One Earth Solar Farm

Preliminary Environmental Information Report [EN010159]

Chapter 16: Noise and Vibration

May 2024

One Earth Solar Farm Ltd

Contents

16. Noise and Vibration

Summary of Preliminary Likely Significant Effects

16.1. This Chapter sets out our preliminary assessment which shows there are unlikely to be any likely significant environmental effects on noise and vibration as a result of our Project. As part of preparing our Environmental Statement (ES), additional modelling and ongoing design work will confirm whether any significant effects are likely to occur. The results of this will be reported in our ES submitted as part of the DCO application.

Introduction

16.2. This Chapter of the PEIR has been prepared by Logika and presents the likely significant environmental effects of noise and vibration from our Project upon local noise sensitive locations (such as residential properties). The experience of the consultants that have prepared this Chapter, who are competent experts for the purposes of the EIA Regulations, is set out in **Appendix 1-1** in **Chapters 1-6**. It has been informed by the environmental information that has been collected to date (which is detailed in this Chapter), as well as the current description of the Project as set out in **Chapter 4: Our Project**.

16.3. This Chapter is supported by further detailed information contained in:

- Appendix 16.1: Baseline noise survey details
- Appendix 16.2: Noise and Vibration Specific Legislation, Policy and Guidance

Current Noise and Vibration Conditions

16.4. The current main sources of environmental noise in the vicinity of our Project arises from local transportation. This includes:

- the A57, immediately adjacent to the north of our Site;
- the A1 approximately 4 km to the west of our Site; and
- the East Coast Main Line, approximately 3 km to the west of our Site.

16.5. There is also some existing noise from the High Marnham 275 kV substation and the associated electricity grid infrastructure.

16.6. Other existing sources of environmental noise in the area are likely to include some occasional noise from the Carr Farm private airstrip, immediately to the east of our Site, and the Darlton Gliding Club, located at approximately 2 km to the west of our Site. It is also likely that there is occasional noise generated by existing farming activities on the land within and around our Site.

16.7. Vibration is commonly associated with railway lines. Since our Site is in a predominantly rural area, and there are no passenger railway lines in the local area other than the East Coast Mainline, which is at too great a distance from our Site to have any effect on vibration levels, baseline vibration levels are likely to be very low. The Network Rail operated High Marnham Test Track (a non-passenger railway line) is located immediately to the west of our Site, however it is understood that this is infrequently used and is also therefore unlikely to contribute to typical baseline vibration levels.

Study Area

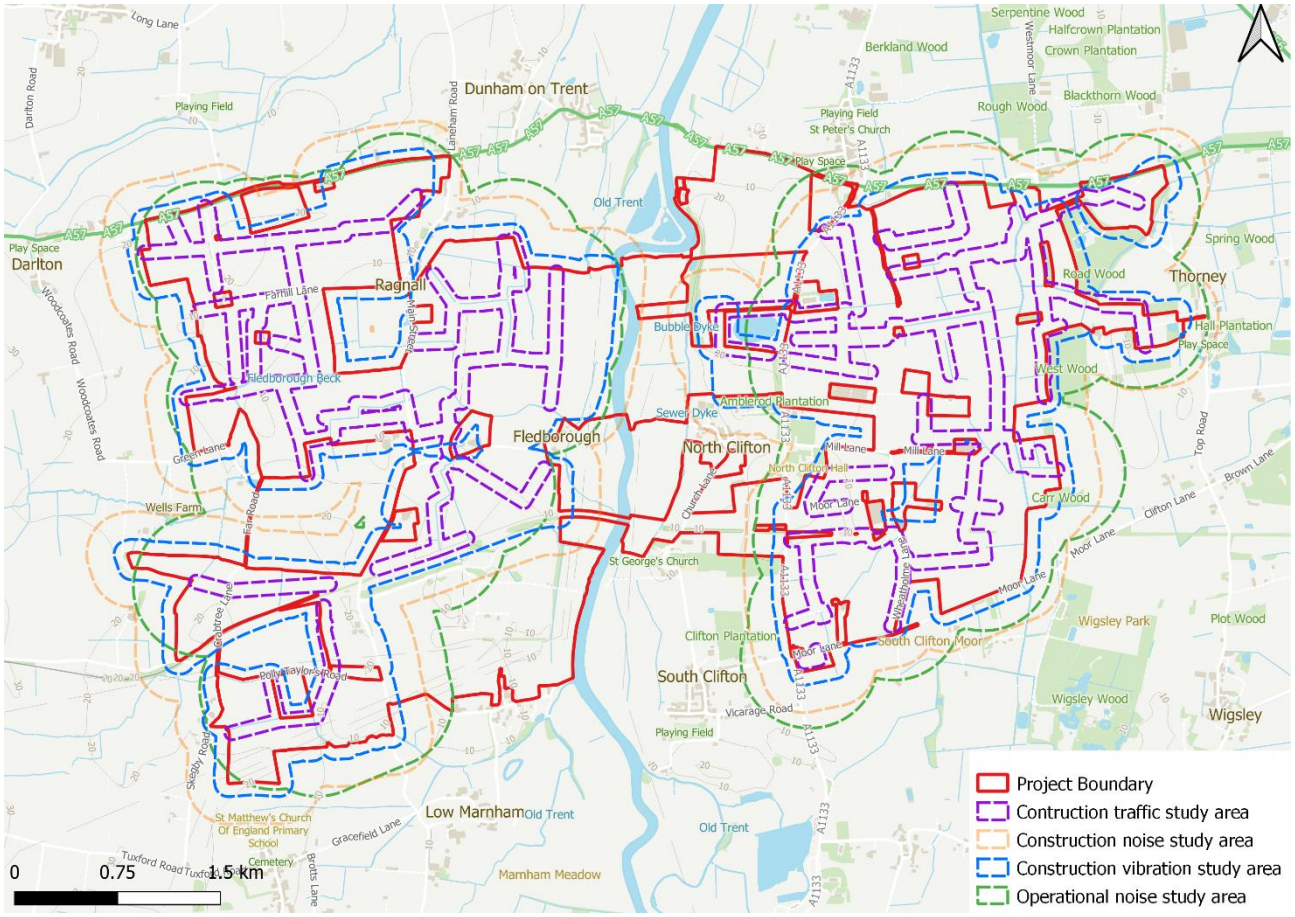
16.8. The study area has been defined based on the type of noise and vibration generated by our Project during the construction, operation and decommission phases and the distances from sensitive receptors at which noise and vibration has the potential to cause impacts. The potential noise and vibration effects that have been scoped-in to the study are as follows:

- Noise from construction traffic: noise effects from construction traffic may include road traffic sounds, such as engine noise and tyres on road surfaces. These sounds are considered for properties within 50 m of roads in the immediate vicinity of our Site that are likely to experience a change in road traffic noise which has the potential to lead to significant noise effects due to the addition of construction traffic, and roads within our Site that are proposed to carry construction vehicles.
- Vibration from construction traffic: vibration effects from construction traffic is considered for properties within 50 m of existing roads that are likely to experience a change in road traffic which could lead to significant vibration effects, and proposed roads within our Site that are proposed to carry construction vehicles.
- Noise from on-site construction activities: noise from construction activities may include (but is not limited to) sounds associated with construction of panels (such as fixing of panels and mounting equipment); the tipping and compaction of aggregate to create internal roads; movement of any earth; the delivery and movement of other solar infrastructure such as the inverters etc. Using professional judgement, a study distance of 300m from on-site construction activities is considered, as beyond this distance, construction noise effects are unlikely.
- Vibration from on-site construction activities: vibration effects from the piling of the mounting equipment into the ground for the panels. A distance of 100m from high-energy construction works such as piling is considered. Beyond this distance, vibration effects are unlikely;

- Operational noise from plant and equipment: the solar panels do not generate any noise. At a very local level (within 300m) noise maybe noticeable for inverters, transformers, other substation equipment and battery storage equipment. This noise is similar to the noise from an electrical telephone exchange box on a pavement. For the purposes of the assessment a distance of 500m from electrical equipment such as inverters, transformers, other substation equipment and battery storage equipment has been considered, to ensure all potential impacts are identified.

16.9. **Figure 16-1** below shows the study area based on the preliminary information available at this stage and considering the likely effects as bulleted above.

Figure 16-1: Study Area for Noise and Vibration Assessment.



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Collection of Noise and Vibration Data

16.10. Existing noise levels in within the study area have been identified using the following approaches:

- Available strategic noise mapping data from Defra[1]. This dataset provides modelled levels of noise from transport sources (i.e. road and rail traffic sources) and includes long-term average noise levels for both the day and night.
- Baseline noise survey data taken at selected locations around our Site as presented to the local authorities. The baseline measurement locations were selected to be representative of the range of background noise levels experienced at residential receptors in the vicinity of our Project.

Current Results

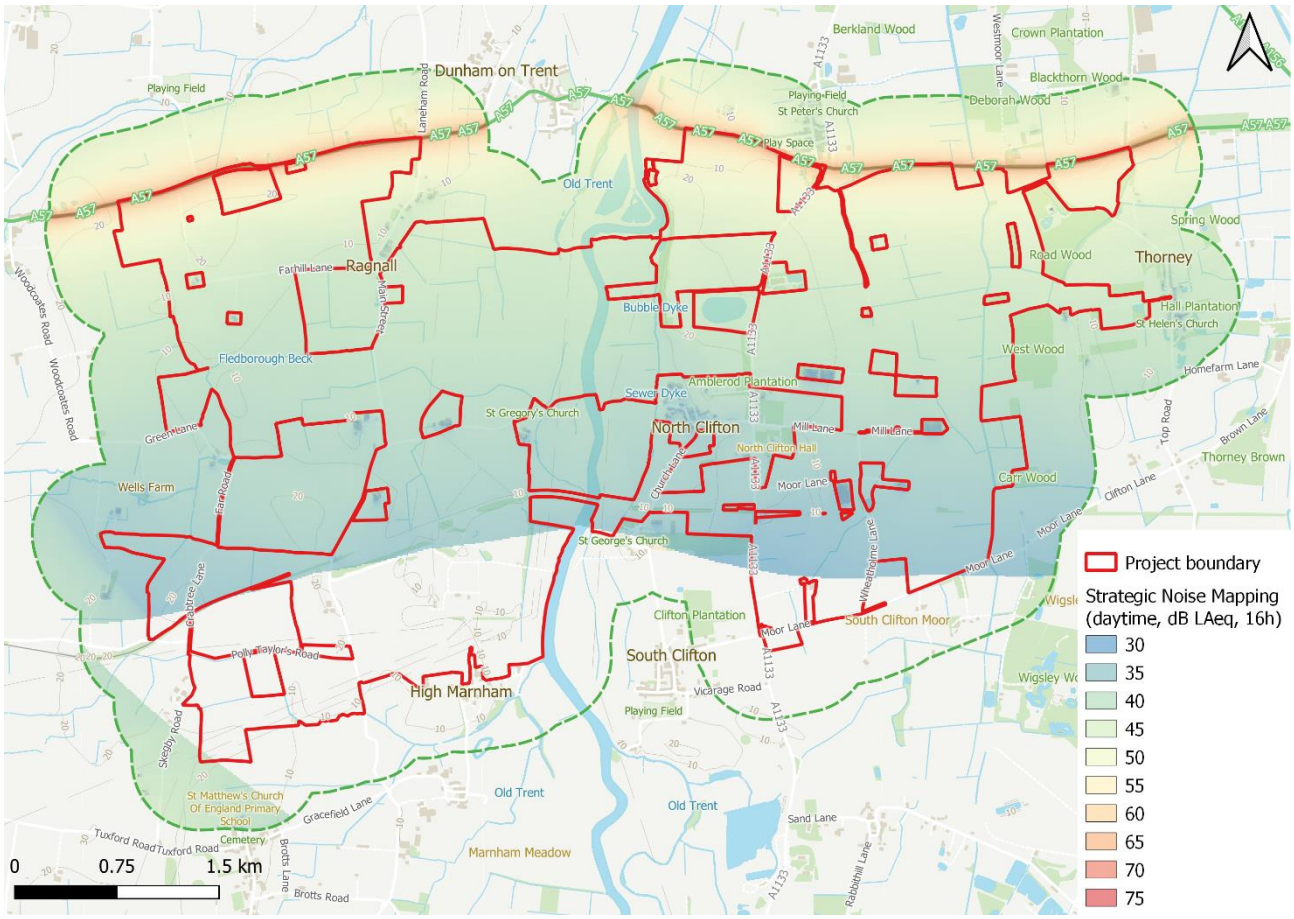
Strategic Noise Mapping

16.11. Noise levels differ during the daytime and night-time, due to different intensity of activity during different times of day / night. For example, in general there are more traffic movements during the daytime compared to the night-time, and as such noise during the daytime is typically higher.

