NOISE IMPACT ASSESSMENT

EVERGREEN FARM, EAST GRINSTEAD

MR PEARCE

DECEMBER 2019

EVERGREEN FARM, EAST GRINSTEAD

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1 INTRODUCTION

Anderson Acoustics Ltd has been commissioned by Mr Pearce in June 2019 to undertake a noise assessment for the proposed development near Evergreen Farm, East Grinstead, RH19 4ND, within the authority of West Sussex County Council (WSCC) and under consultation with Mid Sussex District Council (MSDC).

The capping of the existing site is necessary to mitigate existing environmental effects relating to leachate and gassing issues from the polluted landfill site. In order to contain the health and environmental risks, the site will be capped with clay and soil to a height of approximately 2 m to 3 m above existing land. The scheme proposals, which are to be submitted for planning consent, involve the capping of landfill on open land to the north east of Evergreen Farm. The proposed capping area is adjacent to property used for care accommodation and a small local farm school. This report presents an assessment of the potential noise impacts from the proposed capping works at the nearest noise sensitive receptors.

Details of local noise policy and pertinent guidance are presented in Section 2 of this report, followed by a brief description of the site and proposed development is given in Section 3.

The methodology and results of the baseline noise survey undertaken at the site are presented in Section 4 and Section 5 provides an assessment of the proposed construction works including predicted noise levels at nearby sensitive receptors.

Advice regarding mitigation options to ameliorate noise impacts at nearby sensitive receptors is given in Section 6, followed by a summary of this report in Section 7.

This report is necessarily technical in nature, therefore, a summary of noise units and acoustic terminology relevant to this assessment is provided in Appendix A, for reference.

2 PLANNING POLICY AND GUIDANCE

This section provides a summary of local planning policy relating specifically to noise and of the guidance which is deemed pertinent to an assessment of construction noise effects at noise sensitive receptors in proximity to proposed works. Details of national planning policy and legislation are provided in Appendix B, for reference.

2.1 Local Planning Policy

2.1.1 West Sussex County Council

The West Sussex Waste Local Plan, April 2014, provides the basis for making consistent land-use planning decisions about planning applications for minerals and waste management facilities.

The document includes *Strategic Objective 13: To protect and, where possible, enhance the health and amenity of residents, businesses, and visitors* which states the following, in relation to noise under paragraph 5.3.14:

"Throughout the plan period, new facilities will be located so as to minimise any potential impacts on communities and the potential negative impacts of any new waste development on the health and amenity of residents, businesses and visitors to West Sussex will be minimised, mitigated and, where possible, avoided. In addition and where relevant, opportunities will be taken to maximise benefits for communities, and the environment."

The section on health and amenity states, in relation to noise under paragraph 8.10.4:

"Specific works can be undertaken to mitigate potential disturbance. Measures can include landscaping, sound attenuation, careful design of light sources (including avoidance of light pollution of the night sky) and restriction on working hours. The appropriate measures will depend on the characteristics of the proposal, the site, and the surrounding area."

2.1.2 Mid Sussex District Council

The Mid Sussex District Plan[1], adopted in March 2018, sets out the vision for development in Mid Sussex and provides details of the required delivery strategy.

DP29: Noise Air and Light Pollution, of the district plan, states the following:

> *"The environment, including nationally designated environmental sites, nationally protected landscapes, areas of nature conservation or geological interest, wildlife habitats, and the quality of people's life will be protected from unacceptable levels of noise, light and air pollution by only permitting development where: Noise pollution:*
>
> - *It is designed, located and controlled to minimise the impact of noise on health and quality of life, neighbouring properties and the surrounding area;*
> - *If it is likely to generate significant levels of noise it incorporates appropriate noise attenuation measures;*
>
> *Noise sensitive development, such as residential, will not be permitted in close proximity to existing or proposed development generating high levels of noise unless adequate sound insulation measures, as supported by a noise assessment are incorporated within the development. In appropriate circumstances, the applicant will be required to provide:*
>
> - *an assessment of the impact of noise generated by a proposed development; or*
> - *an assessment of the effect of noise by an existing noise source upon a proposed development;"*

As such, the proposed construction works will need to ensure that the impact of noise on health and quality of life at the nearest receptors should be minimised through the use of appropriate mitigation measures, where required, for the duration of the construction programme.

2.1.3 Consultation

Preliminary consultation took place via email with the minerals and waste planning authority, West Sussex County Council (WSCC), who advised the following:

> *"A noise assessment is required that identifies potential sensitive receptors (e.g. the adjacent Care Home), considers noise impacts (e.g. including plant required, hours/duration of works), proposed mitigation measures and any residual impacts post-mitigation. This should include identification of both baseline and predicted noise levels. I would recommend that you discuss the scope/content of such an assessment with the Mid Sussex District Council Environmental Health Officer."*

As such, WSCC were contacted by email on 10th June with details of the proposed assessment methodology, to which a response was received by email on 8th July confirming that the approach was suitable, however, referenced the governmental Planning Practice Guidance for Noise, which provides generic guidance for planning applications in which there exists the potential for noise impacts.

WSCC went on to state that:

> "*it would seem that the key receptors have been identified. I would also suggest, that as far as possible, the report also draws out the key considerations from Planning Practice Guidance. It will also be key to discuss any mitigation (operational practices/hours of working/phasing etc.) and give a clear understanding of the likely duration of any impacts.*"

2.2 Relevant Guidance

2.2.1 Planning Practice Guidance – Minerals (PPG-M)

The Government has published Planning Practice Guidance on a range of subjects including minerals[2] [https://www.gov.uk/guidance/minerals].

This forms technical guidance to the National Planning Policy Framework (NPPF) and provides advice on how to deliver its policies. The PPG-M provides specific guidance on noise emissions from mineral extraction sites stating:

"Proposals for the control or mitigation of noise emissions should:

- *consider the main characteristics of the production process and its environs, including the location of noise-sensitive properties and sensitive environmental sites;*
- *assess the existing acoustic environment around the site of the proposed operations, including background noise levels at nearby noise-sensitive properties;*
- *estimate the likely future noise from the development and its impact on the neighbourhood of the proposed operations;*
- *identify proposals to minimise, mitigate or remove noise emissions at source;*
- *monitor the resulting noise to check compliance with any proposed or imposed conditions."*

The guidance notes that restoration falls within its minerals guidance, even where the site has been used for landfill:

"*Some former mineral sites may also be restored as a landfill facility using suitable imported waste materials as an intermediate stage in restoration prior to an appropriate after use."* [Paragraph: 045 Reference ID: 27-045-20140306 Revision date: 06 03 2014]

The guidance directs that:

"*Mineral planning authorities should take account of the prevailing acoustic environment and in doing so consider whether or not noise from the proposed operations would:*

- *give rise to a significant adverse effect;*
- *give rise to an adverse effect; and*
- *enable a good standard of amenity to be achieved.*

In line with the Explanatory Note of the Noise Policy Statement for England, this would include identifying whether the overall effect of the noise exposure would be above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation."

The PPG-M suggests the following basis for noise limits from surface mineral working activities:

"*Mineral planning authorities should aim to establish a noise limit, through a planning condition, at the noise-sensitive property that does not exceed the background noise level (LA90,1h) by more than 10 dB(A) during normal working hours (0700-1900). Where it will be difficult not to exceed the background level by more than 10 dB(A) without imposing unreasonable burdens on the mineral operator, the limit set should be as near that level as practicable. In any event, the total noise from the operations should not exceed 55 dB(A) LAeq, 1h (free field). For operations during the evening (1900-2200) the noise limits should not exceed the background noise level (LA90,1h) by more than 10 dB(A) and should not exceed 55 dB(A) LAeq, 1h (free field). For any operations during the period 22.00 – 07.00 noise limits should be set to reduce to a minimum any adverse impacts, without imposing unreasonable burdens on the mineral operator. In any event the noise limit should not exceed 42 dB(A) LAeq,1h (free field) at a noise sensitive property.*

Furthermore, *Paragraph: 022 Reference ID: 27-022-20140306* of the Technical Guidance in support of the National Planning Policy Framework advises that for activities such as soil-stripping, the construction and removal of baffle mounds, soil storage mounds and spoil heaps, construction of new permanent landforms:

Increased temporary daytime noise limits of up to 70 dB(A) LAeq 1h (free field) for periods of up to eight weeks in a year at specified noise-sensitive properties should be considered to facilitate essential site preparation and restoration work and construction of baffle mounds where it is clear that this will bring longer-term environmental benefits to the site or its environs.

Where work is likely to take longer than eight weeks, a lower limit over a longer period should be considered. In some wholly exceptional cases, where there is no viable alternative, a higher limit for a very limited period may be appropriate in order to attain the environmental benefits. Within this framework, the 70 dB(A) LAeq 1h (free field) limit referred to above should be regarded as the normal maximum."

Although not explicit in the guidance, it is considered that exceedance of the criteria above would be an indication of exceedance of the SOAEL, subject to the context of the exceedance, as discussed in the PPGN.

2.2.2 BS 5228-1:2009+A1:2014

BS 5228-1:2009+A1:2014 - *Code of practice for noise and vibration control on construction and open sites – Part 1: Noise* [3] (BS 5228) sets out techniques to predict the likely noise effects from construction works, based on detailed information on the type and number of plant being used, their location and the length of time they are in operation.

The noise prediction methods can be used to establish likely noise levels in terms of the $L_{Aeq,T}$ over the core working hours. This standard also documents a database of information, including previously measured sound pressure level data for a variety of different construction plant undertaking various common activities.

