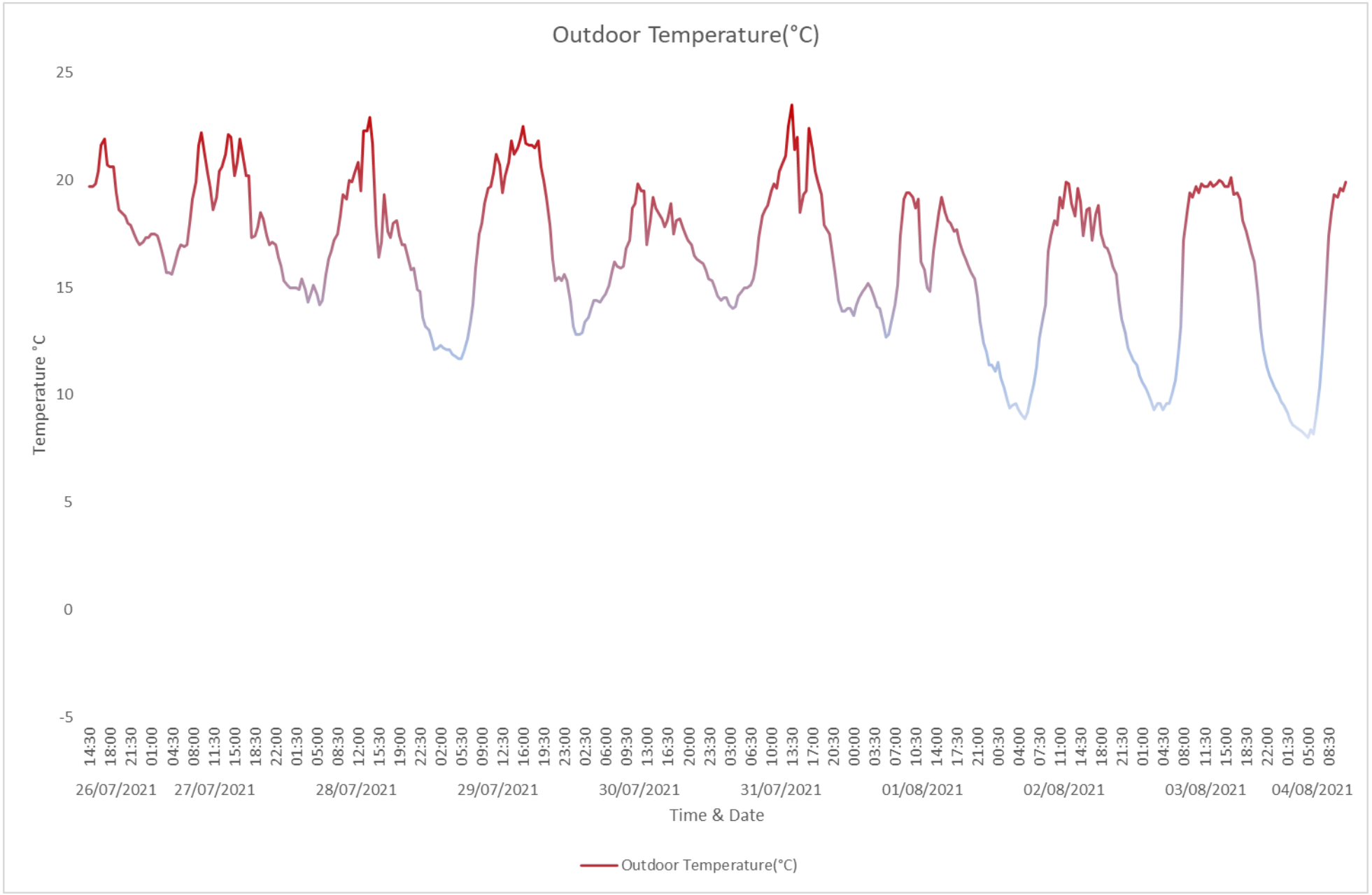
27/07/2021
28/07/2021
29/07/2021
30/07/2021
31/07/2021
01/08/2021
02/08/2021
03/08/2021
04/08/2021
Time & Date
Wind Speed(m/s)
Gust(m/s)
5 m/s


Outdoor Temperature(°C)
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20
15
10
5
0
-5
Temperature °C
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18:00