16.12. Predicted noise levels from the strategic noise mapping datasets for daytime and night-time are shown in the following figures. The figures show the strategic noise mapping results within 500m of our Project. Areas that are within the study area but that are not coloured are outside of the calculated area for the strategic noise mapping data. Note that this does not necessarily mean that these areas do not experience noise from existing transport sources, just that they are unlikely to experience substantial levels of noise from the existing major road and rail sources that are included in the modelling.

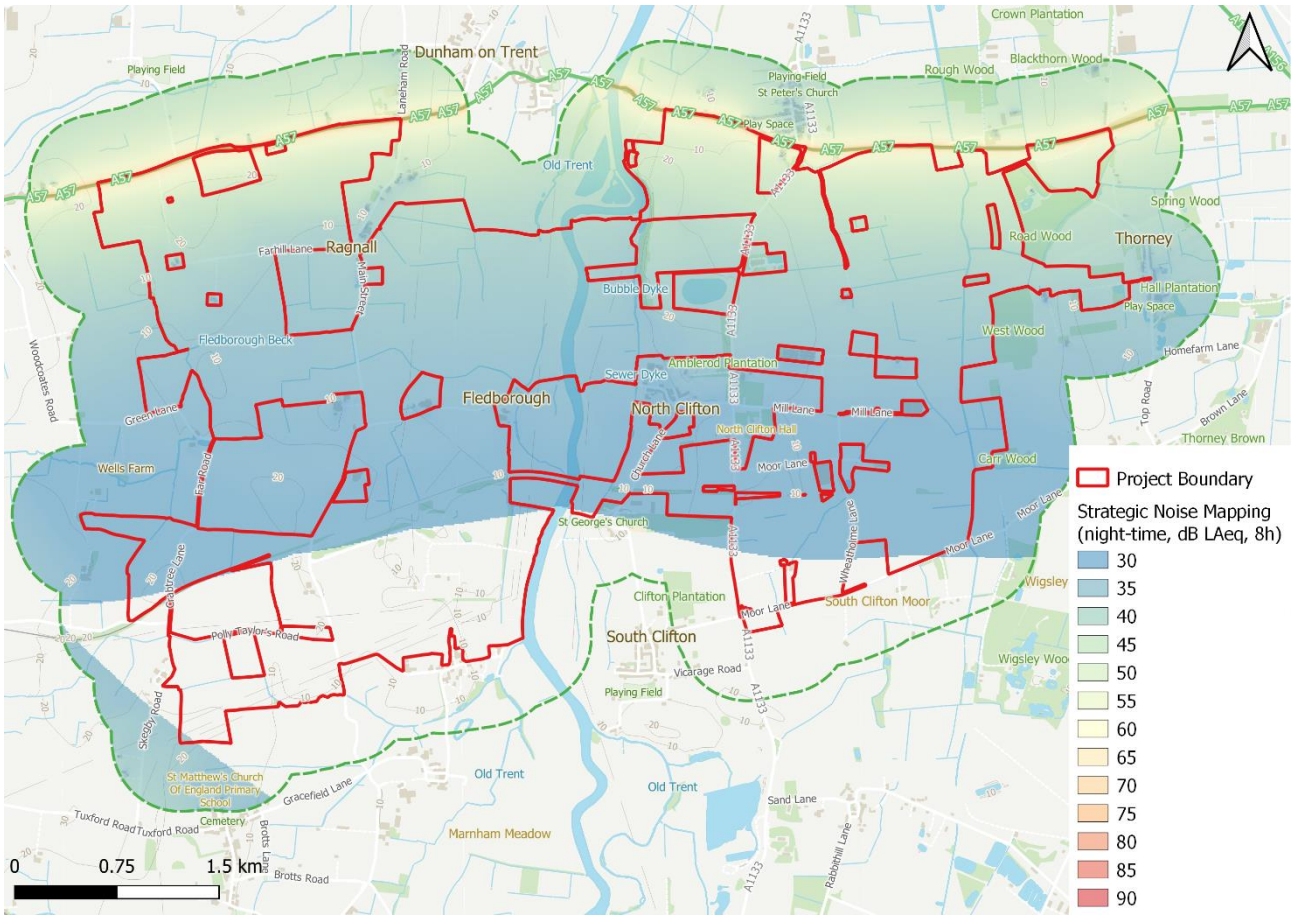
[1] Department for Environment, Food & Rural Affairs (DEFRA), Round 3 Strategic Noise Maps (2017)

Figure 16-2: Strategic Noise Mapping Data for Daytime.



Note: that areas that are within the study area but are not coloured are outside of the calculated area for the Strategic Noise Map. Contains OS data © Crown Copyright and database right 2024.

Figure 16-3: Strategic Noise Mapping Data for Night-Time.



Note that areas that are within the study area but are not coloured are outside of the calculated area for the Strategic Noise Map. Contains OS data © Crown Copyright and database right 2024.

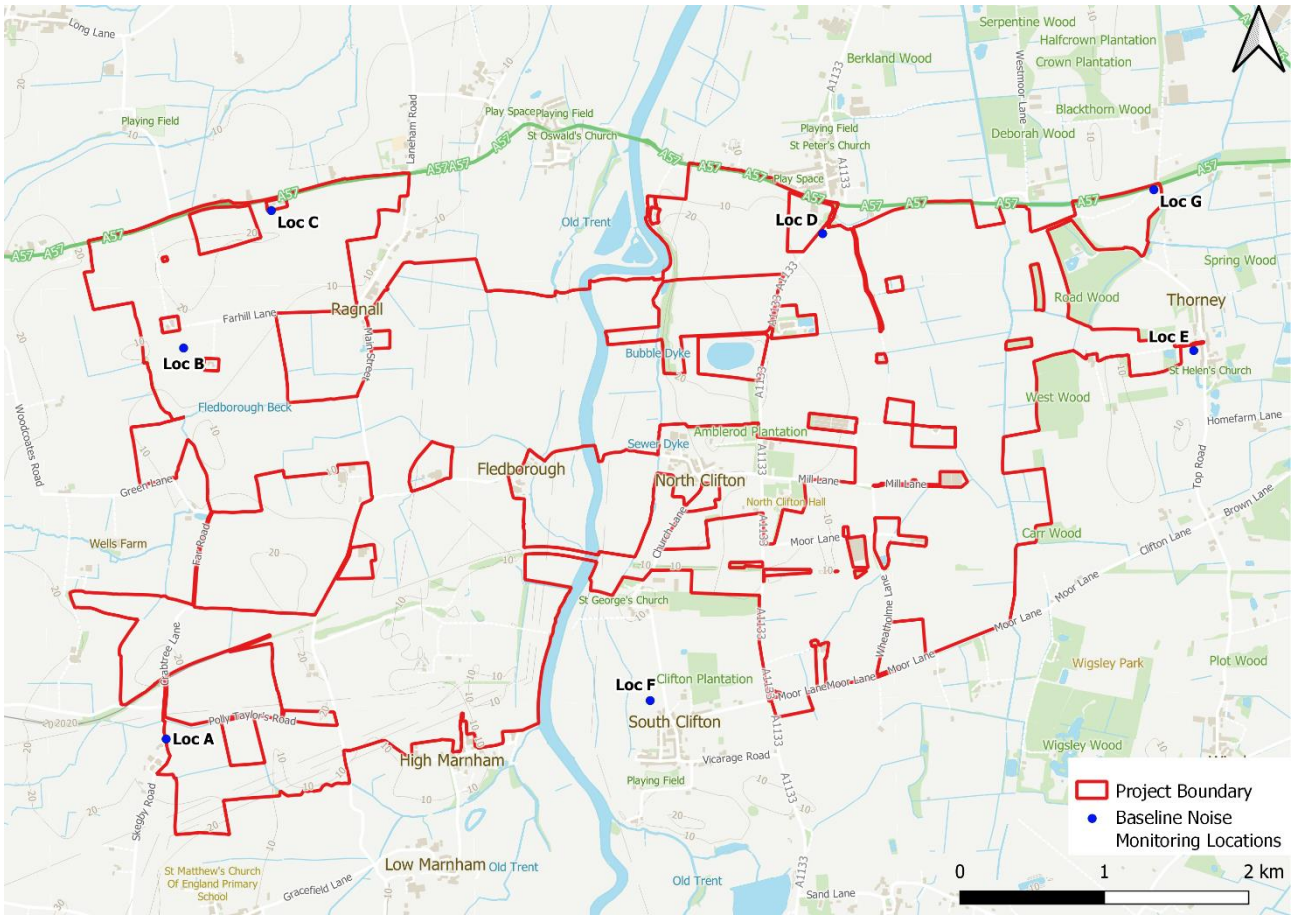
16.13. Whilst the strategic noise mapping data does not include all sources of noise within the local area, it does indicate that the existing ambient noise levels in the vicinity of our Site are likely to be low, particularly during the night.

Baseline Noise Measurements

16.14. Measurements of existing noise levels have been taken at seven locations within our Site. These locations were selected to be representative of baseline noise levels at the residential properties that are in the vicinity of areas that are within the various study areas for our Project.

16.15. Baseline noise measurements were taken at the seven locations indicated in **Figure 16-4** below for a period of one week in order to capture baseline noise levels during day and night and on weekdays and weekends, between 15 - 22 February 2024.

Figure 16-4: Baseline noise monitoring locations.



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16.16. Measurements were taken using calibrated, professional grade noise monitoring equipment, as required by British Standard (BS) 4142. A weather station was also installed at the Location C to record weather conditions during the noise survey. All periods during which weather conditions potentially affected the measured results (i.e. windy conditions or periods of rainfall) were excluded from further analysis. This filtering resulted in approximately 19 % of the data being removed from the analysis to minimise the effect of weather conditions. The remaining survey data covered a period of 138.5 hours (or 5.8 days) and included daytime, evening and night-time periods on weekdays and weekends. Full details of the equipment used for the noise survey, photographs of the installed monitoring equipment and the details of the measurements obtained can be found in **Appendix 16.1**.

16.17. The results of the baseline noise survey are broadly in line with the expectations from the strategic noise mapping data. The highest baseline noise levels were recorded at Locations C, D and G, which are the closest noise monitoring locations to the A57 and so experience the highest levels of road traffic noise. Lower noise levels were measured at the remaining locations, which are at locations away from any sources of noise.

16.18. Night-time background (L_{A90}) noise levels were very low at all locations.

Further Data Collection

16.19. The above monitoring data that has been collected for our Project is sufficient to adequately assess the likely noise impacts and as such no further data collection is proposed.

Future Noise Conditions

16.20. The ambient noise climate in the local vicinity of our Site is rural in nature, with only relatively small areas experiencing appreciable amounts of road traffic noise. Future baseline noise conditions will therefore be assumed to be similar to those that currently exist for the purposes of our ES.

Environmental Measures

16.21. Our Project incorporates the adoption of an Outline Construction Environmental Management Plan (oCEMP) and an Decommissioning Environmental Management Plan (DEMP) to minimise noise emissions during the construction and decommissioning works (see **Chapter 4: Our Project** for further details on the management plans and **Appendix 4-2** in **Chapters 1-6** for the likely measures to be employed during construction). These documents will include details of good design and best practice measures to ensure that adverse noise impacts are avoided, reduced or mitigated. These measures are considered to be included within our Project prior to the technical assessment.

16.22. In addition, where flexibility exists within the project constraints, items of plant and equipment that will be required as part of the development and have the potential to generate noise will be located as far as is reasonably practicable from noise sensitive receptors. Examples of this approach that have been adopted in the preliminary design of our Project include:

- Identifying potential construction traffic routes that, where possible, avoid the main areas of existing residential development;
- Identifying proposed locations for construction compounds that are at least 250m from the nearest residential receptor;
- Identifying proposed locations for substation and battery storage equipment that are, where possible, 300m or more from existing residential properties.

Stakeholder Consultation

16.23. The Scoping Opinion received from PINS requested that agreement should be sought from the relevant Local Authorities on the number and locations of baseline noise monitoring positions (See **Volume 2: Scoping Consultation**, Scoping Opinion ID 3.10.6). Our Site extends across three Local Authority areas, Bassetlaw, West Lindsey and Newark and Sherwood. Discussions relating to the baseline survey were started with these Local Authorities in November 2023.

16.24. A meeting was held with representatives of Newark and Sherwood District Council on 28 November 2023. During this meeting, the approach to taking the baseline noise measurements was discussed and agreed. This included discussion of the proposed monitoring locations within the Newark and Sherwood Local Authority Area, and adjustments were made to proposed monitoring locations in response to those discussions.