Section E.3 of Annex E in BS 5228 advises that for projects that involve large-scale and long-term earth moving activities, akin to mineral extraction (i.e. over 6 months in duration), the guidance

contained with the Technical Guidance to the National Planning Policy Framework should be taken into account when setting the assessment criteria.

2.2.3 Building Bulletin 93 'Acoustic Design of Schools: A Design Guide', 2015

The Department of Education and Skills has produced Building Bulletin 93, *Acoustic Design of Schools: A Design Guide* (BB 93)[4]. The Bulletin provides guidance on the acoustic design for schools and is supported by the Building Regulations. Whilst it relates to the design of new school buildings, the objectives of *providing suitable internal ambient noise levels for clear communication between students and teachers, between students themselves and for quiet study* also apply to situations where a new noise is introduced to an existing school.

BB 93 states that all spaces within a school building should meet the performance standards defined within the document for ambient noise, reverberation time and airborne sound insulation for each of the areas defined. Table 1.1 of the document contains recommended performance standards for indoor rooms, measured as the maximum internal ambient noise level, $L_{Aeq,30mins}$. For general classrooms an upper limit for the indoor ambient noise level of 35 – 40 dB $L_{Aeq,30min}$ is prescribed.

Supporting guidance also provides limits for outdoor teaching space noise levels: "*Playgrounds, outdoor recreation areas and playing fields are generally considered to be of relatively low sensitivity to noise. Indeed, playing fields may be used as buffer zones to separate school buildings from busy roads where necessary. However, where used for teaching, for example sports lessons, outdoor ambient noise levels have a significant impact on communication in an environment which is already acoustically less favourable than most classrooms. [...] Noise levels in unoccupied playgrounds, playing fields and other outdoor areas should not exceed 55 dB $L_{Aeq,30min}$ and there should be at least one area suitable for outdoor teaching activities where noise levels are below 50 dB LAeq,30min. If this is not possible due to a lack of suitably quiet sites, acoustic screening should be used to reduce noise levels in these areas as much as practicable, and an assessment of predicted noise levels and of options for reducing these should be carried out.".*

2.3 Determination of Appropriate Noise Limits

Based on consultation with WSCC and the guidance presented in PPG-M, this assessment of noise impacts from the proposed capping works will be subject to the following noise limits.

Table 2-1 – Proposed noise limit for on-site works

Period	Noise limit, dB ($L_{Aeq,\ 1hr}$)
Daytime (07:00 – 19:00) (works likely to take longer than eight weeks)	Minimised as far as is reasonably practicable to a level 10 dB above the representative background $L_{A90,1hr}$; and No more than 55 dB $L_{Aeq,1hr}$
Daytime (07:00 – 19:00) (up to eight weeks duration)	No more than 70 dB $L_{Aeq,1hr}$
Any Daytime (07:00 – 19:00)	No more than 55 dB $L_{Aeq,30min}$ in areas used as outdoor teaching spaces

Increased temporary daytime noise limits for periods of up to eight weeks are determined as necessary to facilitate essential site preparation work, including construction of baffle mounds, and essential restoration works at locations close to noise sensitive receptors.

3 SITE DESCRIPTION AND CONSTRUCTION PROPOSALS

3.1 Existing Site

The proposed development site is located in a largely rural area to the south of East Grinstead, to the north east of Evergreen Farm. Immediately to the west lies Beechcroft Centre and associated grounds, which is understood to provide accommodation and specialist care for young adults. To the north-west lies Trefoil Montessori Farm School, which serves as a small, local farm school and residential premises. In all other directions immediately adjacent to the site lies open land.

3.1.1 Local Noise Sensitive Receptors

The sensitive receptors noted as being closest to the site are Beechcroft Centre and Trefoil Montessori Farm School, which form the basis of this assessment. The nearest façade of Beechcroft Centre is located approximately 15 m west of the site and the nearest façade of Trefoil Montessori Farm School is located approximately 80 m from the site.

Beyond the adjacencies, approximately 330 m north east of the site, are residential properties on Lister Avenue and approximately 430 m east of the site lies a farm and associated residences on Harwood Lane. National Trust property, Standen House lies approximately 430 m to the south. Given the nature of the proposed works and the substantial distance between these receptors and the site, adverse noise effects arising from the works are anticipated to be negligible and, as such, have been scoped out of this assessment.

3.2 Proposed Capping Works

It is understood that the land of the proposed site is an historic inert landfill, ceasing filling operation in the 1990s. The landfill has leachate and gassing issues and is considered hazardous in its current state. In order to contain the health and environmental risks, the proposed strategy is to cap with two to three metres of soil and clay, which will be supplied to the site by an estimated 12,500 HGVs over the course of the intended works.

It is considered that these works bring longer-term environmental benefits to the site and its environs.

Figures C1 and C2 in Appendix C present the existing and proposed site topography, respectively. A comparison of the two figures indicates that the proposed site levels broadly increase the existing site levels by between 2 – 3 m from the north west boundary of the site towards the south eastern boundary, with a steeper gradient across the land from the north-western boundary to the centre and a notably more shallow gradient from the centre to the south eastern boundary.

HGVs will deliver material to the site, intended for capping, through the entrance to the west, indicated in Figure C-1 in Appendix C and, depending on the weather conditions, follow the track around the eastern/south-eastern perimeter, or the track along the central spine, both of which are also indicated. It is proposed that HGVs will tip material at locations close to these set haul routes and then leave the site through the exit to the south.

The preliminary methodology advises that the onset of site works is anticipated in spring, where the cap will be laid and material spread across the shallow gradient section of the site (indicated in the figures in Appendix C), at the opposite side of the site to the two receptors. During the summer months, when land is dry and presents less of a safety risk to moving plant working on a gradient, site works will move to the section of the site with the proposed steeper gradient (i.e. the side closest to the two receptors). Following the summer months, as the ground becomes increasingly wet, works will once again recede to the shallow section of the site, farthest away from the two receptors.

It is proposed that one excavator, in proximity to the HGV tipping point, will move material to its intended location for spreading by the dozer.

Given the nature of the works and the limited in scope, it is expected that daily site activities will be reasonably consistent throughout the duration of works.

3.2.1 Construction Programme

It is understood that works are intended to run for approximately 80 weeks with an estimated 30 - 35 HGV deliveries to the site per day. The site will operate between 07:00 hrs and 17:00 hrs, Monday to Friday and Saturday 08:00 – 13:00. The works are intended to take place over two phases; in the shallow section of the site, during generally wet conditions; and in the steep section of the site, during generally dry conditions.

In order to minimise the impacts of works on the nearest noise sensitive receptors, initial works on site will comprise the build-up of ground levels to around final height along the boundary of the site to be capped with the noise sensitive receptors, to prove a natural barrier to the passage of noise from the capping works. Continuation of the capping works will then begin closest to the formed natural barrier working backwards away from the receptors.

3.2.2 Plant Schedule

Table 3-1 presents the schedule of plant which will be used on site, which has been provided by Fluid Planning. The schedule includes the sound power level for each item of plant, which has been obtained from the manufacturer, and the anticipated on-time which is given as a percentage of one hour of works, in line with the assessment reference period.

Table 3-1 – Scheme plant schedule

Plant Item	Number of items	Sound level, dB	On-time, %
Komatsu PC210 LC 360 Excavator	1	102 dB L_{WA} (sound power)	100
Komatsu D61 PX Dozer	2	107 dB L_{WA}(sound power)	50
BS 5228: C.2#33: Distribution of material: Articulated Truck	6 movements per hour	79 dB $L_{Amax,T}$ at 10 m	50
BS 5228: C.2#30: Distribution of material: Dump truck – tipping fill	3 events per hour	81 dB $L_{Aeq,T}$ at 10 m	15
Electric Wheelwash measured by AA at waste soil facility on 02/10/2019	1	108 dB L_{WA} (sound power)	15

A discussion of the noise levels for typical HGV movements and off-loading of material is presented in the assessment assumptions in section 5.1.

There will be one to two dozers on site, however they are unlikely to be operating concurrently in the same area of the site for any significant proportion of the operational period being assessed.

A trenching machine may be operational on site for part of the programme; however, this is considered as equivalent to the dozer or excavator and a maximum of 3 items are to be operational concurrently..

Operational on times are based on reasonable worst case one hour of operations.

4 BASELINE SOUND SURVEY

An environmental baseline sound survey, comprising long-term unattended sound measurements at two locations was undertaken to establish the existing sound climate in proximity to the two nearby noise sensitive receptors. Details of the measurement locations are provided, below, and presented graphically in Appendix D, and a summary table of the survey equipment used is presented in Appendix E.

Observation made during site attendance confirmed Beechcroft Care Centre and Trefoil Montessori Farm School as being the receptors most exposed to potential noise effects. The noise climate across the entire site was subjectively low and governed by road traffic on West Hoathly Road to the west of the site.

4.1 Unattended Measurement Locations and Equipment

4.1.1 Measurement Locations

Continuous unattended noise measurements were obtained between approximately 12:00 hrs on Thursday 20th June and 17:30 hrs on Monday 24th June 2019. A summary of the two measurement locations is provided, below.

Measurement Position 1 (MP1)

Measurements were undertaken near the boundary between the site and Beechcroft Care Centre, at a height of approximately 1.5 m above local ground level. The microphone was positioned in free-field conditions, approximately 25 m horizontal distance from the nearest façade of Beechcroft Care Centre.

Measurement Position 2 (MP2)

Measurements were undertaken near the boundary between the site and Trefoil Montessori Farm School, at a height of approximately 1.5 m above local ground level. The microphone was positioned in free-field conditions, approximately 85 m horizontal distance from the nearest façade of the school buildings.