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01:00
04:30
08:00
11:30
15:00
18:30
22:00
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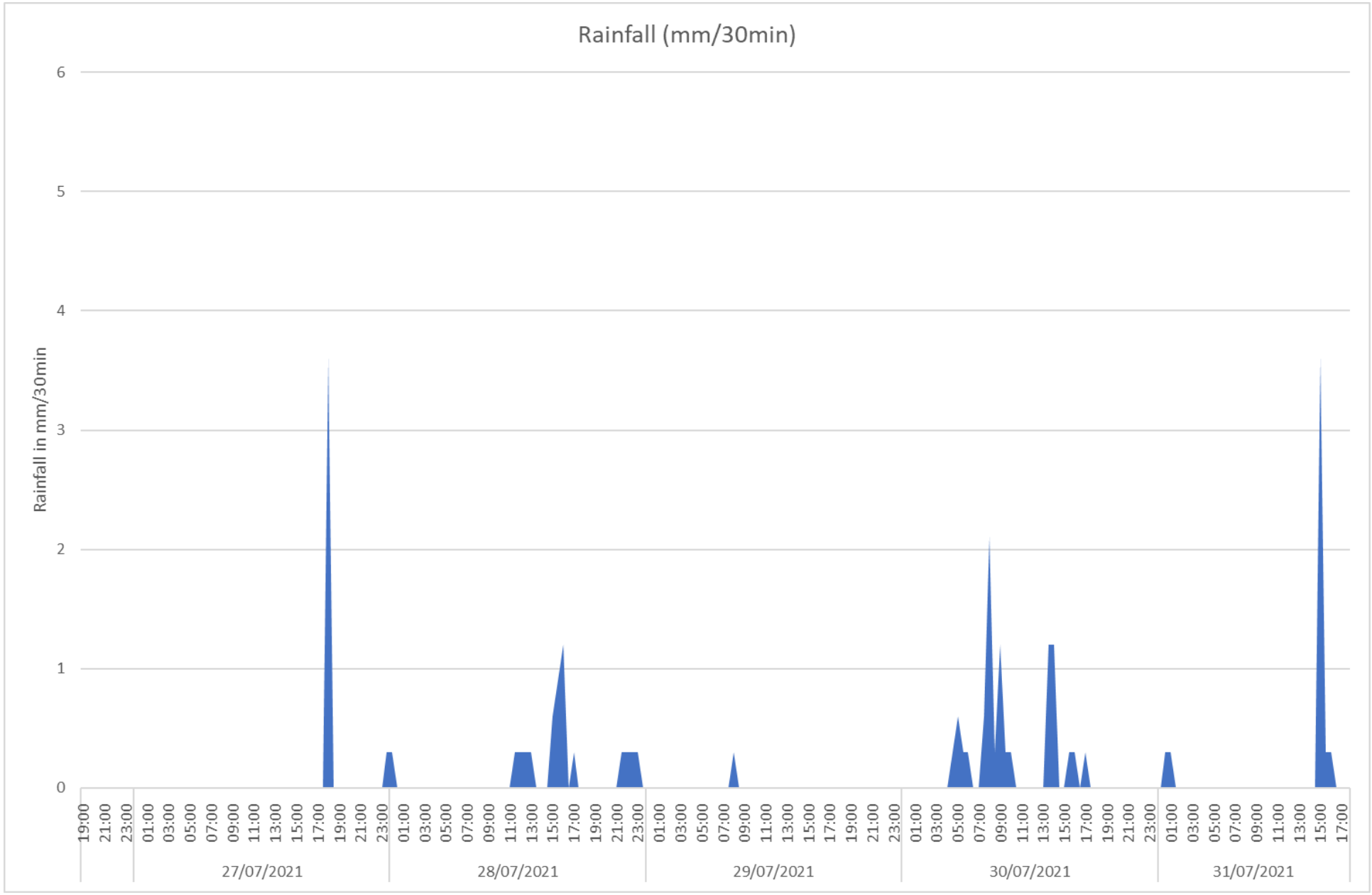
03/08/2021
04/08/2021
Time & Date
Outdoor Temperature(°C)


Rainfall (mm/30min)
Rainfall in mm/30min
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3
2
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