16.25. Feedback was also received from Bassetlaw District Council on the 7th March 2024 that they were in agreement with the monitoring locations used for the baseline monitoring survey. No feedback has been received to date from West Lindsey District Council on the approach to baseline noise surveys.

16.26. Following the completion of the survey, a summary of the survey results was shared with the relevant Local Authorities. Confirmation was received from Newark and Sherwood District Council on the 18th March 2024 that they had no comments to make on the survey results. No further comments were received to date from Bassetlaw or West Lindsey District Councils.

Table 16-1: Overview of Stakeholder Consultation

Stakeholder	Date of Consultation	Relevant Considerations for the PEIR
Newark and Sherwood District Council	28/11/2023	Baseline survey locations discussed. Minor modification of baseline survey locations made following consultation
Newark and Sherwood District Council	18/03/2024	Confirmation received of no comments on baseline measurements
Bassetlaw District Council	07/03/2024	Confirmation received of agreement with baseline survey locations

16.27. The Scoping Report and Scoping Opinion (see **Volume 2: Scoping Consultation**) also discussed the aspects of noise and vibration that have the potential to lead to significant effects and should therefore be scoped-in to the assessment, as well as any aspects of noise and vibration that are unlikely to lead to significant effects and can therefore be scoped-out.

16.28. **Table 16-2** sets out the effects that have been agreed to be scoped out of the assessment. Note that potential noise effects of tracking motors associated with tracker panels have not been included in this study. While tracker panels were discussed in the scoping report, and comments were received in the scoping opinion from PINS to request that noise from tracker panels be scoped in to the assessment, tracker panels are no longer proposed for our Project. The potential effects of noise from this source are therefore not considered further.

Table 16-2: Summary of Potential Noise and Vibration Effects Scoped-out of the assessment

Effects Scoped Out	Justification
Operational road traffic noise and vibration	The development is unlikely to generate any appreciable traffic flows during operation.
Operational noise and vibration from cable routes	Cables are unlikely to generate any noise or vibration once installed.
Operational vibration from proposed plant and equipment	The types of plant and equipment proposed are unlikely to generate levels of vibration that would perceptible outside of plant compounds.

Preliminary Environmental Assessment

Sensitive Receptors

16.29. Noise and vibration sensitive have been identified by reference to local mapping. These include residential properties in the following areas:

- Properties at the eastern edge of Darlton;
- Properties along the A57 between Darlton and Dunham on Trent, including Goosemoor Cottage, Whimpton House and Field House Farm;
- Properties on the western edge of Dunham on Trent;
- The village of Ragnall;
- Farms between Darlton and Ragnall, including America Farm, Farr Hill Farm and Vicarage Farm;
- The village of Fledborough and nearby properties, including North Farm, Fledborough House Farm and Station House;

- The village of Skegby and farms to the north of Skegby, including Babbington Springs Farm, Woodcoates, and Gibraltar Farm[2];
- The village of High Marnham;
- The villages of North and South Clifton;
- Properties along Moor Lane, including Wheatholme, Birkland Barn, Amblerod Farm, The Grange, Woodstock, The Gatehouse, Cosy Cottage and Carr Farm;
- Properties in the village of Thorney, including the nearby properties of Hawthorn Hill, Westwood Farm, Lodge Farm and Thorney Gate;
- Properties along the A57 between Newton on Trent and Drinsey Nook, including Silver Trees Farm, Birchlands Farm (including the residential properties to the north of Birchlands Farm) and Woodside Farm;
- The village of Newton on Trent, including properties to the west of Newton on Trent such as Bridge House and Trent Lodge.

16.30. Non-residential receptors that are also potentially sensitive to noise and vibration have also been identified from available local mapping data. These include:

- St Giles Church, Darlton;
- Dunham on Trent C of E Primary School;
- St Leonards Church, Ragnall;
- St Gregory's Church, Fledborough;
- St Matthew's C of E Primary School, Normanton on Trent;
- St George's Church, North and South Clifton;
- North Clifton Primary School;
- St Helens Church, Thorney;
- St Peter's Church Newton on Trent;
- Newton on Trent C of E Primary School.

Construction Phase

Construction Traffic Noise and Vibration

[2] It is recognised that the residential buildings at Gibraltar Farm are currently disused. These buildings have been assumed to be residential for the purposes of this assessment, as they could feasibly be brought back into residential use.

16.31. There is the potential for noise and / or vibration impacts at sensitive receptors close to construction traffic routes. In particular, these impacts are more likely where heavy construction vehicles are required to travel along routes that do not currently experience heavy traffic.

Approach

16.32. For the purposes of the assessment presented in this PEIR an indicative, qualitative assessment of the potential noise and vibration impacts has been carried out, based on professional judgement.

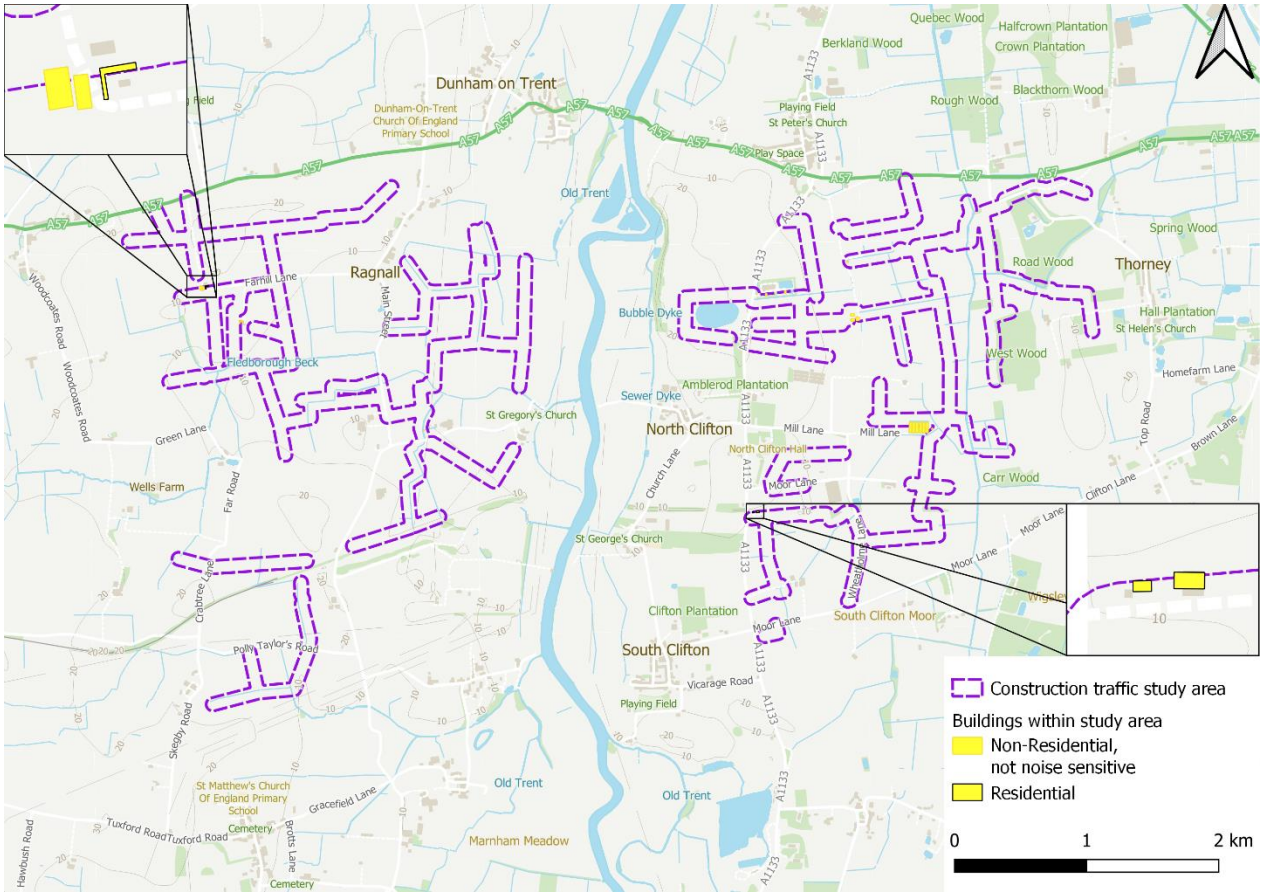
Receptors and Receptor Sensitivity

16.33. The assessment of the potential noise and vibration effects of construction traffic has been carried out by reference to local mapping of properties within 50m of proposed roads within our Site. These locations are indicated in **Figure 16-5** below. Note that this includes all properties within 50m of the currently proposed construction traffic routes. There are currently 3 residential properties within the construction traffic study; Farr Hill Farm and two residential properties off the A1133 (see **Figure 16-5**). There are no non-residential noise sensitive receptors within the current study area.

16.34. The main construction traffic route to our Site is expected to be via the A57, which carries significant existing traffic flows. Any additional construction traffic on this road would therefore equate to a very small change in traffic flows and is therefore very unlikely to lead to noise and / or vibration impacts.

16.35. Any construction traffic flows that are required to travel along other existing roads have the potential to lead to significant noise and / or vibration impacts if they pass close to existing residential properties. This will be avoided wherever possible. The noise and vibration effects of offsite construction traffic will be assessed in the ES, once offsite construction traffic routes have been finalised.

Figure 16-5: Study Area for Potential Construction Traffic Noise and Vibration Effects, and Existing Buildings within this Area.



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Preliminary Assessment

16.36. The receptors that are currently expected to experience construction traffic noise or vibration impacts include the individual residential properties that are situated close to construction traffic routes that run through our Site. These receptors may, therefore, potentially suffer significant adverse noise and / or vibration effects, however the likelihood of this occurring is considered low.

16.37. The construction traffic routes proposed within our Project are indicative and there remains flexibility in terms of their final location. In addition, construction traffic will be manged through the Construction Traffic Management Plan and the oCEMP to ensure any likely effects, such as congestion on the highway, is avoided (see Chapter 4: Our Project for further details). As such, there are likely to be no significant effects from construction and decommissioning traffic noise and vibration.

Next Steps

16.38. The potential effects of construction traffic noise and vibration will be quantified as part of our ES. This assessment will be based upon the likely construction traffic flows, construction traffic routes and the resulting changes in traffic on local roads, which will be developed further as the project progresses. These changes will be assessed against the criteria set out in the Design Manual for Roads and Bridges, LA 111 Noise and Vibration, as set out in our Scoping Report (see **Volume 2: Scoping Consultation**).

On-site Construction Plant Noise

16.39. Potential sources of on-site noise from construction plant and equipment include piling, earthworks, concreting, access road construction etc. The precise locations and durations of work, and the precise works required, are not yet known, therefore a detailed assessment of noise effects cannot be carried out at this stage. The current construction parameters include the following, and these have been used as the basis of the initial assessment of construction noise and vibration:

- There will be two principal construction compounds (one on the west and one on the east of the River Trent). In addition, there will be up to 10 satellite construction compounds. All construction compounds are to be located at least 250m from residential properties to minimise the likelihood of noise or vibration impacts from the compounds;
- The overall construction programme will last for up to 2 years;
- Construction will involve site establishment, establishment of construction compounds, construction of site tracks, construction of foundations for the substation and battery storage compounds, installation of cabling, site restoration and final commissioning and connection, with general site deliveries throughout.
- Installation of the solar panels is likely to take approximately 15 months in total, however panel installation will not be carried out in any one area of our Site for this full duration. Whilst it is assumed that construction will take place in all areas of our Site for the entire construction duration, panel installation activities will move across our Site as construction progresses;
- Full details of the likely plant and equipment that would be required during construction are not yet known, however it is understood that concussive piling may be required for the construction of the solar foundations. As such, concussive piling has been assumed as a worst case, as opposed to quieter piling methods such as auger boring;

- As part of the construction, a cable route across the River Trent will need to be constructed. This includes Horizontal Directional Drilling (HDD) works to install the cable under the river. For noise and vibration this method will result in the greatest generation of construction noise and vibration. This will require an HDD compound on one side of the River Trent, with a smaller compound on the opposite site to receive the cable. At this stage, it is possible that night-time construction works may be required specifically for HDD works. The HDD compounds will therefore be located at least 250m from the nearest residential properties. The alternative river crossing will not make use of HDD, therefore the preferred route is the worst case in terms of construction noise and vibration.

16.40. For the purposes of our PEIR, we have therefore set out a qualitative assessment of the possible construction noise effects below.

Approach

16.41. At this stage, full details of the likely construction plant and equipment and exact locations of the main construction works are not fully developed. As such, at this stage an indicative, quantitative assessment of potential construction noise impacts has been carried out, based on professional judgement.