4.1.2 Equipment Summary

Noise levels were measured using Rion NL-52 precision integrating sound level meters. The microphones were fitted with a weatherproof windshield. The sound level meters were powered by dry cell batteries and stored inside a weatherproof security box.

The equipment was calibrated before and after the survey using a Rion NC-74 sound calibrator to generate a calibration level of 94.0 dB at 1 kHz. No significant calibration drifts were observed.

The meters were configured to log 5-minute, consecutive ambient noise measurements ($L_{Aeq,T}$) using the '*fast*' time weighting and A-weighting frequency network.

4.2 Weather Conditions

Weather conditions during the survey period have been obtained from internet sources www.wunderground.com (weather station at Ashplats Wood) which indicates light rain on the evening and during the night of Thursday 20th June (however night time noise data will not be used in this assessment) the remainder having dry conditions with light wind speeds. At the time of set-up and collection of the noise monitor the weather conditions were dry with negligible wind.

It is considered that the weather conditions did not significantly adversely affect the noise measurements.

4.3 Baseline Noise Survey Results

A summary of the daytime hourly ambient $L_{Aeq,1hr}$ and background $L_{A90,1hr}$ noise levels at both measurement locations is presented below. These values are presented as the linear average and

range of hourly daytime noise level metrics for each day of the survey period, between the proposed site working hours of 07:00 to 17:00, with the exception of Thursday 20th June, when measurements began between 12:00 and 13:00 hrs at both measurement locations. The full results of the continuous noise monitoring survey are presented in graphical form in Appendix F.

4.3.1 MP1

Table 4-1 – Range of hourly ambient sound measurements during the proposed site working hours at Measurement Position 1

Monitoring period	Daytime, dB			
	$L_{Aeq,1hr}$ (07:00 – 17:00)		$L_{A90,1hr}$ (07:00 – 17:00)	
	Average	Range	Average	Range
Thursday 20th June 2019	44	41 - 48	36	35 - 38
Friday 21st June 2019	44	41 - 47	34	33 - 35
Saturday 22nd June 2019	48 (48[1])	45 - 51 (45 - 51[1])	34 (33[1])	32 - 36 (32 - 35[1])
Sunday 23rd June 2019	48	44 - 53	37	35 - 39
Monday 24th June 2019	45	42 - 50	35	32 - 37

[1] Results for period 08:00 – 13:00 in line with Saturday operational hours

4.3.2 MP2

Table 4-2 – Range of hourly ambient sound measurements during the proposed site working hours at Measurement Position 2

Monitoring period	Daytime, dB			
	$L_{Aeq,1hr}$ (07:00 – 17:00)		$L_{A90,1hr}$ (07:00 – 17:00)	
	Average	Range	Average	Range
Thursday 20th June 2019	47	45 - 49	39	38 - 40
Friday 21st June 2019	45	43 - 47	39	37 - 41
Saturday 22nd June 2019	47 (47[1])	45 – 49 (45-48[1])	35 (34[1])	33 – 36 (33 – 35[1])
Sunday 23rd June 2019	46	43 - 48	38	35 - 44
Monday 24th June 2019	46	41 - 51	36	34 – 37

[1] Results for period 08:00 – 13:00 in line with Saturday operational hours

In order to determine the representative hourly ambient sound level at both measurement locations, the time periods during the survey period which are deemed to be most representative of site working hours have been established.

Given that site works are proposed for 07:00 – 17:00 hrs Monday to Friday and 08:00 – 13:00 hrs Saturday, the measured ambient noise levels for Sunday have been discounted. Therefore, the hourly ambient and background sound levels at both measurement locations has been taken as the linear average value of the hourly sound data during proposed site working hours for Thursday 20th, Friday 21st, Saturday 22nd and Monday 24th June.

At MP1 measurement location, these sound levels are 45 dB $L_{Aeq,1hr}$ and 35 dB $L_{A90,1hr}$ for the ambient and background sound levels. At MP2 measurement location, these sound levels are 46 dB $L_{Aeq,1hr}$ and 38 dB $L_{A90,1hr}$ for the ambient and background sound levels. The noise level taken as representative of the general area has been taken as the lower of the two surveys, ie. The representative ambient sound level is taken to be 45 dB $L_{Aeq,1hr}$ and representative background sound level of 35 dB $L_{A90,1hr}$.

These are considered representative of the typical sound levels at the nearest facades of the two noted receptors.

The guidance in Section 2 states that noise from site works should, ideally, not exceed the background L_{A90} level by more than 10 dB(A), subject to a maximum of 55 dB $L_{Aeq,1hr}$ (free field) at the nearest noise sensitive receptors, without imposing unreasonable burdens on the mineral operator, the limit set should be as near that level as practicable. Assuming a representative noise level of 35 dB $L_{A90,1hr}$ at the nearest noise sensitive receptor, a value of 10 dB above this level is 45 dB. It is further noted that all the works detailed in this assessment are for environmental benefit to cap landfill.
The assessment of these levels against the proposed criteria presented in Table 2-1, concludes that noise is minimised as far as is reasonably practicable to a level 45 dB $L_{Aeq,1hr}$ and no more than 55 dB $L_{Aeq,1hr}$ for long duration works of more than 8 weeks. For workings of short duration, less than 8 weeks, a level of 70 dB $L_{Aeq,1hr}$ should not be exceeded.

5 CAPPING WORKS NOISE ASSESSMENT

This section presents an assessment of the predicted noise levels at the nearest facades of Beechcroft Care Centre and Trefoil Montessori Farm school, from the proposed capping works at the site.

A detailed acoustic model of the site and surrounding area has been created to calculate the level of noise at the facades of the two receptors. The model has been generated using CadnaA® noise mapping software and the modelled site layout is based upon the drawings provided by Fluid Planning, which are presented in Appendix C.

The topography across the site and the surrounding area has been based on 1 m Digital Terrain Model (DTM) data across the site.

The results from the model are presented graphically, as noise contours, in Appendix G.

5.1 Assessment Assumptions

In order to predict the typical noise levels which are anticipated to arise from the proposed site works, a number of assumptions must be adopted within the model. Those which have been adopted are provided, below.

- The calculations in this assessment assume capping works take place over two phases; during months when site conditions are generally dry (summer) and months when site conditions are more likely to be wet.
- 4 scenarios have been modelled:
    1. Works taking place at the minimum distance to Beechcroft Care Centre in the steep section
    2. Works taking place at the minimum distance to Beechcroft Care Centre in the shallow section
    3. Works taking place at the minimum distance to Trefoil Montessori Farm School in the steep section
    4. Works taking place at the minimum distance to Trefoil Montessori Farm School in the shallow section
- The predictive model assumes all works take place during daytime hours.
- The modelled scenarios are based upon the excavator moving the material from the tipping point to the dozer, where the material is spread. As such, all scenarios include the following:

  - a line source modelled haul road to and from the appropriate tipping location;
  - a point source which is representative of the tipping event;
  - a point source which is representative of the excavator and is located between the tipping point and the dozer; and
  - a point source which is representative of the dozer

- For the modelled scenarios in the steep sections, the dozer is assumed to work at the minimum practical distance from the two receptors. It is understood that works will not take place within the wooded area located between the Beechcroft Care Centre and the site and, as such, the minimum distance between the dozer and the Beechcroft Care Centre will be 5 m from the wooded area. The 5 m allows for clearance for manoeuvring. The minimum distance between dozer and Trefoil Montessori Farm School will be 5 m from the site boundary closest to the school.
- The hourly percentage on-times of the excavator and the dozer is 100%.
- The calculation method presented in F2.5.2 of BS 5228 for *mobile plant using a regular well-defined route* has been adopted to establish the noise contribution from HGV movements along the on-site haul road. The calculation is based upon a sound power level, derived from Table C.2 of Annex C in BS 5228 (ref *C.2 #33: Distribution of material: Articulated Truck*), which is 81 dB $L_{Aeq,T}$ at 10 m.
- It is assumed that an average of 3 HGV round-trips take place per hour (i.e. 6 HGV movements along the haul road) which take 5 minutes each to complete. This results in an assumed percentage on-time of 50%.
- The assumed noise level for a typical tipper waggon off-loading material at the site has been taken from Table C.2 of Annex C in BS 5228 (ref *C.2 #30: Distribution of material: Dump truck – tipping fill*), which is 79 dB $L_{Amax,T}$ at 10 m.
- The HGVs are assumed to off-load material at two haul road locations:
  - along the central spine of the site for works in the steep section; and
  - along the track at the eastern/south-eastern perimeter of the site for works in the shallow section.
- It is assumed that the HGV will take up to 5 minutes to off-load material. Under the assumption that there are 3 HGV trips per hour on average, the percentage on-time equates 15%.
- The topography across the intervening ground between the receptors and the site is such that site activities will be visible at Beechcroft Centre and Trefoil Montessori Farm School at both ground and first floor level, which precludes the need for an assessment at both floor heights. Therefore, calculations are based upon receiver heights set at 1.5 m.
- The source heights for excavators, HGVs and the dozer are set at 2 m above local ground level.
- The ground cover across the site and between the site and the receptors is noted as being green space, therefore, the calculations assume 100% soft ground.
- Calculations are based upon the current site levels.

5.2 Predicted Noise Levels at Noise Sensitive Receptors

Table 5-2 presents the predicted, cumulative noise levels at Beechcroft Care Centre and Trefoil Montessori Farm School as a result of the proposed site works. The predicted levels are based upon the construction information provided by Fluid Planning and the assumptions outlined, above.

It should be noted that the predicted levels reflect the periods of time when workings are closest to the two sensitive receptor areas, and that for the majority of the proposed works, plant will be more distant than assumed within these calculations.

