



Noise Impact Assessment

Kirkby Valley Golf Club & Course, Knowsley

Green Circle Estates Limited

MAN.889.001.NO.R.001



Contact Details:

Enzygo Ltd.
Samuel House,
5 Fox Valley Way
Stocksbridge
Sheffield
S36 2AA

tel: 0114 321 5151
email: acoustics@enzygo.com
www: enzygo.com

Noise Impact Assessment

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Author:	Mark Harrison BSc (Hons) MIOA
Reviewer	Darren Lafon-Anthony MSc MIOA FIQ

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Enzygo Limited Registered in England No. 6525159

Registered Office Stag House Chipping Wotton-Under-Edge Gloucestershire GL12 7AD

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1 Introduction

1.1 Project Introduction

- 1.1.1 Enzygo Limited (Enzygo) has been commissioned by Green Circle Estates Limited to undertake a noise impact assessment to support a planning application for the redevelopment of Kirkby Valley Golf Club and Course, off Valley Road (A506), Knowsley near Liverpool.
- 1.1.2 The assessment has been undertaken to assess the potential impacts of the proposed redevelopment during both the construction and operational phases, in accordance with the relevant standards and guidance, at the nearest noise-sensitive properties to the site.
- 1.1.3 Details of the assessment methodology employed, together with the results of the noise survey, calculations, assessment, and conclusions are presented within this assessment report.

1.2 Site Description

- 1.2.1 The redevelopment is proposed for an existing golf course located on land between Kirkby and New Hall, to the northeast of Liverpool. The site is adjacent to junction 6 of the M57, north of Valley Road and has the River Alt running through the middle.
- 1.2.2 The site is an existing golf course and has been open and operating since 1928. Its current facilities include an 18-hole course, clubhouse with parking and access road joining Ingoe Lane and Valley Road (A506).
- 1.2.3 The site and nearest identified noise-sensitive receptors are shown in Figure 1-1. The receptors identified from aerial imagery are detailed in Table 1-1.

Table 1-1: Identified Receptor Locations

Receptor	Approximate Grid Coordinates	
	Easting	Northing
AL01 - Croxteth House	339931	397812
AL02 – Mathers Cottage	339153	397741
AL03 – 842 Moor Lane	339493	397469

Figure 1-1: Site Location Plan



1.3 The Proposed Development

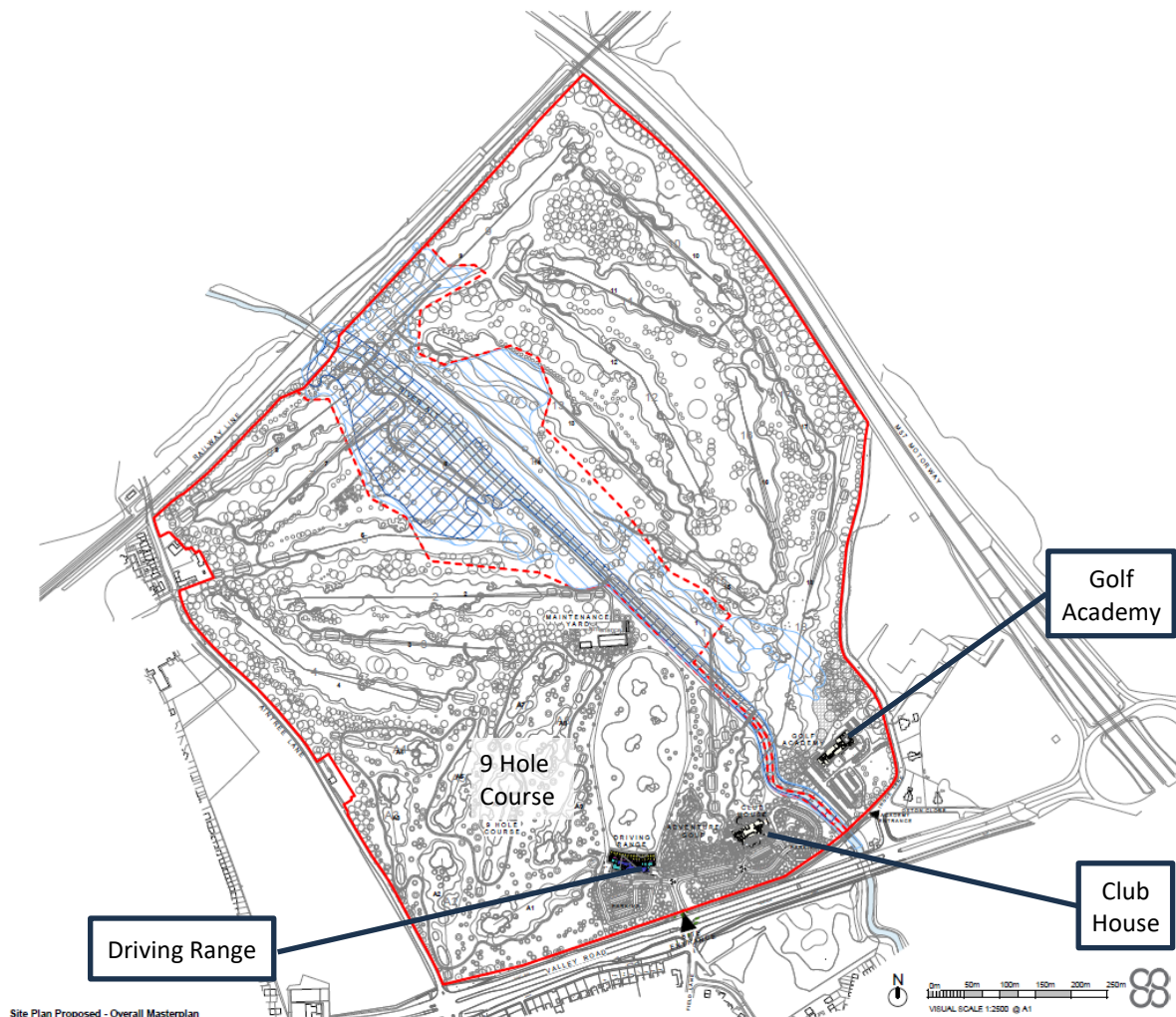
1.3.1 The proposed scheme is for the redevelopment of the existing golf course and facilities including the following elements:

- Reconfiguration and other improvement works across the entire golf course, including the reshaping of tees/greens/bunkers to provide both an improved 18-hole course and the introduction of a new 9-hole course on currently unused land;
- New and improved irrigation/drainage works (including 2no. irrigation lakes), extensive tree and shrub planting, and ecological mitigation measures across the course;
- The erection of a footbridge over the River Alt (to provide improved access);
- The erection of a new 2-storey Clubhouse with associated operational/management offices, pro shop, café, restaurant, function room, changing and toilet facilities;
- Retention, alteration and 364m² (GEA) extension of the existing clubhouse, and its change of use to form a golf-related/grounds maintenance training academy with associated classroom space, cafeteria and overnight accommodation for golf professionals, teachers, trainers (existing access and car park retained/unchanged);

- A new centrally located greenkeeper's compound with an associated 720m² GEA portal frame building to contain welfare facilities, office, training space and equipment storage and maintenance and security fencing;
- An adventure golf course and practice putting green;
- A golf driving range with an associated 2-storey building containing 32no. driving bays (over two levels), bar/lounge, pro shop, training and practice rooms/facilities, and external lighting and safety netting;
- Car, motorcycle and cycle parking spaces to serve all of the above facilities; and,
- One new access created onto Valley Road to serve the development.

1.3.2 The site layout is shown in Figure 1-2.

Figure 1-2: Proposed Site Layout



2 Standards and Guidance

2.1 Planning Practice Guidance: Noise

- 2.1.1 The Planning Practice Guidance (PPG): Noise is the Government's online guidance on managing potential noise impacts from new developments.
- 2.1.2 The PPG includes a noise exposure hierarchy table which relates response to noise and example outcomes to effect levels. The table also identifies actions required for each effect level.
- 2.1.3 Particularly relevant to this assessment are the No Observed Effect Level and the No Observed Adverse Effect Level (NOAEL) to which the PPG states:

Table 2-1: Noise Hierarchy Table Excerpt

Response	Example of Outcomes	Increasing Effect Level	Action
No Observed Effect Level			
Not present	No effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			
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 change in the quality of life	No Observed Adverse Effect	No specific measures required

2.2 British Standard 5228-1:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites*

- 2.2.1 British Standard 5228:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites, Part 1: Noise* (BS5228-1) sets out methods for predicting noise levels arising from a wide variety of construction and related activities.
- 2.2.2 Noise level generated by construction activities and experienced at local receptors will depend on several variables, the most significant of which are:
- The sound power outputs of the plant, equipment and/or process;
 - The periods of operation of the plant, equipment and/or process;
 - The distance between the source of noise and the receptor;
 - The presence of screening by buildings, barriers or landforms;
 - The potential reflection of sound;
 - Soft ground attenuation.
- 2.2.3 It is understood that construction operations at the proposed development would only occur during normal daytime working hours, i.e., between 07:00 and 19:00 hours Monday to Friday and between 07:00 and 13:00 hours on Saturdays.