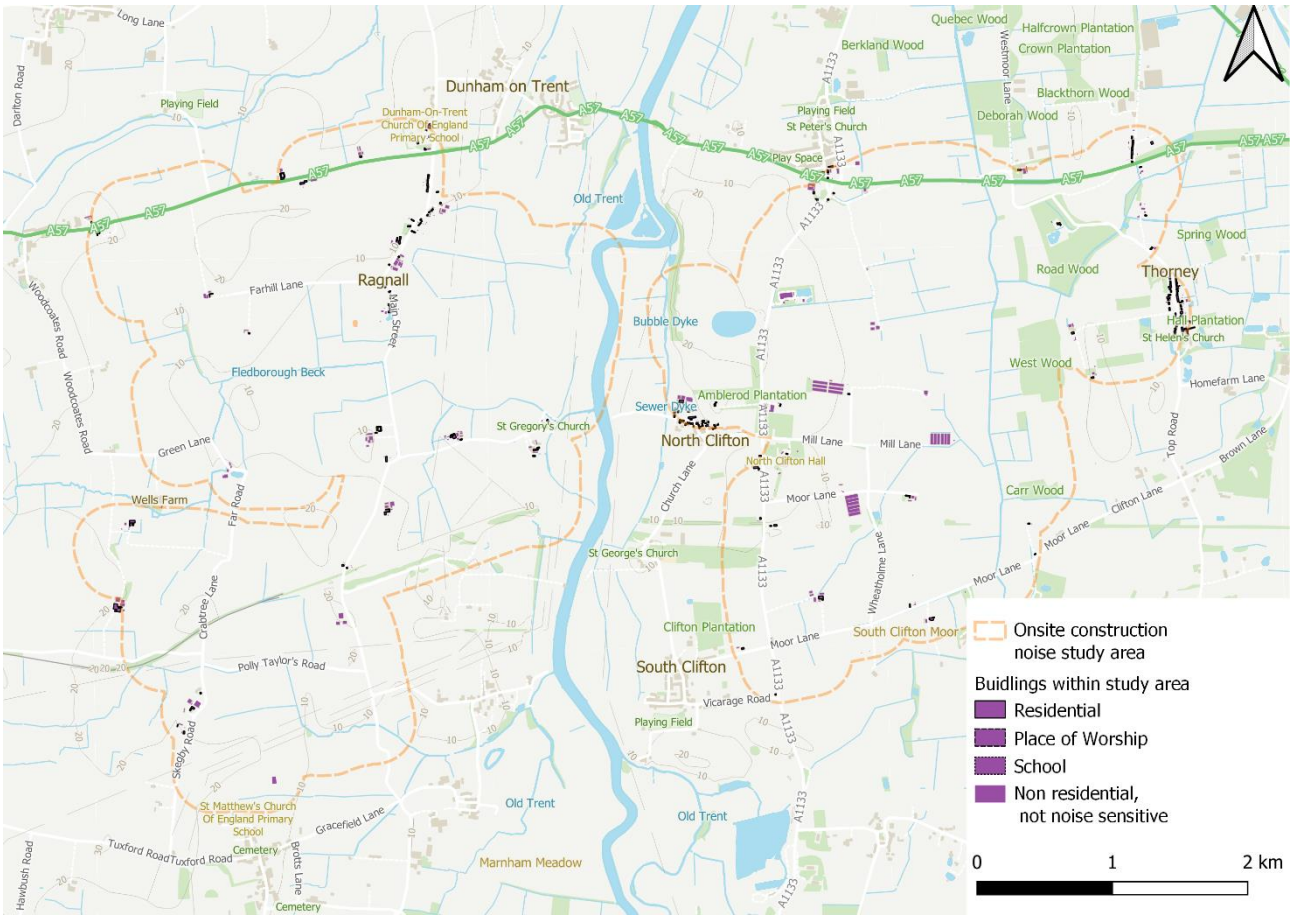
Receptors and Receptor Sensitivity

16.42. The assessment of the potential noise effects of construction activities within our Site has been carried out by reference to local mapping. Properties within 300m of areas proposed to contain solar panels or electrical infrastructure (e.g. substation or battery storage equipment) have been identified as having the potential to be affected by on site construction noise. These locations are indicated in **Figure 16-6** below. Note that this area includes all buildings within 300m of potential construction works, however there are 172 residential properties identified within the construction noise study area. These are located in Darlton, Dunham on Trent, Ragnall, Fledborough, Skegby, Newton on Trent, North Clifton and Thorney (see **Figure 16-6**).

16.43. The study area also includes non-residential receptors that are potentially noise sensitive, including St Giles Church, Darlton, Dunham on Trent CofE Primary School, St Leonards Church, Fledborough and St Helen's Church, Thorney.

16.44. As further information becomes available on the likely locations of the main construction works, the study area for construction noise assessment may reduce in size.

Figure 16-6: Study Area for Potential onsite Construction Noise Effects, and Existing Buildings within the Study Area.



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16.45. The most likely areas to experience noise impacts are the areas closest to the main construction activities. These are likely to be the battery storage units, substations, transformers etc. The majority of the area of our Site will consist of solar panels, and therefore whilst construction activities will be needed in most areas of our Site, the intensity of construction activities will be relatively low and short term for most areas. As discussed above, where project constraints allow, these items of plant will be located as far as practicable from noise sensitive receptors.

16.46. There is also the potential for night-time noise impacts from the HDD compounds associated with the preferred river crossing option. The locations of these compounds are not yet known, however the compounds will be located as far as practicable from residential properties.

Preliminary Assessment

16.47. At the present time, there is the potential for construction noise impacts at noise sensitive receptors in Darlton, Dunham on Trent, Ragnall, Fledborough, Skegby, Newton on Trent, North Clifton and Thorney, as well as at isolated residential properties within and around our Site. At this stage, based on the information currently available, it is not possible to rule out significant noise effects at the identified sensitive receptors. Since the majority of the area of our Site will, however, experience limited construction activity, the likelihood of significant construction noise effects is low.

16.48. The construction compounds proposed within our Project are indicative and there remains flexibility in terms of their final location. In addition, the oCEMP will set out measures to reduce the effects of on-site construction plant noise (see **Chapter 4: Our Project** for further details). As such, there are likely to be no significant effects from on-site construction plant noise.

Next Steps

16.49. The potential effects of onsite construction noise will be quantified as part of our ES. This assessment will be based upon the likely construction activities that will be required in the various areas of our Site, the likely construction programme and the likely construction plant and equipment that will be needed for each construction activity. The assessment will be carried out in accordance with the prediction and assessment methodology outlined in BS 5228, Code of practice for noise and vibration control on construction and open sites, Part 1, Noise, as set out in our Scoping Report (see **Volume 2: Scoping Consultation**).

On-site Construction Plant Vibration

16.50. Similarly to construction noise, potential sources of on-site vibration from construction plant and equipment include piling, earthworks, access road construction etc. The precise locations and durations of work, and the precise works required, are not yet known, therefore a detailed assessment of vibration effects cannot be carried out at this stage. The construction parameters for the assessment of vibration are the same as those set out above for construction noise.

16.51. For the purposes of our PEIR, we have therefore set out a qualitative assessment of the possible construction vibration effects below.

Approach

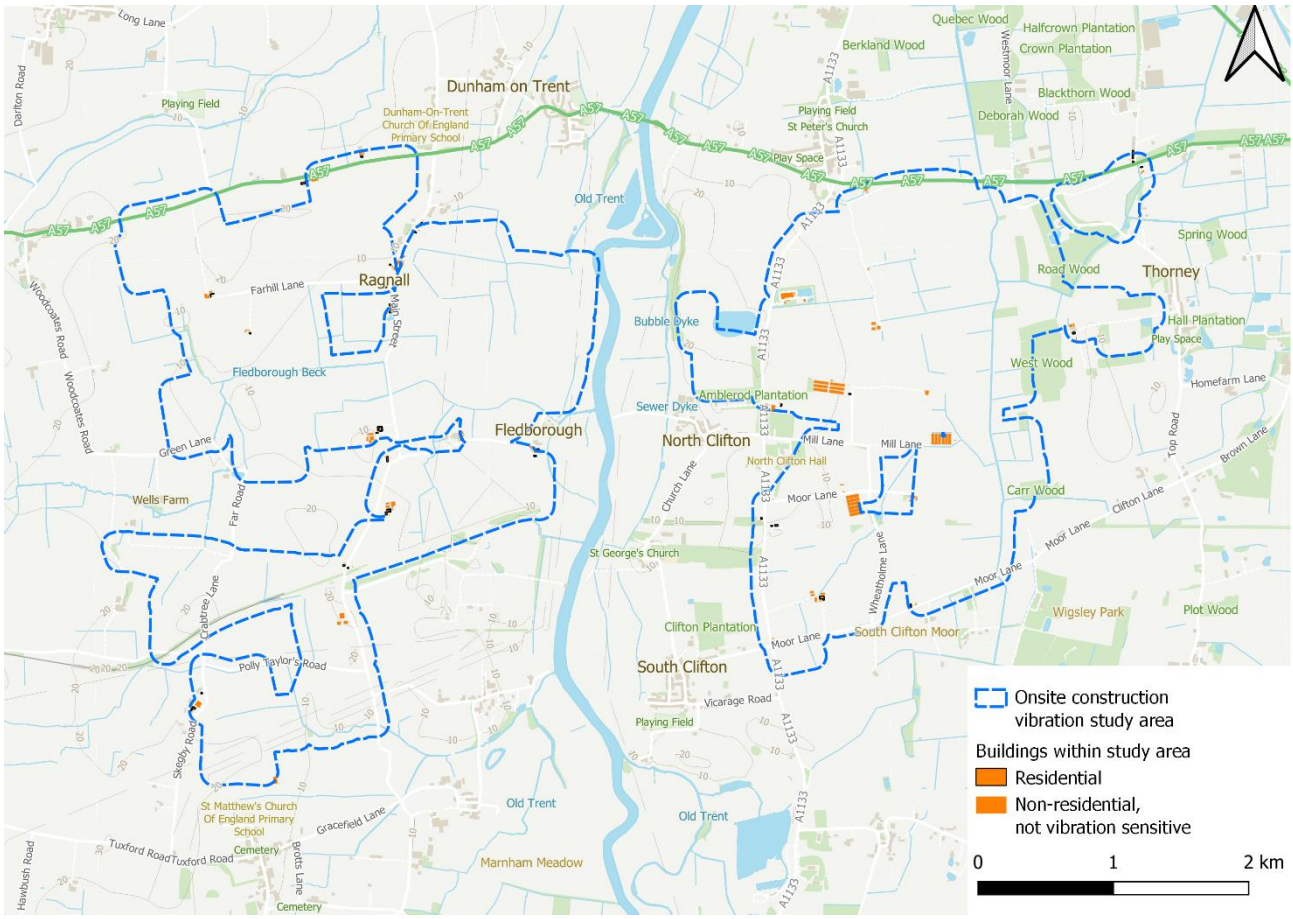
16.52. At this stage, details of the likely construction plant and equipment and exact locations of the main construction works are not fully developed. Similar to the construction noise assessment, at this stage an indicative, quantitative assessment of potential construction vibration impacts has therefore been carried out, based on professional judgement.

Receptors and Receptor Sensitivity

16.53. The assessment of the potential vibration effects of construction activities within our Site has been carried out by reference to local mapping. Properties within 100m of areas proposed to contain solar panels or electrical infrastructure (i.e. substation or battery storage equipment) have been identified as having the potential to be affected by on site construction vibration. Beyond this distance, it is considered very unlikely that vibration will be perceptible, therefore no vibration impacts are expected at receptors other than those identified. These locations are indicated in **Figure 16-7** below. Note that this area includes all buildings within 100 m of potential construction works, however there are 35 residential properties within the construction vibration study area. These properties are located in Ragnall, Fledborough and Skegby, along with a small number of other residential properties (see **Figure 16-7**). There are no non-residential vibration sensitive receptors within the study area.

16.54. Potential vibration impacts are only likely in areas where construction activities take place which generate appreciable levels of vibration. These activities include piling, ground compaction for road construction or upgrading, etc. As such, it is likely that, as further information becomes available on the likely locations of the main construction works, the study area for construction vibration assessment will reduce in size.

Figure 16-7: Study Area for Potential Onsite Construction Vibration Effects, and Existing Buildings within this Area.



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16.55. The most likely areas to experience vibration impacts are the areas closest to the main construction activities. These are likely to be the battery storage units, substations, transformers etc. The majority of the area of our Site will consist of solar panels, and therefore whilst construction activities will be needed in most areas of the site, the intensity of construction activities will be relatively low for most areas of our Site. As discussed above, where project constraints allow, these items of plant will be located as far as practicable from vibration sensitive receptors.