Table 5-2 also presents the exceedance of predicted noise level over the noise limit as described in Section 3. The target limit of 45 dB would be an unreasonable over the entire programme for the site and the works are for environmental benefit, therefore the limit of 55 dB is considered as the suitable target noise limit.

Table 5-2 – Predicted noise levels from works, applicable noise limits and exceedances for all four scenarios

Scenario	Location	Predicted free-field noise level, dB (LAeq,16hr)	Exceedance, dB
1	Minimum setback distance from Beechcroft Centre in steep section (approx. 20 m)	68	13
2	Minimum setback distance from Beechcroft Centre in shallow section (approx. 70 m)	61	7
3	Minimum setback distance from Trefoil Montessori Farm school in steep section (approx. 90 m)	57	2
4	Minimum setback distance from Trefoil Montessori Farm school in shallow section (approx. 110 m)	57	2

Table 5-2 indicates that the predicted noise level at the nearest façade of Beechcroft Centre is anticipated to exceed the long-term criterion by 13 dB when works are at the minimum practical distance in the steep section (scenario 1) and 6 dB at the minimum practical distance in the shallow section (scenario 2). The predicted noise level at Trefoil Montessori Farm School is anticipated to exceed the above guideline limit by 2 dB when works are at the minimum practical distance in the steep section (scenario 3) and 1 dB at the minimum practical distance in the shallow section (scenario 4). The predictions also exceed the criterion based on background L_{A90} + 10 dB.

The works closest these receptors, however, does not result in noise levels which exceed the limit for shorter-term works. It is understood that the works in each of the areas resulting in exceedance of the long-teerm criteria are intended to take place for 8 weeks per year over the 2 year programme.

Therefore, consideration is given to potential mitigation measures which will minimise noise impacts at both receptors, below.

Particular consideration is also given to noise levels at Trefoil Montessori Farm school with regards to the limits in BB 93. The maximum predicted external free-field levels at the receptor façade location of 56 – 57 dB $L_{Aeq,1hr}$ would be attenuated by a single-glazed window to below 35 dB $L_{Aeq,30min}$, which would provide a satisfactory internal noise environment. With windows partially open and depending on the effectiveness of the mitigation measures below, however, there may be short periods of work where levels exceed 40 dB $L_{Aeq,30min}$. It is anticipated, therefore, that there may be brief periods of works where windows are required to be shut to ensure a good internal teaching environment.

External noise levels would be expected to be reduced by the mitigation measures below by at least 3 dB, sufficient to bring maximum external noise levels around the school to below the criteria of 55 dB $L_{Aeq,30min}$ for outdoor teaching areas. Furthermore, from observation of the layout of the school it is believed that there will be some outdoor areas available to the north and west which benefit from screening and increased distance from the works such that predicted noise levels will be reduced below 50 dB $L_{Aeq,30min}$.

6 MITIGATION

The primary mitigation actions are within the construction works to prioritise works along the edge nearest the receptors. This will create a 3 m soil embankment with the plant working behind, maximising screening to the sensitive properties beyond. Due to the undulating profile of the site topography and the decreasing site levels approaching the boundary closest to the Beechcroft Centre, however, the likely acoustic benefit afforded by installing any further screening at the boundary (i.e. where site levels are lowest) would be negligible. Therefore, consideration is given to suitable setback distances and appropriate periods of work where disruption can be minimised.

The predictive model indicates that, under the given assumptions, capping works will fall below the guideline noise limit of 55 dB $L_{Aeq,1hr}$ when the excavator and the dozer are at distances greater than approximately 110 m from the nearest façade of the Beechcroft Centre and Trefoil Montessori Farm School. This distance is marked by the black/white dashed line in the Figure C-3 in Appendix C for reference. Levels are likely, however, to still exceed the target of 45 dB $L_{Aeq,1hr}$ (10 dB above background). As such, noise from site continues to require mitigation as far as is reasonably practicable without placing unreasonable burdens on the operator, subject to a limit of 55dB $L_{Aeq,1hr}$ for general working.

For works to take place within the 110 m distance, the guideline limit of 70 dB $L_{Aeq,1hr}$, which is proposed in *Paragraph: 022 Reference ID: 27-022-20140306* of the technical guidance to the National Planning Policy Framework, should be followed. This guideline limit is applicable for a period of up to 8 weeks within a year. The results in Table 5-2 indicate that noise levels at the minimum distances from the receptors (i.e. the worst case scenarios) are anticipated to fall below the 70 dB limit. It is understood that the programme of works is to be set out so that this period is adhered to.

To further minimise any noise impacts at the school, works within the 110 m distance should take place following liaison with Trefoil Montessori Farm School to minimise any potential effects on their teaching activities. This might result in works during the school holidays, or avoiding summer when windows are more likely to be open. This will allow works to continue without disruption to teaching at the school.

Furthermore, should plans indicate that works within the 110 m distance may exceed the 8 week period, it may be possible to increase the plant and operators on site (i.e. an additional excavator and dozer) so that works can take place concurrently, in proximity to the two receptors, and be concluded within the 110 m distance within the allowable period. The model indicates that the distance between the two receptors is sufficiently large enough that works may be undertaken concurrently without increasing the combined activity noise levels above 70 dB $L_{Aeq,1hr}$.

In addition to the above recommendations, the following measures should be taken during capping works on site in to minimise potential noise impacts at the nearest noise sensitive receptors.

- The works should be carried out in as timely a manner as possible in order to minimise the duration of any disturbance.
- Via communication between the contractor and the Local Authority, the school and local residents should be kept informed of general site activities including working hours.
- All plant and equipment should be properly maintained.
- All plant and equipment, including delivery HGVs should be shut down, with engines off when not in use.
- On-site haul routes for HGVs should be located as far from noise sensitive as possible.
- Deliveries to the site should be timed to arrive within the permitted working hours only.
- All reasonable steps should be taken to limit the number of vehicles waiting to access the site.

- Vehicle movements should be arranged so as to minimise noise form reversing warning indicators. White-noise or visual indicators will be used instead of tonal 'beeping' warning signals.
- Site workers and operatives should be regularly advised of the need to work in such a way as to minimise noise and disturbance, with noise minimisation being a point of focus in site meetings.
- A community liaisons representative should be appointed, who shall be responsible for investigating and addressing any complaints received directly by the site.
- The contact details for the community liaisons representative should be advertised, for example at the pedestrian site access.
- The community liaisons representative shall be empowered to investigate noise complaints and enforce noise mitigation measures as identified to be necessary.
- A complaints log shall be kept of all complaints received, and remedial measures undertaken.
- The community liaisons representative shall be responsible for informing the local community regarding the progress of the works and advising local residents of the timing of particularly noise works in the vicinity of their properties in advance of this commencing.
- Best construction practices and methods should be used in executing the construction works so as to avoid or reduce noise as far as possible. Only plant that conforms to the relevant European Union noise emission standards would be used during the construction of the proposed development.

7 CONCLUSIONS

A noise assessment has been undertaken to assess the impact of construction noise on nearby noise sensitive receptors to the site. It is understood that the works are necessary to mitigate emissions and leachate from an historic landfill site and plant pasture and woodland.

The two receptors which were deemed to be the most exposed to capping operations noise from the site are Beechcroft Centre, adjacent to the western boundary of the site, and Trefoil Montessori Farm School at Ashwood Farm, located adjacent to the north-western boundary, which serves as a small, local school and residential premises. The receptors used are representative and that the residential and art school receptors beyond would have a lesser effect. Other sensitive receptors in the surrounding area are sufficiently far away from the site that noise impacts from the proposed capping works are anticipated to be negligible and have not been considered as part of this assessment.

In accordance with the requirements of the Minerals Planning Authority, two unattended noise measurements have been undertaken at two locations, considered representative of the Beechcroft Care Centre and Trefoil Montessori Farm School (and to a lesser extent the residential and art school receptors beyond), to establish the existing local noise climate. Site observations indicated that the dominant source of noise in the area is road traffic along West Hoathly Road.

Assessment of the maximum predicted noise levels during each phase of works closed to each receptor has been undertaken against the guidance from Mid Sussex District Council's District Plan, consultation, the Government's Planning Practice Guidance – Minerals and the criteria for schools given in BB 93. Based on assumptions outlined in this assessment, which have been informed by capping works details provided by Fluid Planning, the predicted noise levels at the nearest façades of Beechcroft Care Centre and Trefoil Montessori Farm School, arising from capping and associated works are anticipated to exceed some of the recommended noise limits and are subject to mitigation measures.

It has been determined that, whilst site works should ideally, not exceed the background L_{A90} level by more than 10 dB(A), this would impose unreasonable burdens on the operations that are for environmental benefit, and instead noise should be minimised as far as is reasonably practicable to a level no more than 55 dB $L_{Aeq,1hr}$ for long duration works of more than 8 weeks. For workings of short duration, less than 8 weeks, a level of 70 dB $L_{Aeq,1hr}$ should not be exceeded.

In order to undertake the capping works which "will bring longer-term environmental benefits to the site or its environs", noise levels in excess of 55 dB are likely to occur, as demonstrated in the assessment. It is accepted that Beechcroft Care Centre operates throughout the year, however the school summer break is deemed the period where the least disruption would occur to ensure the leachate and gassing issues are contained. In addition to the working restrictions recommended in the assessment, it is strongly advised that the best practicable means measures identified in the assessment report should be keenly adhered to, to ensure disruption is minimised as far as practicably possible.

With the adoption of the mitigation measures provided in this report, it is anticipated that noise levels at the nearest façade of Beechcroft Care Centre and Trefoil Montessori Farm school will meet the PPG-M.