Preliminary Assessment

16.56. At the present time, there is the potential for construction noise impacts at noise sensitive receptors in Skegby, Ragnall, and Fledborough, as well as at isolated residential properties within and around our Site. At this stage, it is not possible to rule out significant construction vibration effects at the identified sensitive receptors. Since the majority of the area of our Site will, however, experience limited construction activity, the likelihood of significant construction noise effects is low.

16.57. The construction compounds proposed within our Project are indicative and there remains flexibility in terms of their final location. In addition, the oCEMP will set out measures to reduce the effects of on-site construction plant vibration (see **Chapter 4: Our Project** for further details). As such, there are likely to be no significant effects from on-site construction plant vibration.

Next Steps

16.58. The potential effects of onsite construction vibration will be quantified as part of our ES. This assessment will be based upon the likely construction activities that will be required in the various areas of our Site, the likely construction programme and the likely construction plant and equipment that will be needed. The assessment will be carried out in accordance with the prediction and assessment methodology outlined in BS 5228, Code of practice for noise and vibration control on construction and open sites, Part 2, Vibration, as set out in our Scoping Report (see **Volume 2: Scoping Consultation**).

Operational Phase

Operational Plant Noise

16.59. Potential sources of noise from operational plant and equipment include noise from substation, transformer, battery storage and inverter equipment located within our Site. The majority of this equipment will be located together at specific locations within our wider Site, however there will be some equipment, for example Power Converter Stations, that will be located through our Site, amongst the solar arrays. The precise locations at which this equipment will be situated are not yet known, however options where the substation and battery storage equipment could be installed, along with indicative locations for Power Converter Stations are set out in **Chapter 4: Our Project**. A qualitative assessment of the potential operational noise effects is set out below, based on the currently available information and professional judgement.

Approach

16.60. As above, an indicative, qualitative assessment of the potential for adverse noise effects due to operational plant and equipment has been undertaken.

Receptors and Receptor Sensitivity

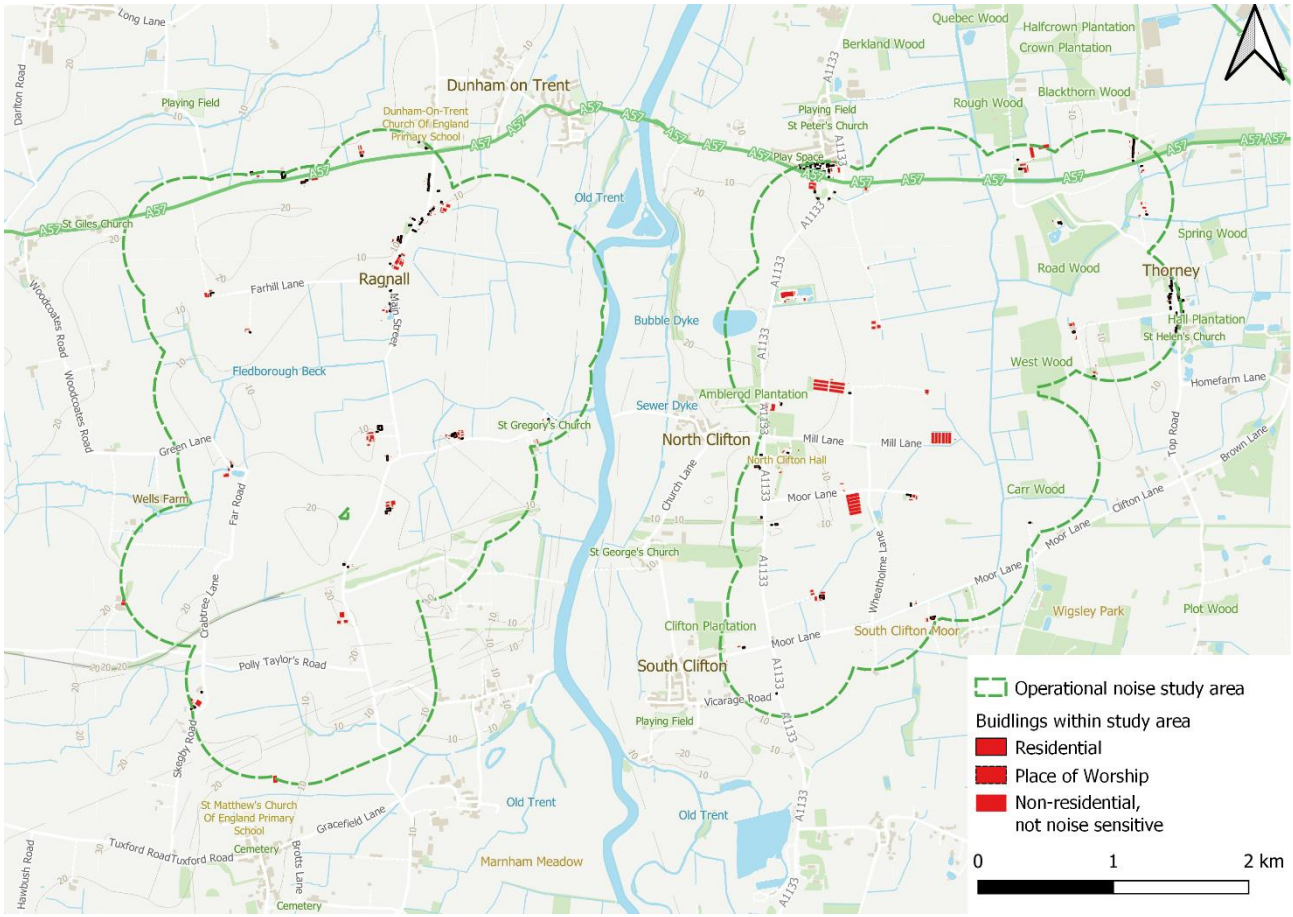
16.61. The assessment of the potential noise effects of sources of operational noise within our Site has been carried out by reference to local mapping. Properties within 500m of potential locations for operational plant and equipment, including substation equipment, battery storage equipment and power converter stations, have been identified as having the potential to experience operational noise impacts. These locations are indicated in Figure 16-8 below. Note that this area includes all buildings within 500 m of the current indicative location of substation and battery storage equipment and Power Converter Stations, however there are 135 residential properties identified within the operational noise study area. These are located in Ragnall, Fledborough, Skegby, Newton on Trent, and Thorney along with a small number of individual residential properties (see **Figure 16-8**).

16.62. Non-residential receptors within the operational vibration study area include St Leonards Church, Ragnall and St Gregory's Church, Fledborough.

16.63. The majority of our Site will be occupied by solar panels, which in themselves do not generate noise. The main sources of noise within our Site are likely to be substation, transformer and battery storage plant and equipment. Whilst the PCSs will generate noise, these are distributed throughout our Site and are therefore less likely to result in substantial noise impacts at any individual sensitive receptor. Since the locations of the PCSs are, at this stage, only indicative, the same 500 m study area has been used around PCSs, to allow for the greater uncertainty in the precise locations of the PCSs.

16.64. Equipment will be located at specific, localised areas within the development site. As such, as the project progresses, the study area for operational noise effects is likely to reduce, once the areas within which the potential noise generating plant and equipment will be located have been defined in more detail.

Figure 16-8: Study Area for Potential Operational Noise Effects and Existing Buildings within the Study Area



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16.65. The most likely areas to experience noise impacts are the areas closest to the areas where battery storage and substation equipment will be located. The majority of the area of our Site will consist of solar panels, and appreciable levels of operational noise are only likely to be generated by Power Converter Stations within these areas. As discussed above, where project constraints allow, noise generating items of plant will be located as far as practicable from noise sensitive receptors. It is therefore likely that, as further detail becomes available on the likely plant locations within our Site, the operational noise study area identified above will reduce in size.

Preliminary Assessment

16.66. At the present time, there is the potential for operational noise impacts at noise sensitive receptors in Skegby, Ragnall, Fledborough, Newton on Trent and Thorney, as well as at isolated residential properties within and around our Site. Considering the majority of the area of our Site will not contain plant or equipment that is likely to generate substantial levels of noise, and, as set out in the Design Principles, large noise generating plant and equipment will be sited at least 300m from residential properties, there are likely to be no significant effects from operational plant noise.

Next Steps

16.67. The potential effects of operational noise from onsite plant and equipment will be quantified as part of our ES. This assessment will be based upon the likely makes, models and quantities of plant and equipment needed, manufacturer's noise data for this plant and equipment and the likely location and layout of this plant and equipment within our Site. The assessment will be carried out in accordance with the prediction and assessment methodology outlined in BS 4142, Methods for rating and assessing industrial and commercial sound, as set out in our Scoping Report (see **Volume 3: Scoping Consultation**).

Conclusions

16.68. **Table 16-3** presents a summary of the preliminary likely significant effects, with further information. It also includes the next steps to be undertaken as part of the Environmental Impact Assessment.

Table16-3: Summary of Likely Significant Effects

Element	Preliminary Likely Significant Effect	Further Information	Next Steps
Construction Traffic Noise and Vibration	No Likely Significant Effects	The construction traffic routes proposed within our Project are indicative and there remains flexibility in terms of their final location. The adoption of the management plan (including the oCEMP) will mitigate effects.	The potential effects of construction traffic noise and vibration will be quantified in accordance with DMRB LA111 guidance and presented as part of our ES.

Onsite construction noise	No Likely Significant Effects	The construction compounds proposed within our Project are indicative and there remains flexibility in terms of their final location. The adoption of the management plan (including the oCEMP) will mitigate effects.	The potential effects of onsite construction noise will be quantified in accordance with the methodology set out in BS 5228, Part 1, as part of our ES.
Onsite construction vibration	No Likely Significant Effects	The construction compounds proposed within our Project are indicative and there remains flexibility in terms of their final location. The adoption of the management plan (including the oCEMP) will mitigate effects.	The potential effects of onsite construction vibration will be quantified in accordance with the methodology set out in BS 5228, Part 2, as part of our ES
Operational noise	No Likely Significant Effects	The majority of the area of our Site will not contain plant or equipment that is likely to generate substantial levels of noise. The Design Principles will ensure large noise generating plant and equipment will be sited at least 300m from residential properties	The potential effects of operational noise from onsite plant and equipment will be quantified in accordance with the methodologies set out in BS 4142 as part of our ES.

Appendices

Appendix 16.1 – Baseline Noise Survey Details

Appendix 16.2: Key Policy and Legislation

Appendix 16.1 – Baseline Noise Survey Details

Figure 1: Photographs of baseline noise monitoring equipment at Location A

Figure 2:Photographs of baseline noise monitoring equipment at Location B

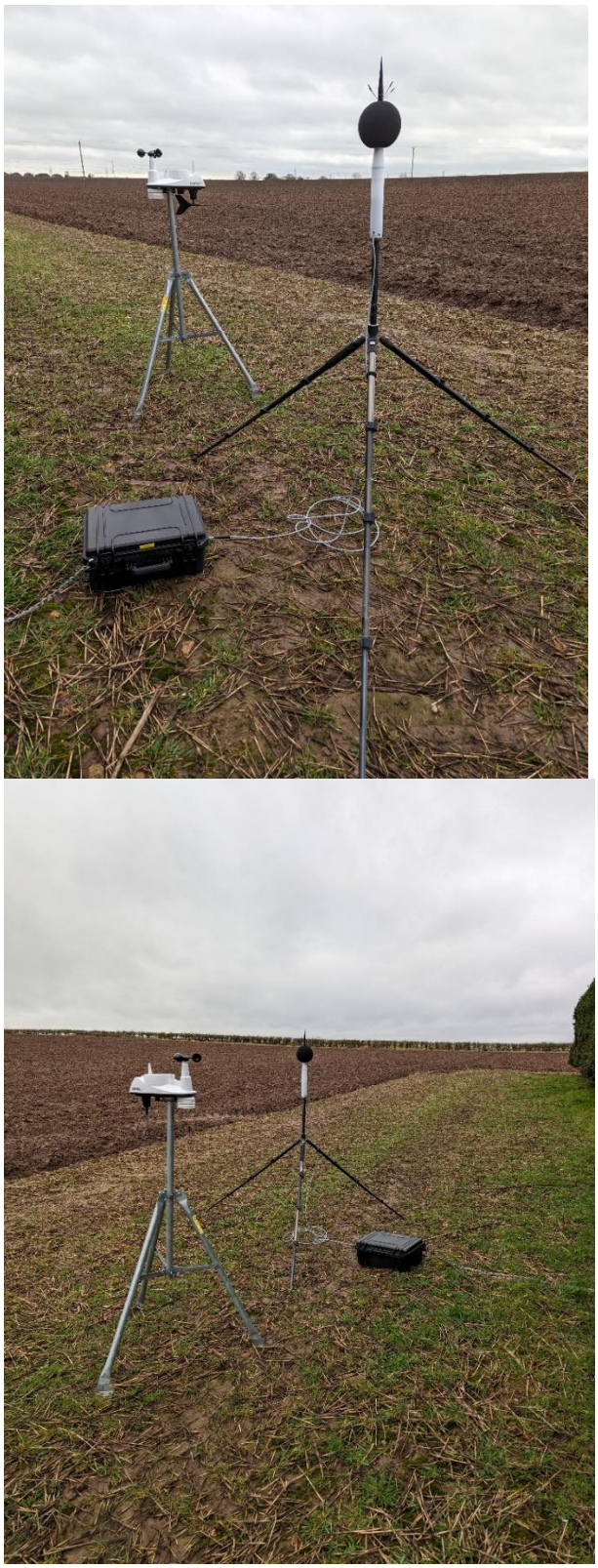

Figure 3:Photographs of baseline noise monitoring equipment at Location C

Figure 4: Photographs of baseline noise monitoring equipment at Location D

Figure 5: Photographs of baseline noise monitoring equipment at Location E

Figure 6: Photographs of baseline noise monitoring equipment at Location F

Figure 7: Photographs of baseline noise monitoring equipment at Location G

Table 1: Summary of Baseline Noise Measurements.