8 REFERENCES

1 Mid Sussex District Council. Mid Sussex District Plan 2014 - 2031. Adopted March 2018

2 Department for Communities & Local Government. Planning Practice Guidance: Minerals. HMSO. 2014. http://planningguidance.planningportal.gov.uk/

3 British Standards Institution. BS 5228-1:2009+A1:2014 - *Code of practice for noise and vibration control on construction and open sites – Part 1: Noise.* 2014

4 Department for Education and Skills. Building Bulletin 93. Acoustic Design of Schools: A Design Guide. The Stationery Office. 2015

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APPENDIX A

NOISE UNITS AND TERMINOLOGY

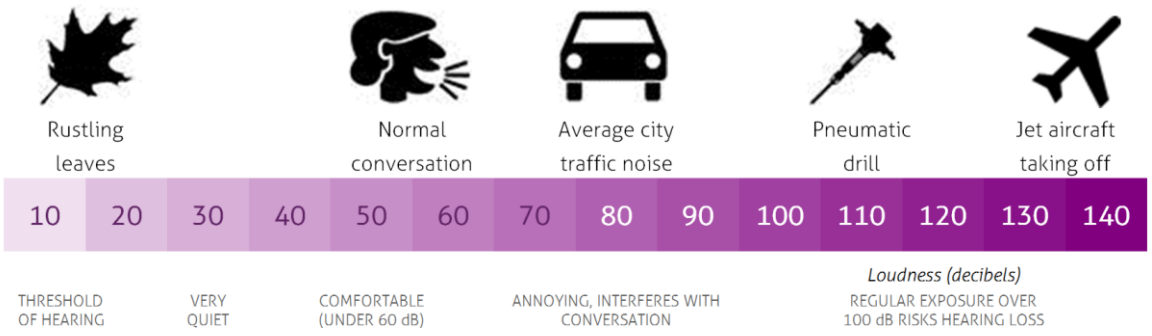
Noise units

Noise is measured using a logarithmic scale, to account for this wide range, called the decibel (dB). Noise is defined as unwanted sound and the range of audible sound varies from around 0 dB to 140 dB.

The human ear is capable of detecting sound over a range of frequencies from around 20 Hz to 20 kHz, however its response varies depending on the frequency and is most sensitive to sounds in the mid frequency range of 1 kHz to 5 kHz. Instrumentation used to measure noise is therefore weighted across the frequency bands to represent the sensitivity of the ear. This is called 'A weighting' and is represented as dB(A).

It is generally accepted that under normal conditions humans are capable of detecting changes in steady noise levels of 3 dB, whilst a change of 10 dB is perceived as a doubling or halving of the noise level. An indication of the range of noise levels commonly found in the environment is given below.

Figure A-1 - Typical noise levels



Acoustic terminology

A number of different indices are used to describe the fluctuations in noise level over certain time periods. The main indices include:

$L_{A90,T}$ This is the noise level exceeded for 90% of the measurement period and provides a measurement of the quieter 'lull' periods in between noise events. It is often referred to as the background noise level.

$L_{Aeq,T}$ This is the "equivalent continuous A weighted sound pressure level" and is the level of a notional steady sound which has the same acoustic energy as the fluctuating sound over a specified time period. It is often used for measuring all sources of noise in the environment, which can be referred to as the ambient noise.

$L_{Amax,F}$ This is the maximum sound pressure level measured in a given time period with the sound level meter set to 'fast' response.

Reference is often made to acoustic measurements being undertaken in 'free-field' or 'façade' locations. Free-field measurements represent a location away from vertical reflecting surfaces, normally by at least 3.5 metres. A façade measurement is undertaken, or calculated to a position 1 metre from an external façade and a correction of up to 3 dB can be applied to account for the sound reflected from the façade. This latter position is often used when assessing the impact of external noise affecting residents inside properties.

APPENDIX B

NATIONAL PLANNING POLICY AND LEGISLATION

National Planning Policy

National Planning Policy Framework

First published in 2012 and most recently updated in July 2018, the *National Planning Policy Framework* (NPPF)[1] sets out the Government's planning policies for England and how these are expected to be applied. The NPPF replaced Planning Policy Guidance Note (PPG) 24: Planning and Noise amongst other PPG's and Planning Policy Statements (PPS's). The sections of the NPPF which are relevant to noise are as follows:

"170. Planning policies and decisions should contribute to and enhance the natural and local environment by:...[a number of points including]...

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;"

"180. 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 (60);

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;...".

"182. Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed."

Reference number 60 of the above quotation points to the Explanatory Note to the *Noise Policy Statement for England*.

Noise Policy Statement for England

The Noise Policy Statement for England (NPSE)[2] was published on 15 March 2010. It sets out the long-term vision of the Government's noise policy, which is to promote good health and a good quality of life through the management of noise within the context of sustainable development.

The NPSE sets out the following aims:

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

- avoid significant adverse impacts on health and quality of life;
- mitigate and minimise adverse impacts on health and quality of life; and
- where possible, contribute to the improvement of health and quality of life."
- The NPSE describes a number of effect levels that may be used to define effects in the context of noise policy, as follows:

- **NOEL – No Observed Effect Level -** This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.
- **LOAEL – Lowest Observed Adverse Effect Level -** This is the level above which adverse effects on health and quality of life can be detected.

- **SOAEL – Significant Observed Adverse Effect Level -** This is the level above which significant adverse effects on health and quality of life

Further guidance on interpreting the effect levels was published on the Government's Planning Practice Guidance first published in March 2014 and updated in October 2019. This includes a table that summarises noise exposure hierarchy, noting this is based on the likely average response of a population. This table is reproduced, below:

Table B-1 - Noise exposure hierarchy and effect levels

Perception	Examples of outcomes	Increasing effect level	Action
No Observed Effect Level			
Not present	No Effect	No Observed Effect	No specific measures required
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour , attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