Measurement Location	Period	Measurement Descriptor (dB(A))				
		L_{Aeq}	L_{Amax}	L_{A10}	L_{A90} (Mean)	L_{A90} (Mode)
Location A	Day	51	88	47	39	37
	Evening	42	74	39	33	33
	Night	37	72	36	32	30
Location B	Day	46	82	45	39	41
	Evening	37	75	38	33	34
	Night	35	65	35	29	26
Location C	Day	54	96	56	46	49
	Evening	48	71	51	36	40
	Night	42	69	44	30	27
Location D	Day	64	101	68	48	49
	Evening	57	80	58	39	38
	Night	53	80	47	35	35
Location E	Day	46	77	48	41	42
	Evening	37	60	39	32	32
	Night	33	64	33	27	25
Location F	Day	44	94	43	36	34
	Evening	34	56	35	31	29
	Night	33	54	34	30	28
Location G	Day	65	93	69	53	54
	Evening	60	79	64	39	36
	Night	55	77	52	30	30

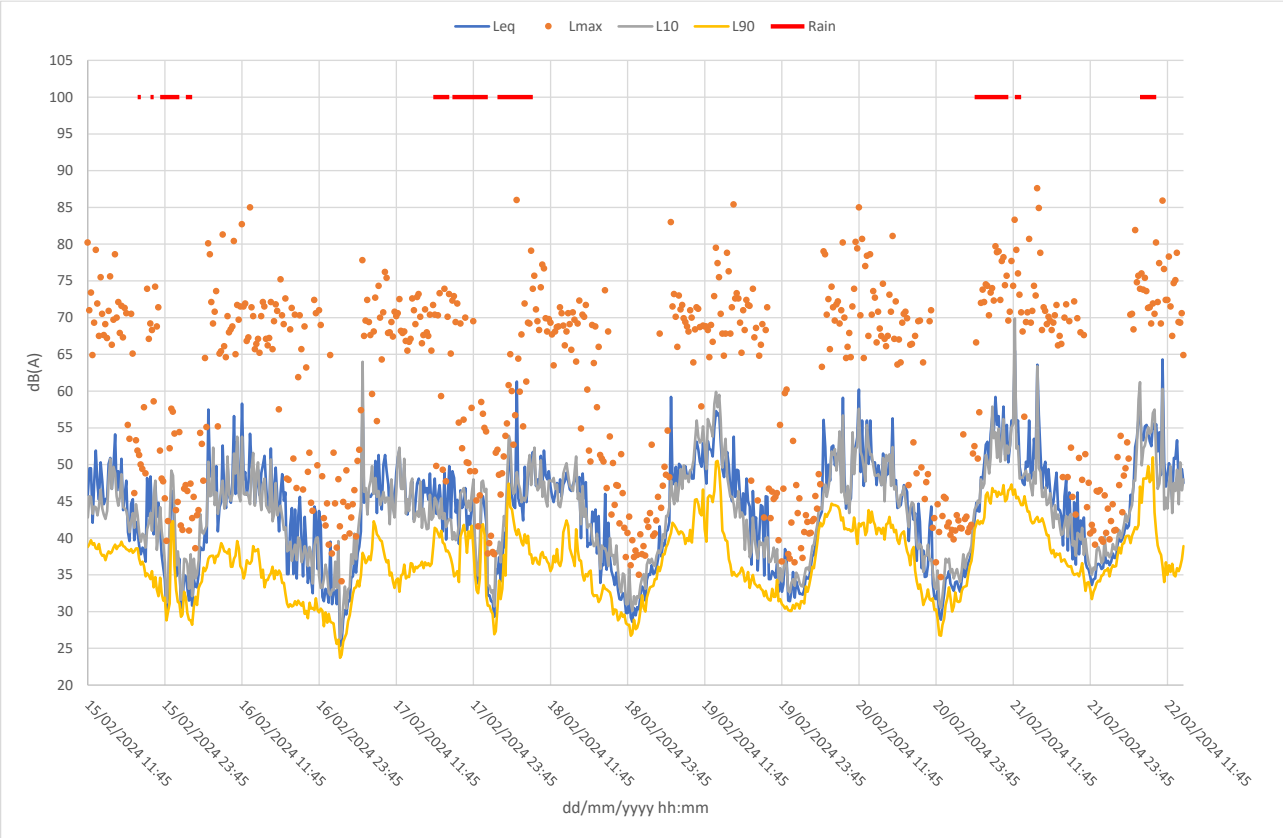

Figure 8: Time history of baseline noise monitoring data at Location A

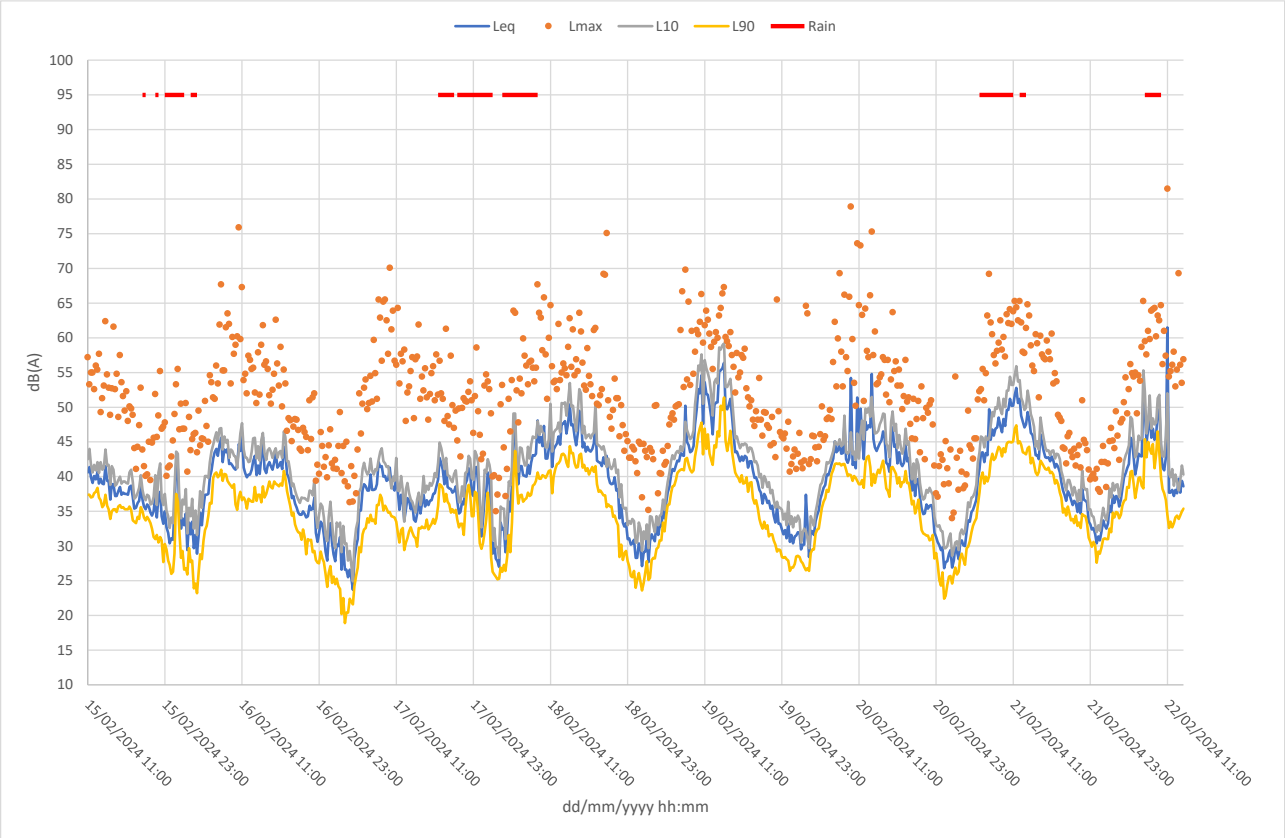

Figure 9: Time history of baseline noise monitoring data at Location B

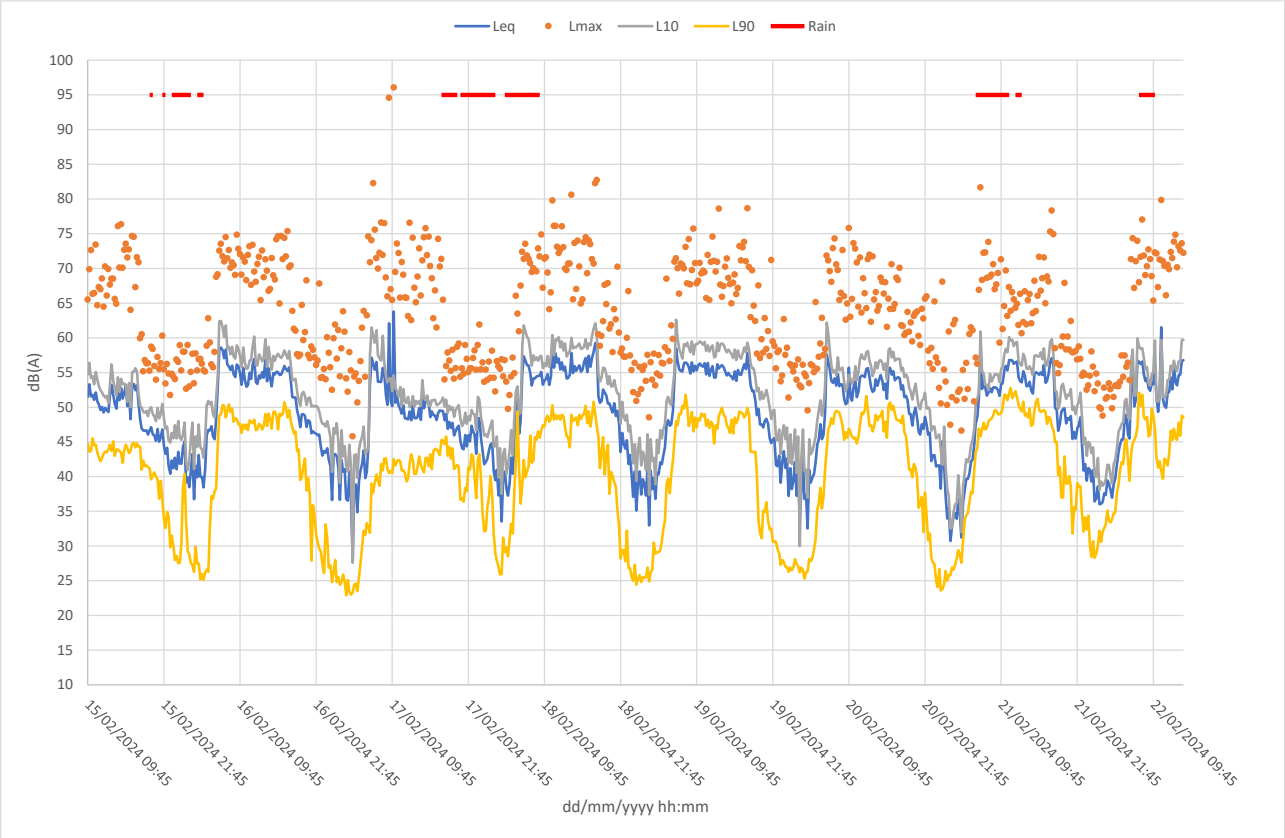

Figure 10: Time history of baseline noise monitoring data at Location C