APPENDIX C

EXISTING AND PROPOSED SITE

Figure C-1 – Existing site and topographical levels

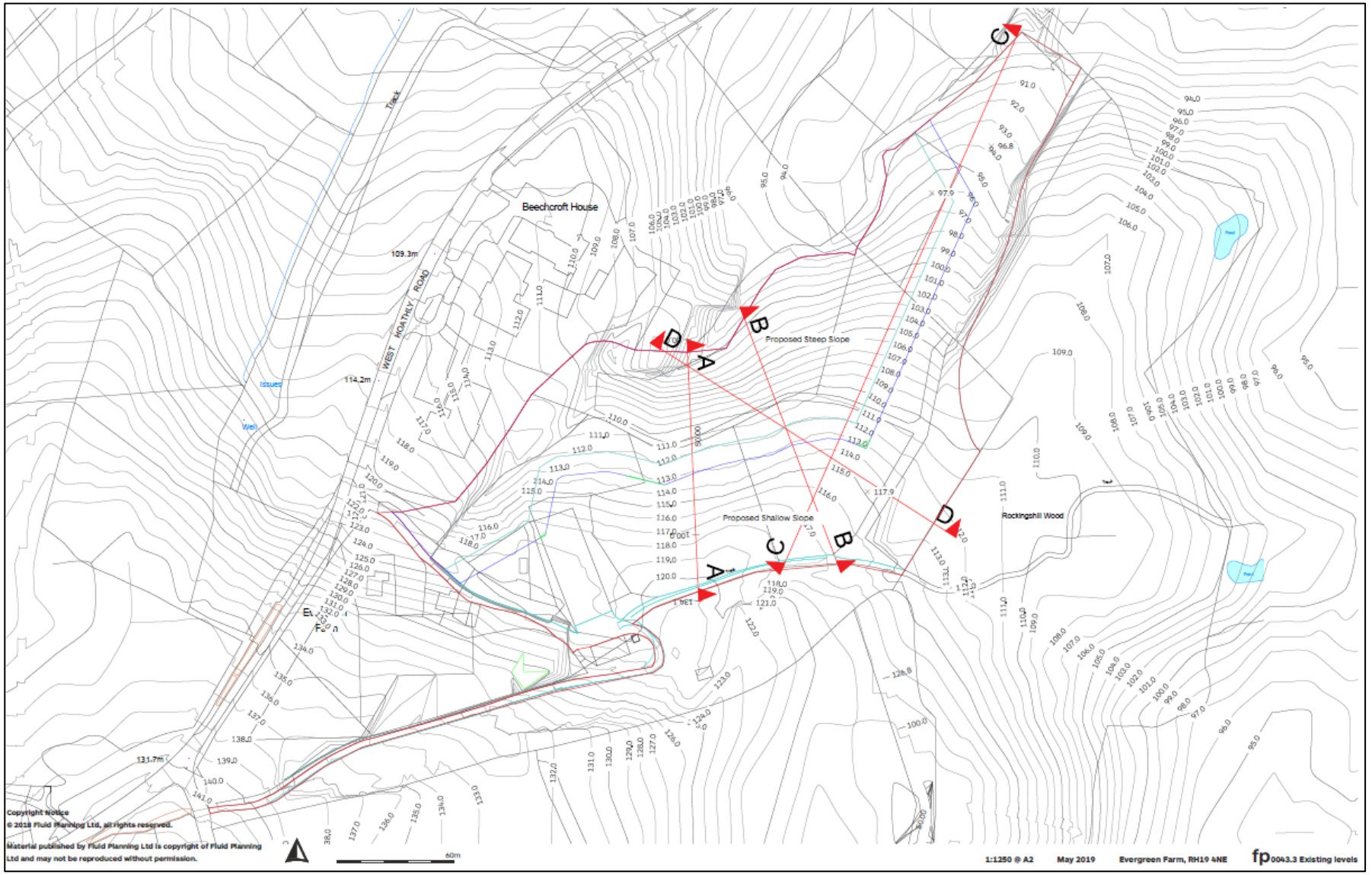


Figure C-2 – Proposed site and topographical levels

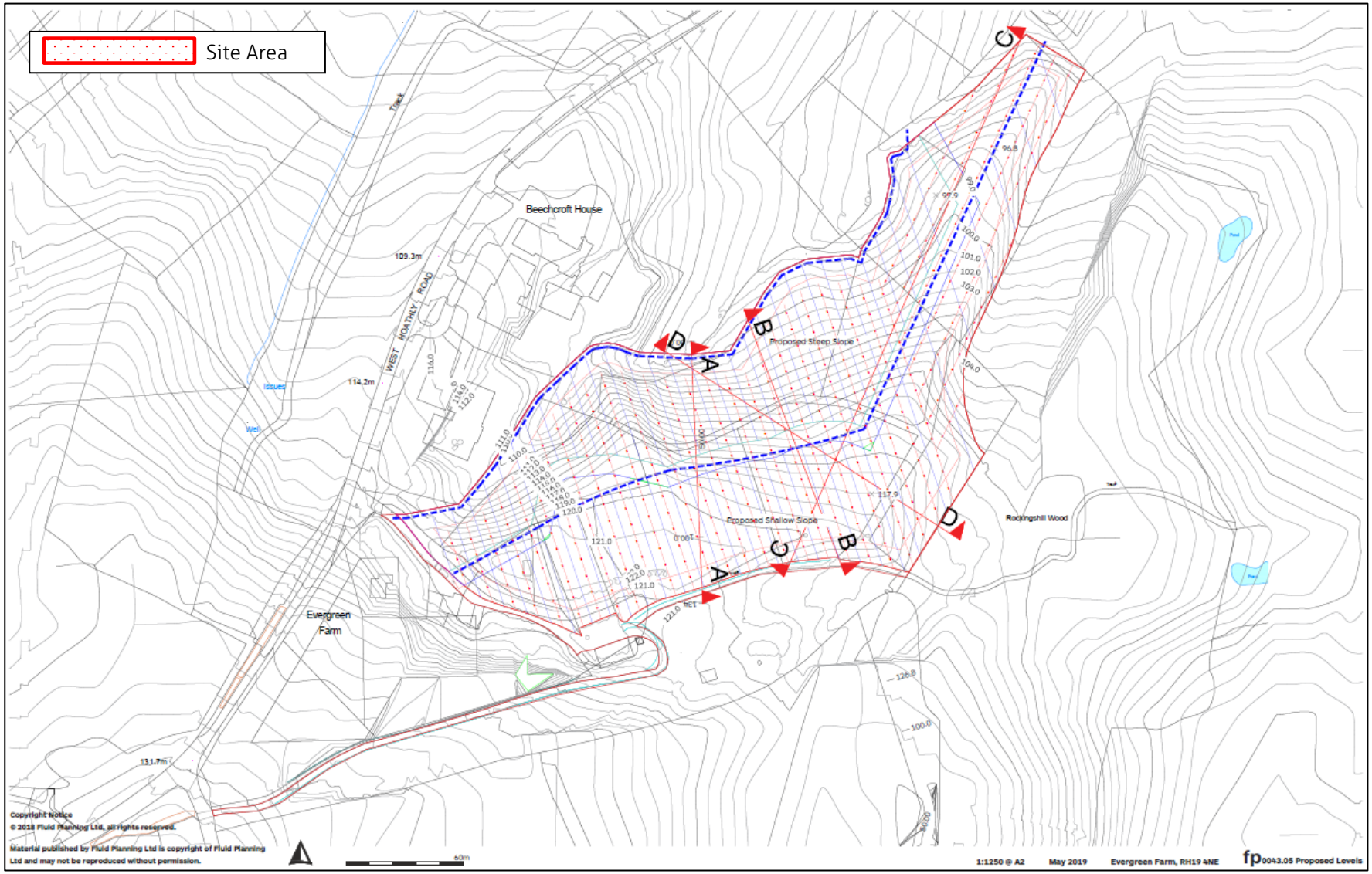
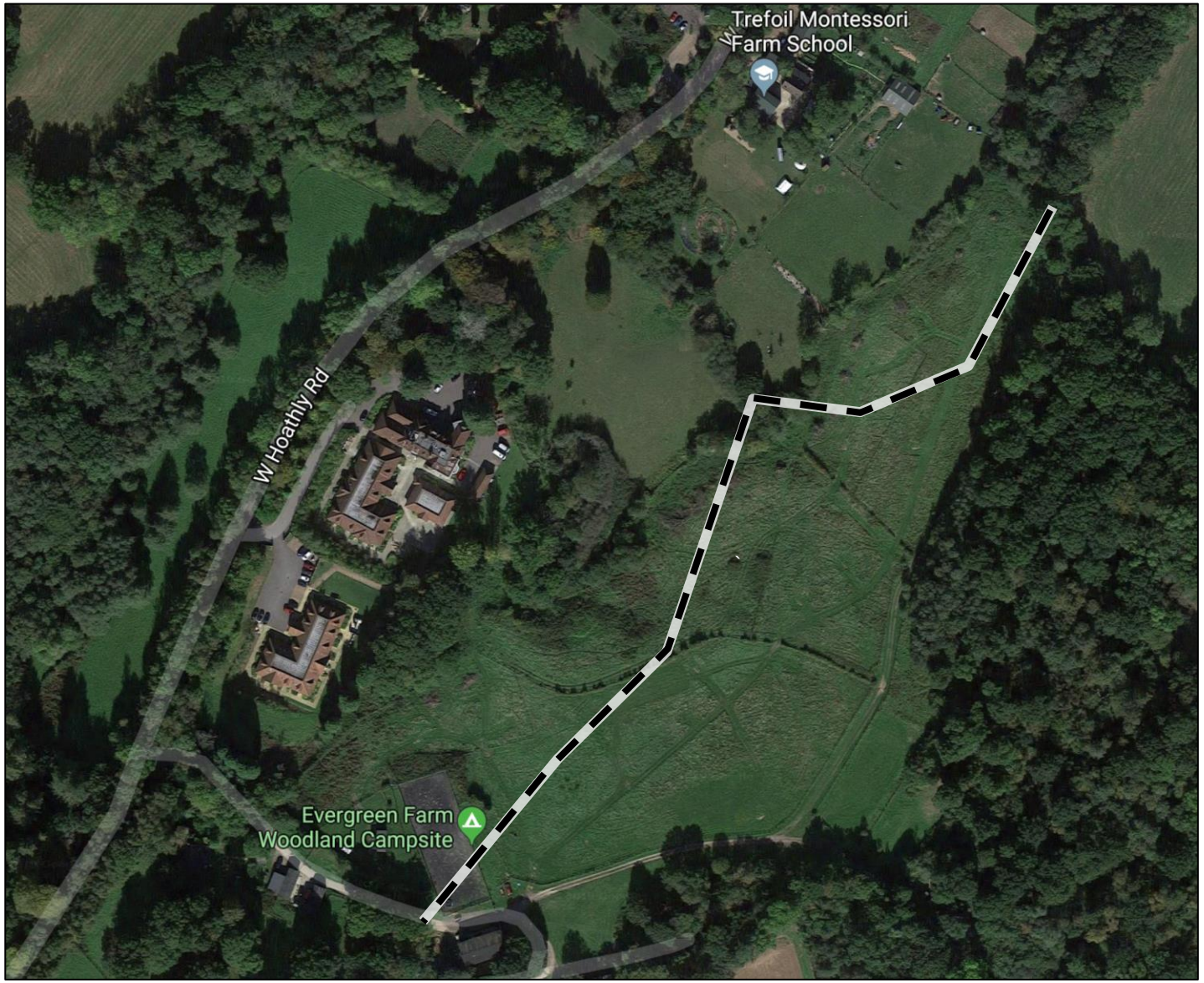


Figure C-3 – Approx. 110 m distance line for works beyond which guideline noise limits are met for long-term works



APPENDIX D

MEASUREMENT LOCATIONS

Figure D-1 – Measurement Locations

APPENDIX E

MEASUREMENT EQUIPMENT

Measurement Position	Item	Make and Model	Serial Number	Calibration	
				Certificate number	Expiry Date
1	Sound Level Meter	Rion NL-52	00732147	UCRT18/2194	30/11/2020
	Preamplifier	NH-25	32175		
	Microphone	UC-59	05339		
	Calibrator	Rion NC-74	35173438	UCRT19/1290	06/03/2020

Measurement Position	Item	Make and Model	Serial Number	Calibration	
				Certificate number	Expiry Date
2	Sound Level Meter	Rion NL-52	0610202	UCRT19/1036	22/03/2020
	Preamplifier	NH-25	10611		
	Microphone	UC-59	06171		
	Calibrator	Rion NC-74	35173438	UCRT19/1290	06/03/2020