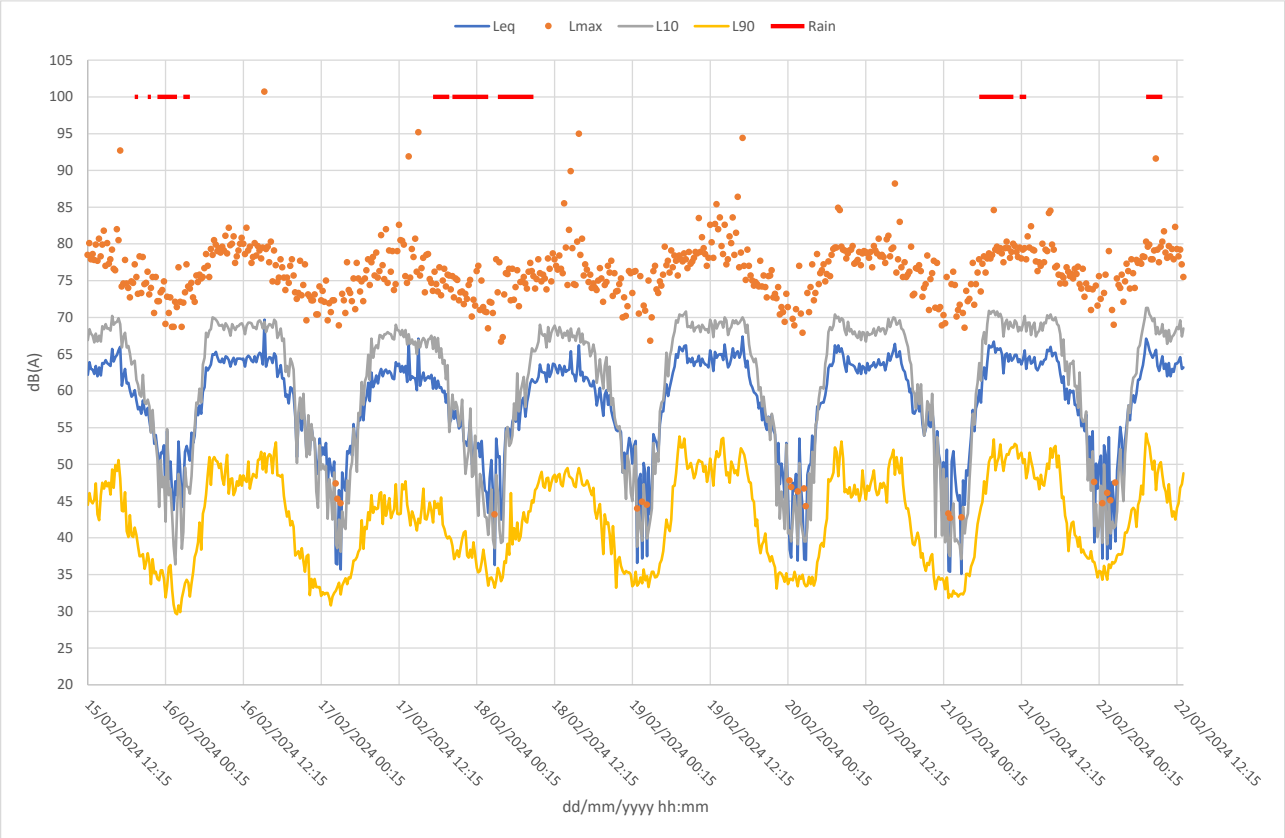

Figure 11: Time history of baseline noise monitoring data at Location D

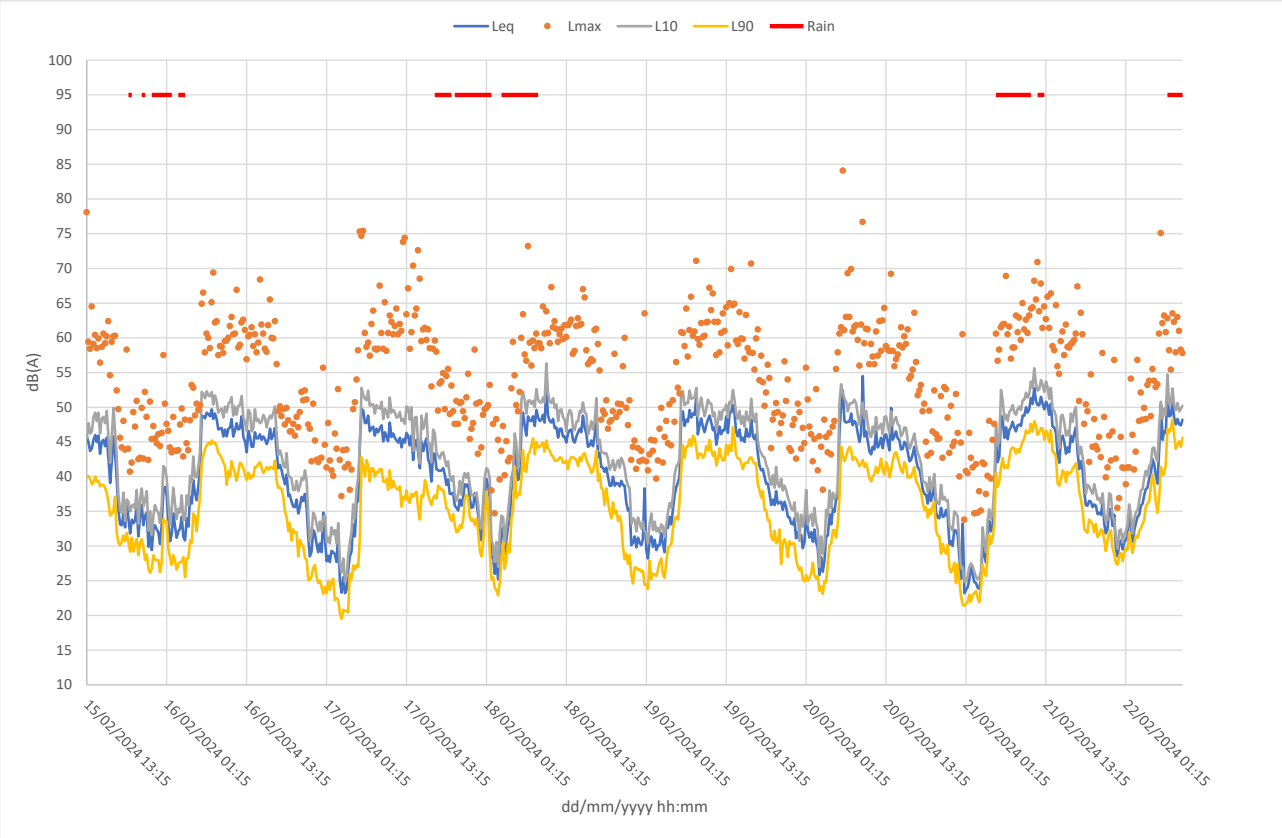

Figure 12: Time history of baseline noise monitoring data at Location E

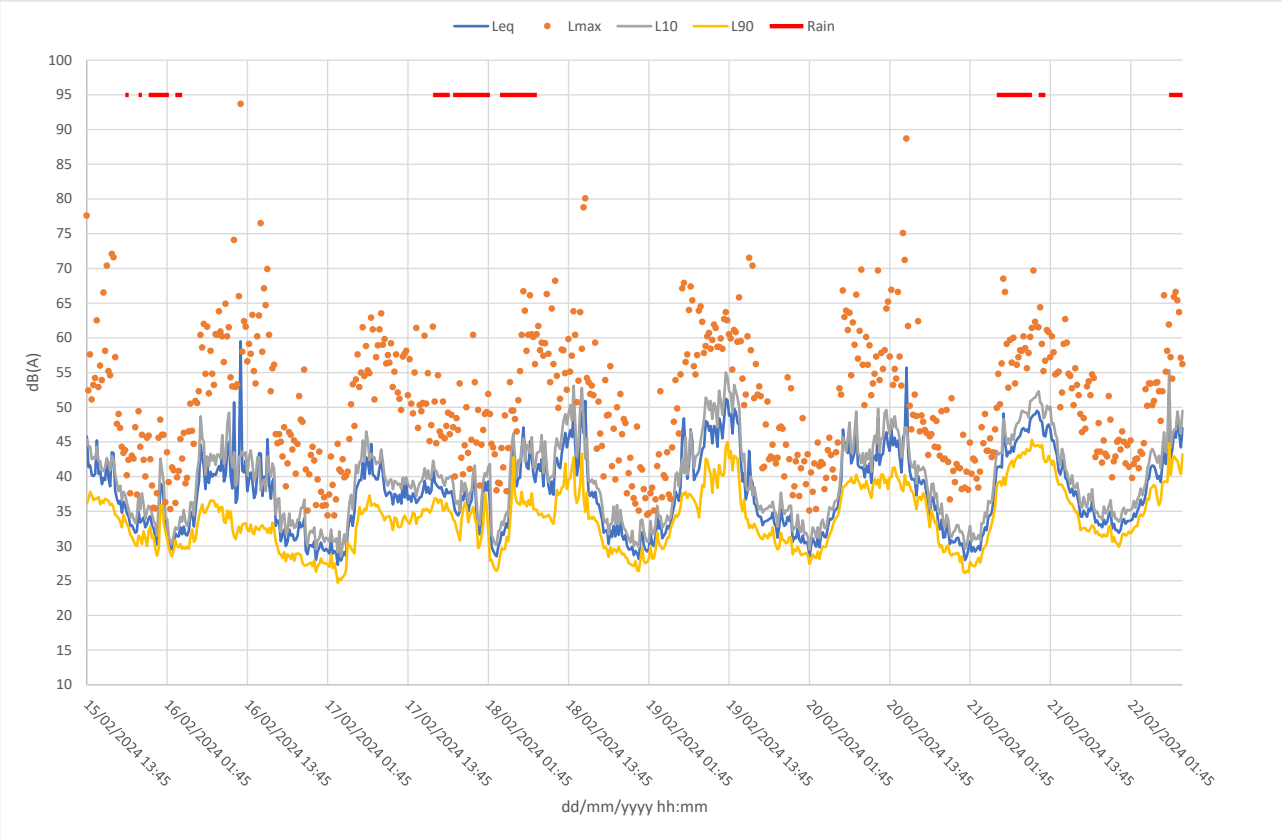

Figure 13: Time history of baseline noise monitoring data at Location F

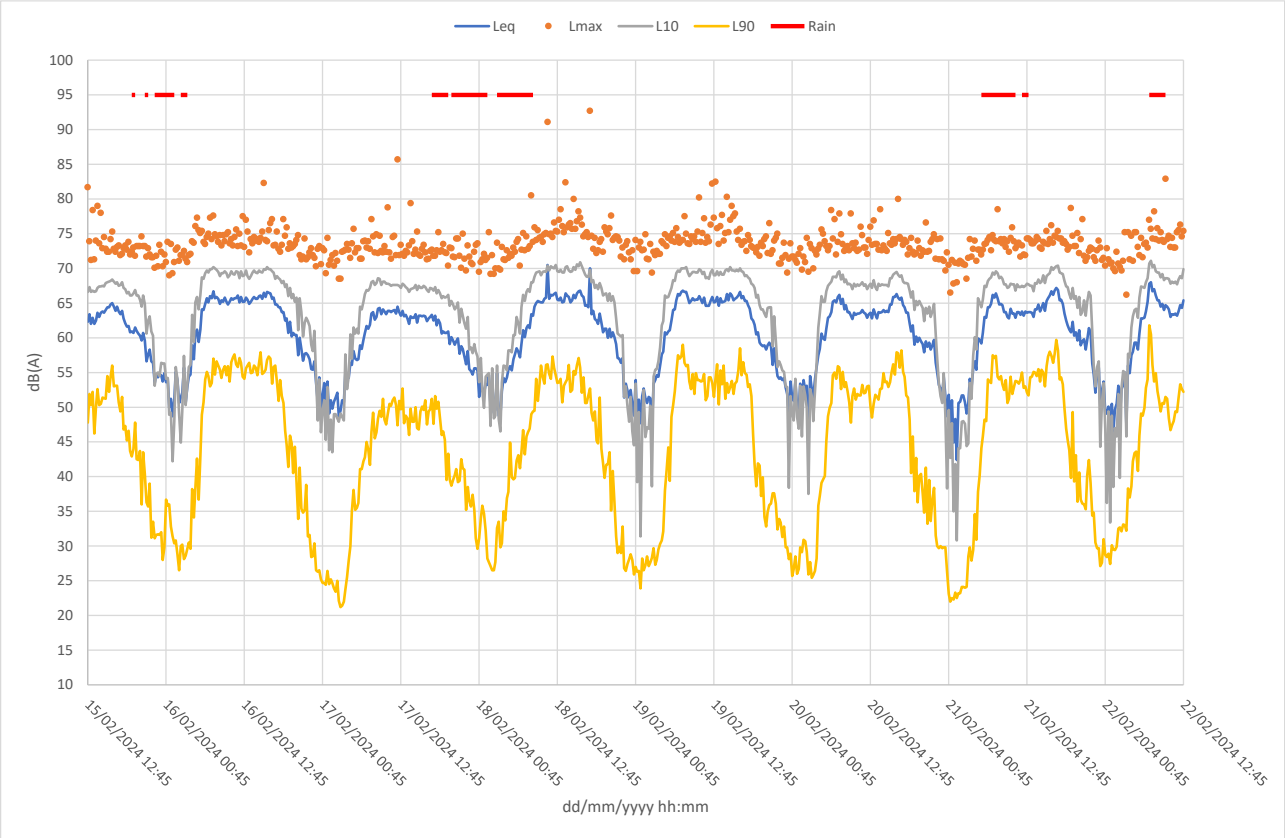

Figure 14: Time history of baseline noise monitoring data at Location G

Appendix 16.2: Key Policy and Legislation

Review of Policy, Legislation and Relevant Guidance

Legislation, planning policy and guidance relating to noise and vibration, and pertinent to the Project comprises:

Legislation

Environmental Protection Act, 1990

This Act set out the structure of emission control within England, Wales and Scotland. Particularly in regard to noise air quality, this act set controls which have worked toward reducing air pollution. Part III of the Act details information on statutory nuisances and associated penalties.

Control of Pollution Act, 1974

This Act (under Section 60) gave local authorities further powers to impose requirements on developers and general construction, on how works should be carried out to minimise noise disturbance during these works. This normally comes in the form of restricting times in which construction activities can take place.

National Planning Policy

Overarching National Policy Statement for Energy (EN-1) (2023)

This provides overarching government policy on energy NSIPs, how planning applications relating to energy will be assessed, and the way in which any impacts and mitigation measures will be considered. Part 5, Section 5.12 of this policy statement specifically relates to noise and vibration.

Paragraph 5.12.6 states that *"Where noise impacts are likely to arise from the proposed development, the applicant should include the following in the noise assessment:*

- *a description of the noise generating aspects of the development proposal leading to noise impacts, including the identification of any distinctive tonal characteristics, if the noise is impulsive, whether the noise contains particular high or low frequency content or any temporal characteristics of the noise;*
- *identification of noise sensitive receptors and noise sensitive areas that may be affected;*
- *the characteristics of the existing noise environment;*
- *a prediction of how the noise environment will change with the proposed development*
    - *in the shorter term, such as during the construction period*
    - *in the longer term, during the operating life of the infrastructure*
    - *at particular times of the day, evening and night (and weekends) as appropriate, and at different times of year;*

- *an assessment of the effect of predicted changes in the noise environment on any noise-sensitive receptors, including an assessment of any likely impact on health and quality of life / well-being where appropriate, particularly among those disadvantaged by other factors who are often disproportionately affected by noise-sensitive areas;*
- *if likely to cause disturbance, an assessment of the effect of underwater or subterranean noise; and*
- *all reasonable steps taken to mitigate and minimise potential adverse effects on health and quality of life."*

National Policy Statement for Renewable Energy Infrastructure (EN-3) (2023)

This policy acts as key guidance for a range of stakeholders to understand government policy on NSIPs, how planning applications relating to energy infrastructure will be assessed, and the way in which any impacts and mitigation measures will be considered. Specific extracts relating to this Project are as follows:

Paragraph 2.10.162 states that *"The Secretary of State is unlikely to give any more than limited weight to traffic and transport noise and vibration impacts from the operational phase of a project."*

The National Planning Policy Framework (2023)

The National Planning Policy Framework (NPPF) is an overarching document which sets out government planning policy for England, and how this is expected to be applied by local authorities and developers. The NPPF provides a framework for local sustainable development via local plans. Specific extracts relating to this Project are as follows:

Paragraph 180 states that *"Planning policies and decisions should contribute to and enhance the natural and local environment by:*

e) 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;"

Paragraph 191 states that *"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:*

> *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;*

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; and

c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation."

The Noise Policy Statement for England, 2010

- This statement set out the long term outlook of noise policy for the UK government to promote human health and quality of life indicators through better management of noise receptors. This policy is collectively bringing together information from other policies and practices across UK government into one statement. The main noise policy aims are to:
- *"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."*

Local Planning Policy

Local planning policy relevant to the Site is set out below. Local policies can be an important and relevant consideration for NSIPs as well, but in the event of any conflict, the NPS policy prevails.

Newark and Sherwood District Council (2023), Local Development Framework, Allocations and Development Management, Development Plan Document (AADMDPD). Submission version, January 2024

This amended local Development Plan Document (DPD) has been compiled to ensure that the wider development framework within Newark and Sherwood District Council sufficiently allocates land for development to meet the needs of the area, up until 2033. This DPD is currently under examination via the Secretary of State with an independent planning inspector.

Specific policies within the AADMDPD relevant to the Project include Policy DM4 *"Renewable and Low Carbon Energy Generation"* which states that*:*

In order to achieve the commitment to carbon reduction set out in Core Policy 10, planning permission will be granted for renewable and low carbon energy generation development, as both standalone projects and part of other development, its associated infrastructure and the retro-fitting of existing development, where its benefits are not outweighed by detrimental impact from the operation and maintenance of the development and through the installation process upon:

…

4. Amenity, including noise pollution, shadow flicker, and electro-magnetic interference"

Central Lincolnshire Local Plan (2023)

The Local Plan for the central Lincolnshire area sets out the approach to planning policy and overarching development allocations to drive growth in the area over a 20-year period. The Local Plan is contextualised into a wider vision, series of objectives and core policies toward delivery.

Specific policies detailed in the Local Plan and are relevant to the Project, as below.

Policy S14 "*Renewable Energy*" states that:

"The Central Lincolnshire Joint Strategic Planning Committee is committed to supporting the transition to a net zero carbon future and will seek to maximize appropriately located renewable energy generated in Central Lincolnshire (such energy likely being wind and solar based).

Proposals for renewable energy schemes, including ancillary development, will be supported where the direct, indirect, individual and cumulative impacts on the following considerations are, or will be made, acceptable. To determine whether it is acceptable, the following tests will have to be met:

> *…*
>
> *iii. The impacts are acceptable on the amenity of sensitive neighboring uses (including local residents) by virtue of matters such as noise, dust, odor, shadow flicker, air quality and traffic;*

…

In order to test compliance with part (iii) above will require, for relevant proposals, the submission by the applicant of a robust assessment of the potential impact on such users, and the mitigation measures proposed to minimize any identified harm.

For all matters in (i)-(iii), the applicable local planning authority may commission its own independent assessment of the proposals, to ensure it is satisfied what the degree of harm may be and whether reasonable mitigation opportunities are being taken.

…

Proposals for ground-based photovoltaics and associated infrastructure, including commercial large-scale proposals, will be under a presumption in favor unless:

- *There is clear and demonstrable significant harm arising; or*

…"

Bassetlaw District Council (2010) Local Development Framework, Publication Core Strategy and Development Management Policies

The Core Strategy for the Bassetlaw District sets out the overarching vision for the area up until 2026, including the policy approach to deliver this.

Policy DM10 "*Renewable and Low Carbon Energy*" is related to the Project and states:

"The Council will be supportive of proposals that seek to utilize renewable and low-carbon energy to minimize CO2 emissions. Such proposals will be expected to demonstrate regard to the Council's Energy Opportunities Diagram and Renewable and Low-Carbon Energy Study (or subsequent replacement) when identifying options for achieving CO2 emission reductions. Proposals for renewable and low-carbon energy infrastructure will need to demonstrate that they:

…

- Will not result in unacceptable impacts in terms of visual appearance, landscape character, noise, shadow-flicker, watercourse engineering and hydrological impacts, pollution, traffic generation, or loss of features of recognized importance for biodiversity;

- Will not result in an unacceptable cumulative impact in relation to the factors above."

Draft Bassetlaw Local Plan (2023) 2020-2038: Main Modifications Version, August 2023

This Local Plan sets out Bassetlaw District's proposed planning and policy framework, development strategy and site allocations to inform effective delivery of Bassetlaw District's overall vision up until 2038. Whilst the Local Plan is currently a draft, and therefore does not currently set policy, it has been referred to as a guide to the potential future policy direction of Bassetlaw District Council.

Policies set out in the Local Plan relate to the Project.

Policy ST51 "*Renewable Energy Generation*" states that:

""Development that generates, shares, transmits and/or stores zero carbon and/or low carbon renewable energy including community energy schemes will be supported subject to the satisfactory resolution of all relevant site specific and cumulative impacts upon:

…

g) Noise, light, glare, smell, dust, emissions or flicker;

…

Proposals must take into account operational and approved developments, as well as any proposed intensification to operational or approved proposals"

Policy ST48 "*Protecting Amenity*" states that:

"Proposals for development should be designed and constructed to avoid and minimise impacts on the amenity of existing and future users, individually and cumulatively, within the development and close to it. As such, proposals will be expected to:

…

b) not generate a level of activity, noise, light, air quality, odour, vibration or other pollution which cannot be mitigated to an appropriate standard."

National Guidance

Planning Practice Guidance (2023), Noise ('PPG', 2019)

This guidance gives overarching advice on how the planning process can help to manage potential noise impacts within proposed developments. Key advice includes a noise hierarchy for exposure, factors that could influence the level of impact from noise, and further considerations on addressing noise impacts on residential developments.

British Standard BS 4142, Methods for rating and assessing industrial and commercial sound, 2014 + 2019 Amendments

This British Standard sets out the broad methodology for assessing the impact on humans in residential premises. This Standard is aimed at environmental health officers as well as other consultants and engineers. Methods described here utilise outdoor sound levels to *"assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident."*

British Standard BS 5228, Code of practice for noise and vibration control on construction and open sites – Part 1: Noise and Part 2: Vibration, 2009 + 2014 Amendments

This British Standard is split into two parts. The first section focuses on noise, and outlines recommendations relating to general construction and open sites that may generate significant noise levels.

The second part of this Standard relates to vibration control and outlines recommendations for control methods to construction and open sites, where vibration levels are expected to be significant. Further guidance is detailed here which looks at the measurement of vibration, further assessing its effects upon the environment.

British Standard BS 7445, Description and measurement of environmental noise, Guide to quantities and procedures, 2003

This British Standard focuses on the context of measuring noise levels. The methods and procedures detailed here should be used by practitioners and authorities to deal with noise issues within communities and for individuals. This standard also clearly defines the minimum class of sound level meters.

BS 6472, Guide to evaluation of human exposure to vibration in buildings, Part 1, Vibration sources other than blasting, 2008

This British Standard focuses on the human response to vibration in buildings and helps users of the standard to determine vibration values, the estimation of adverse impacts, noting external factors such as the time of assessments and the actual use of occupied space.

BS 7385, Evaluation and measurement for vibration in buildings – Guide to damage levels from groundborne vibration, 1993

This British Standard sets out guidance on the specific vibration levels which could potentially damage building structures. This standard details the different factors that influence the vibration response of developments, and also describes the overarching procedure to undertake specific measurements to gather this information.

British Standard BS 8233, Guidance on sound insulation and noise reduction for buildings, 2014

This is a British Standard principally aimed at local planning authorities, to help ensure that proposed developments have adequate noise insulation and are protected from outside noise sources in an adequate manner. BS8233 sets minimum noise level targets in regard to road, rail and aircraft noise, alongside levels for other industry including construction.

Calculation of Road Traffic Noise, Department of Transport, Welsh Office, 1988

This memo is a description of the procedures which must be followed to calculate road traffic noise. This guidance is appropriate for general applications including land use planning. This memo therefore sets out the method of calculation, the considerations for specific circumstances, and the acceptability levels to be met.

Design Manual for Roads and Bridges, Sustainability and Environment Appraisal, LA 111, Noise and Vibration, 2020.

National Highways DMRB guidance focuses on the assessment and reporting of highways noise and vibration from different activities including construction, operation and maintenance of projects and proposed developments. Assessment requirements are set out and promote a proportionate approach which complies with legislation and best practice.

one earth

solar farm