APPENDIX F

MEASUREMENT RESULTS

Figure F-1 – Measurement Position 1 results

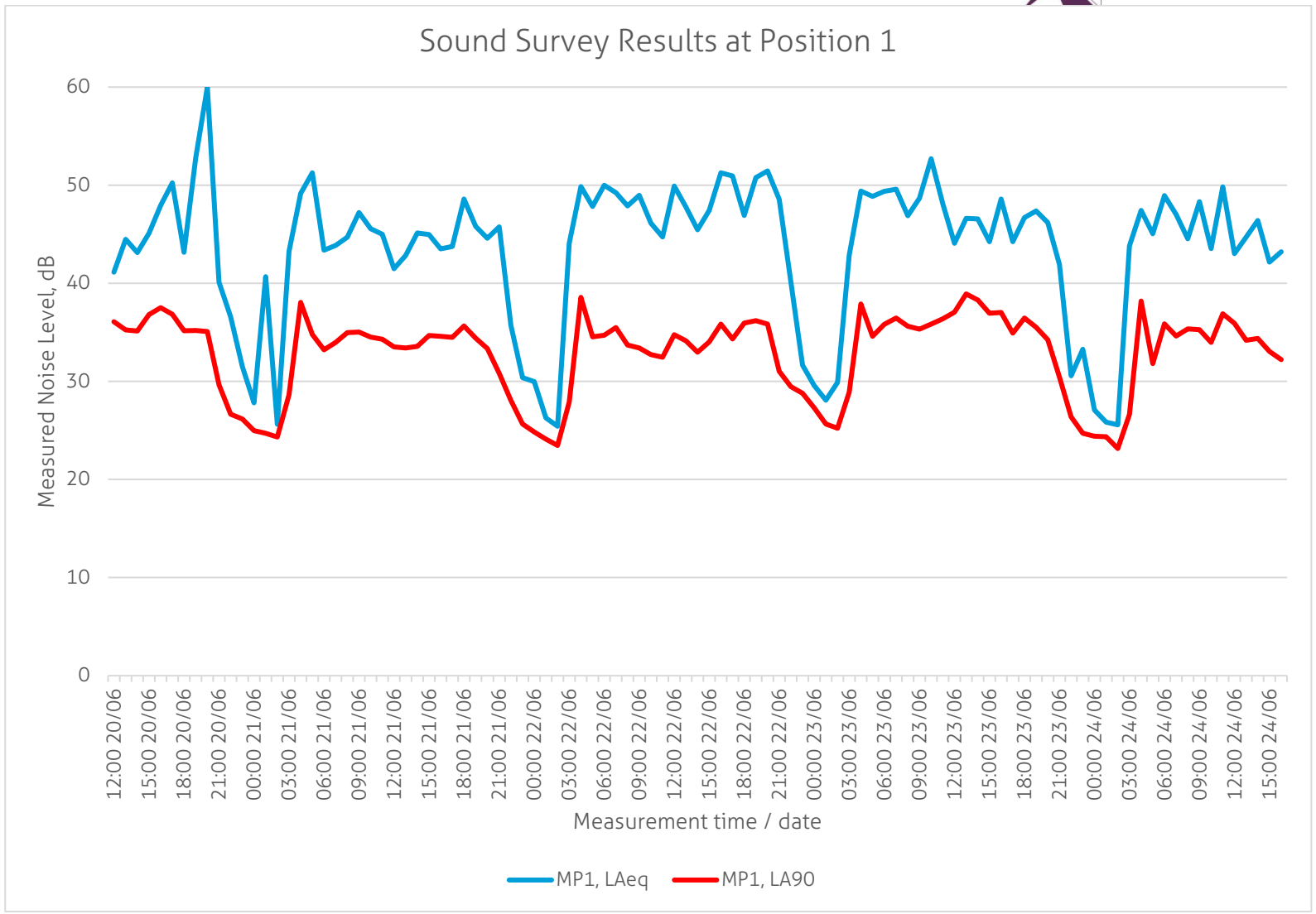
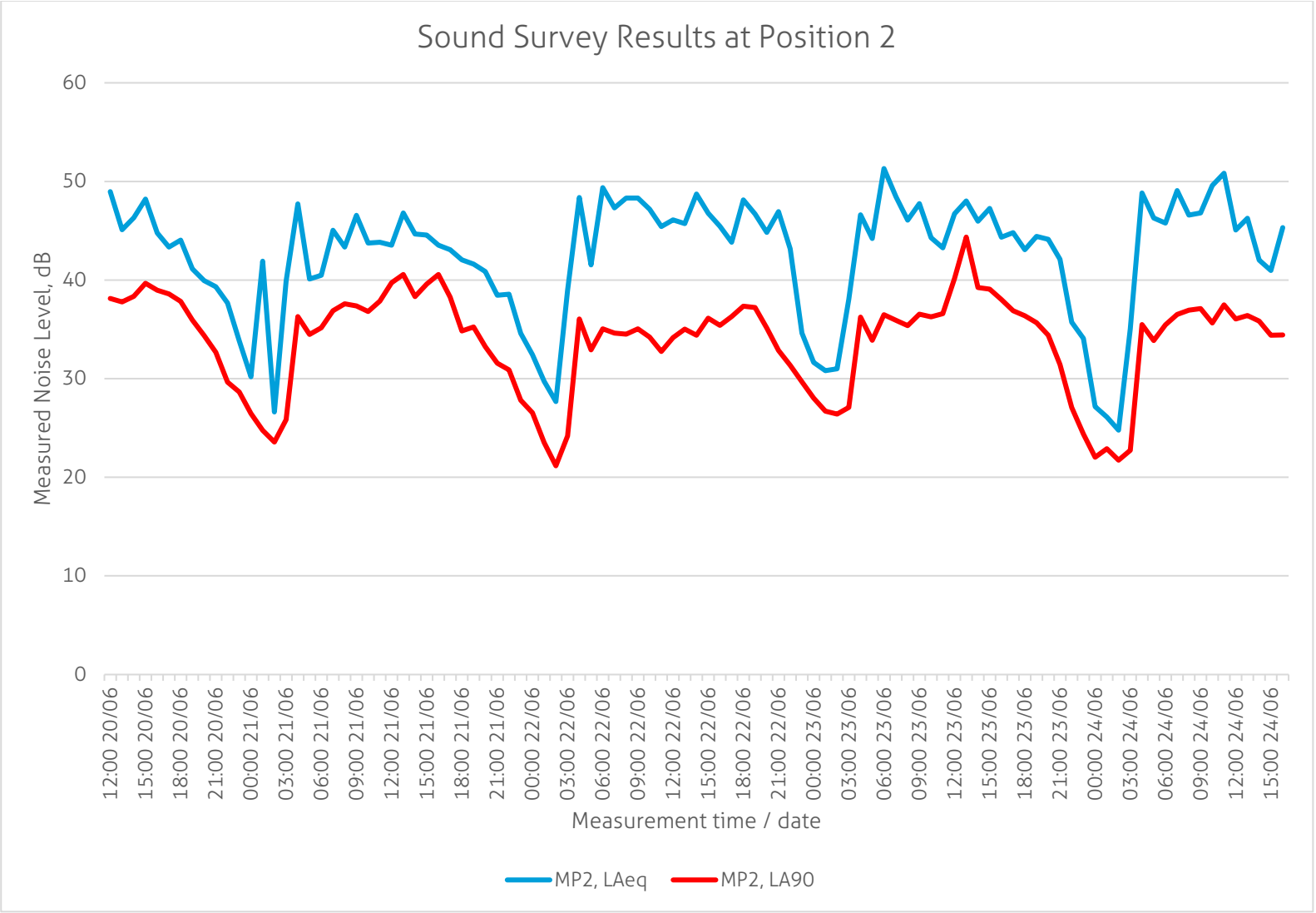


Figure F-2 – Measurement Position 2 results



APPENDIX G

PREDICTIVE NOISE CONTOURS

Figure G.1 – Noise Level Prediction Contour, Steep Section, Beechcroft Centre (1.5m height)

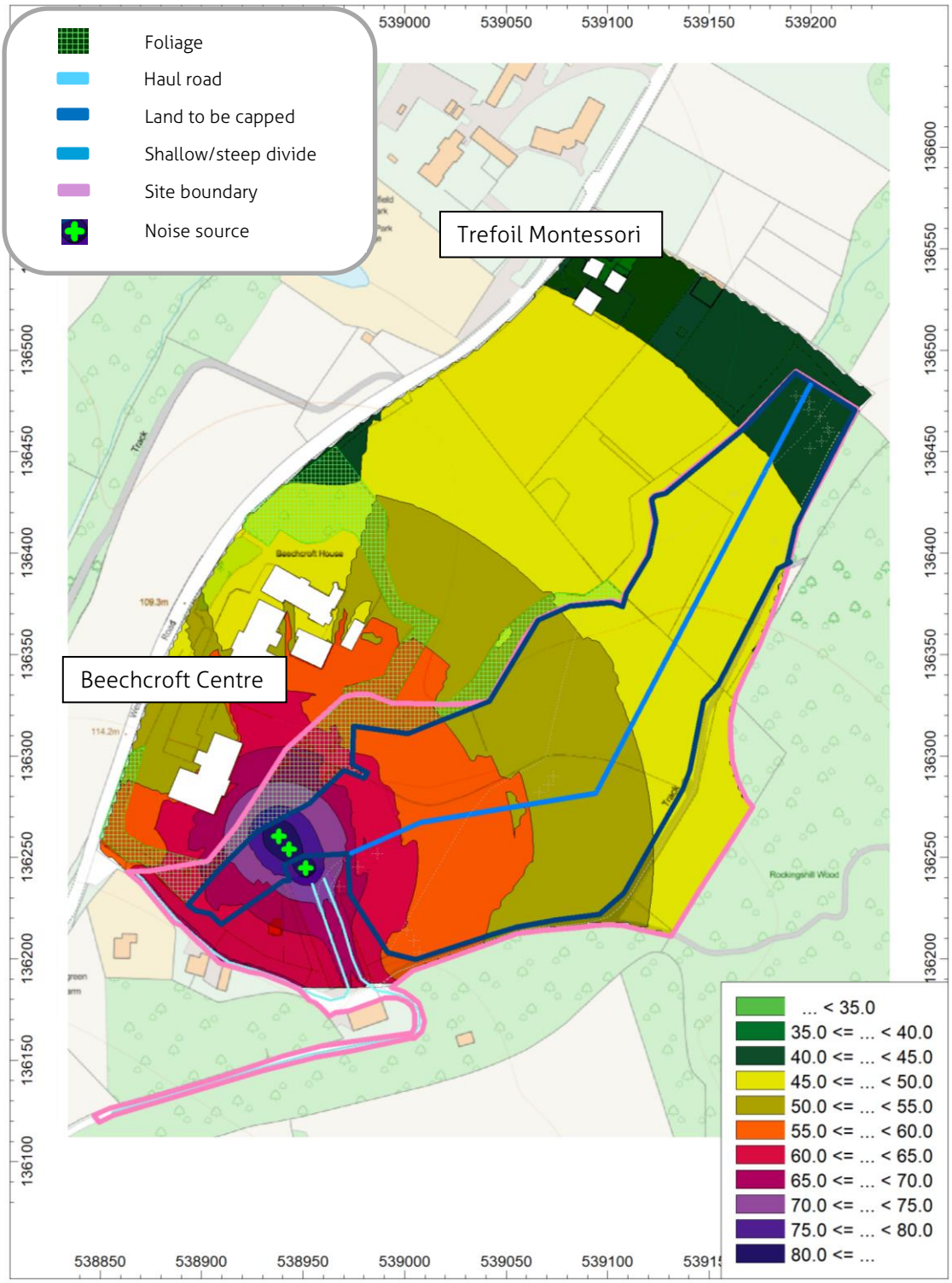


Figure G.2 - Noise Level Prediction Contour, Shallow Section, Beechcroft Centre (1.5m height)

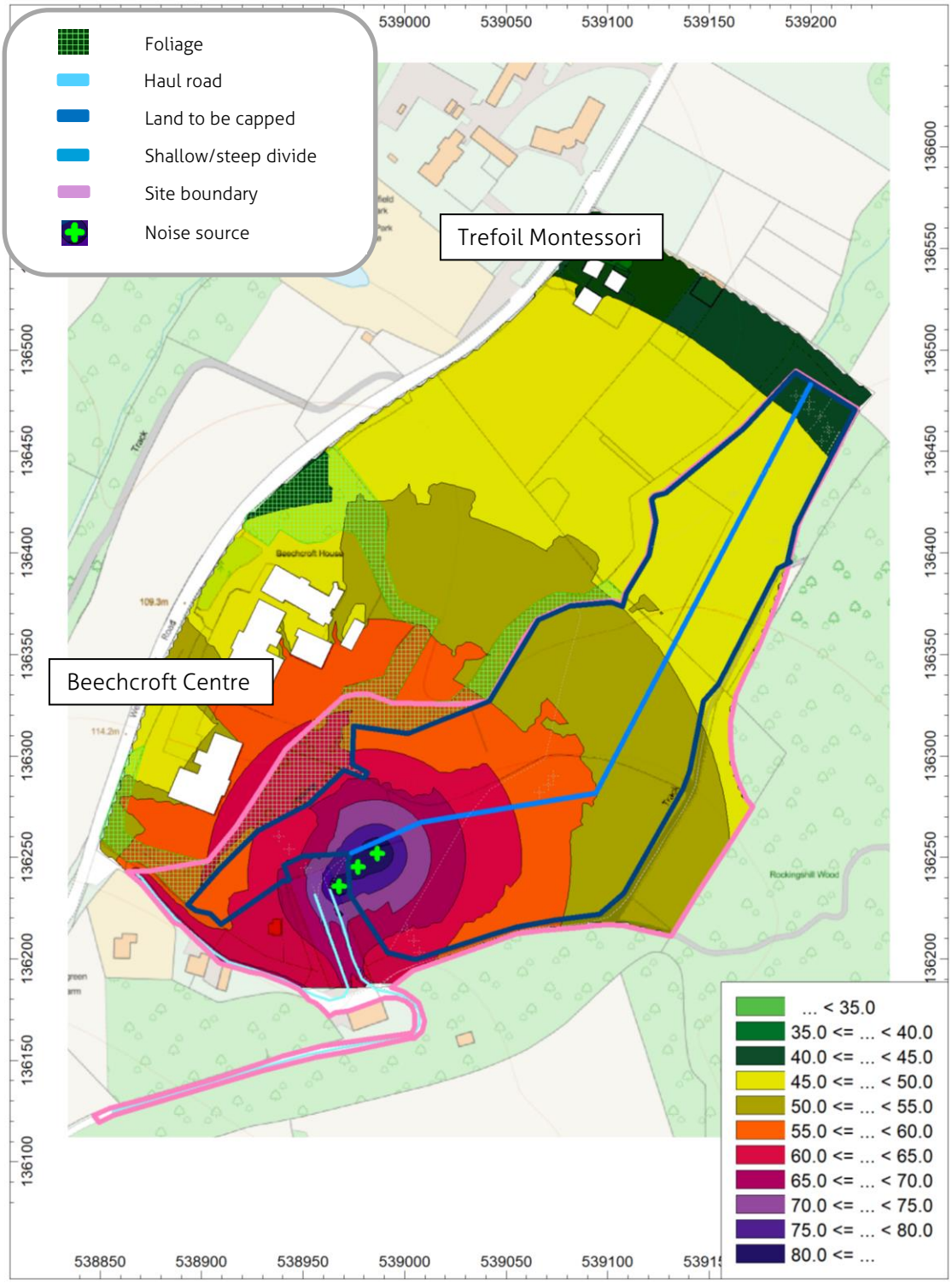


Figure G.3 - Noise Level Prediction Contour, Steep Section, Trefoil Farm School (1.5m height)

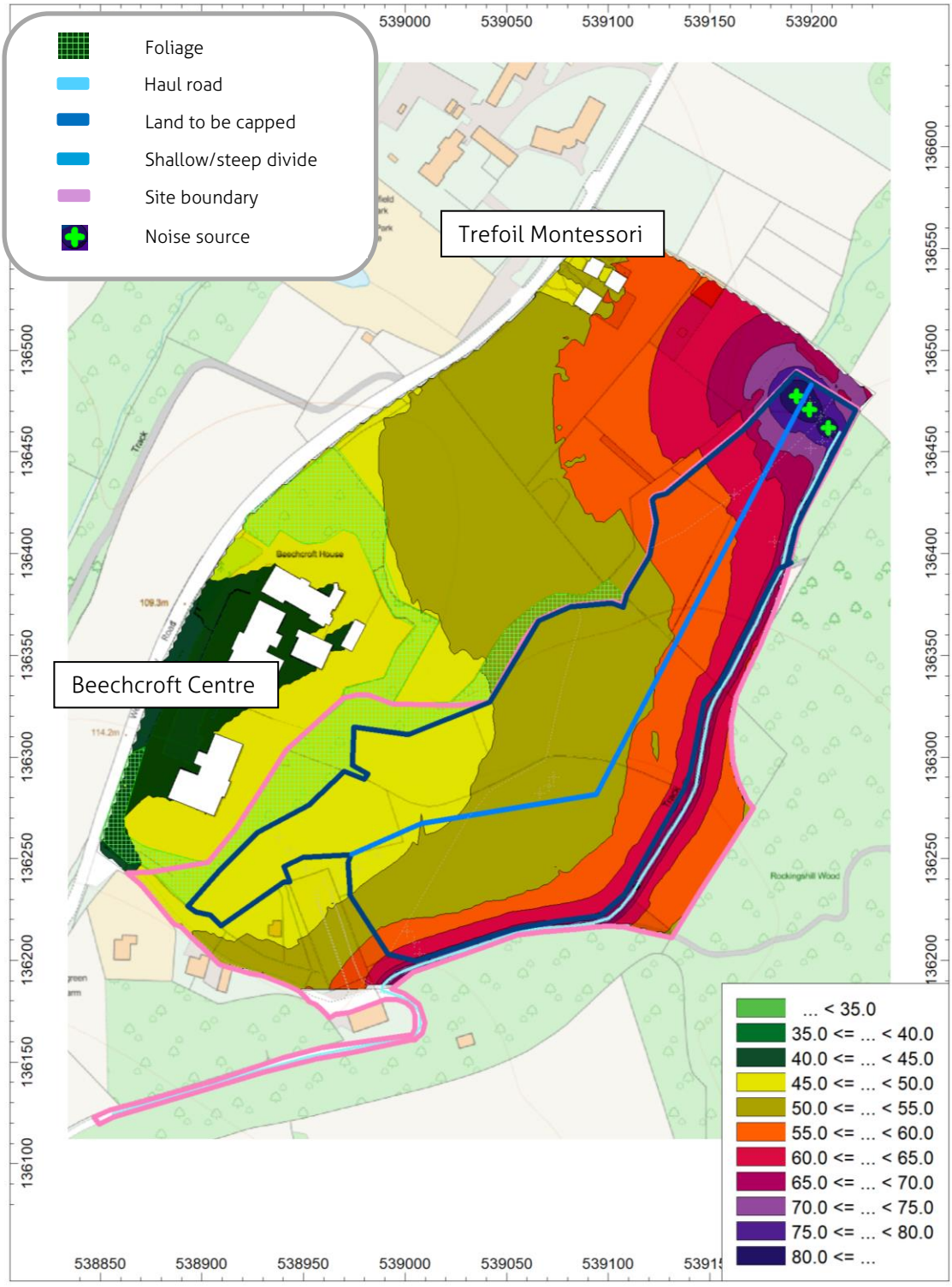


Figure G.4 - Noise Level Prediction Contour, Shallow Section, Trefoil Farm School(1.5m height)