- 2.2.4 BS5228-1 gives several examples of acceptable limits for construction noise. For the purposes of this assessment, the 'Potential significance based upon noise change – The ABC method' has been used for residential receptors and the 'Potential significance based on fixed noise limits' method has been used for all other receptors. Both methods are described below.

Potential Significance Based upon Noise Change – The ABC Method

- 2.2.5 The ABC method gives examples of thresholds of potential significant effects at dwellings when the noise level from construction operations, rounded to the nearest decibel, exceeds the tabulated value. The values are shown in Table 2-2 below.

- 2.2.6 The table is designed to be used as follows:

“for the appropriate period (night, evening/weekends or day), the ambient noise level is determined and rounded to the nearest 5dB. This is then compared to the site noise level. If the site noise level exceeds the appropriate category value, then a potential significant effect is indicated. The assessor then needs to consider other project-specific factors, such as the number of receptors affected and the duration and character of the impact, to determine if there is a significant impact.”

Table 2-2: BS5228 – Example Threshold of Potential Significant Effect at Dwellings

Assessment category and threshold value period	Threshold value, in decibels (dB) $L_{Aeq,T}$		
	Category A ^{A)}	Category B ^{B)}	Category C ^{C)}
Night-time (23:00 – 07:00)	45	50	55
Evenings and weekends ^{D)}	55	60	65
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	65	70	75
NOTE 1 A potential significant effect is indicated if the $L_{Aeq,T}$ noise level arising from the site exceeds the threshold level for the category appropriate to the ambient noise level.			
NOTE 2 If the ambient noise level exceeds Category C threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a potential significant effect is indicated if the total $L_{Aeq,T}$ noise level for the period increases by more than 3dB due to site noise.			
NOTE 3 Applies to residential receptors only.			
^{A)} Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values.			
^{B)} Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as Category A values.			
^{C)} Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than Category A values.			
^{D)} 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays			

2.3 British Standard 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound

- 2.3.1 BS4142 provides a methodology for rating and assessing sound associated with both industrial and commercial premises. The purpose of the Standard is clearly outlined in the opening section where it states that the method is appropriate for the consideration of:

- Sound from industrial and manufacturing processes;

- Sound from fixed installations which comprise mechanical and electrical plant and equipment;
 - Sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and
 - Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site.
- 2.3.2 The methods described in the Standard use 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.
- 2.3.3 The Standard states that sound of an industrial/commercial nature does **not** include sound from the passage of vehicles on public roads and railway systems.
- 2.3.4 The Standard is based around the premise that the significance of the noise impact of an industrial/commercial facility can be derived from the numerical subtraction of the background noise level (not necessarily the lowest background level measured, but the typical background at the receptor) from the measured/calculated rating level of the specific sound under consideration. This comparison will enable the impact of the specific sound to be concluded based upon the premise that typically *“the greater this difference, the greater the magnitude of the impact”*. This difference is considered as follows:
- A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.
 - A difference of around +5dB is likely to be an indication of an adverse impact, depending upon context.
 - The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact.
- 2.3.5 BS4142 further states that *“where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact,”* again depending upon the specific context of a site. The Standard further qualifies the assessment protocol by outlining conditions to a comparative assessment and stating that *“not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact”*, thus implying that all sites should be assessed on their own merits and specifics.
- 2.3.6 The Standard goes on to states that *“where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night”*.
- 2.3.7 The Standard quantifies the typical reference periods to be used in an assessment namely:
- | | | |
|--------------------|---------------|--------------------------|
| Typical Daytime | 07:00 – 23:00 | 1-hr assessment period |
| Typical Night-time | 23:00 – 07:00 | 15-min assessment period |
- 2.3.8 The Standard outlines methods for defining appropriate *“character corrections”* within the rating levels to account for tonal qualities, impulsive qualities, other sound characteristics and/or intermittency. These are *a) the Subjective Method, b) the Objective Methods for*

tonality and c) the Reference Method. It is noted by the Standard that where multiple features are present the corrections should be added in a linear fashion to the specific level.

2.3.9 The Subjective Method is based on the following corrections:

Table 2-3: BS4142 Subjective Method Rating Corrections

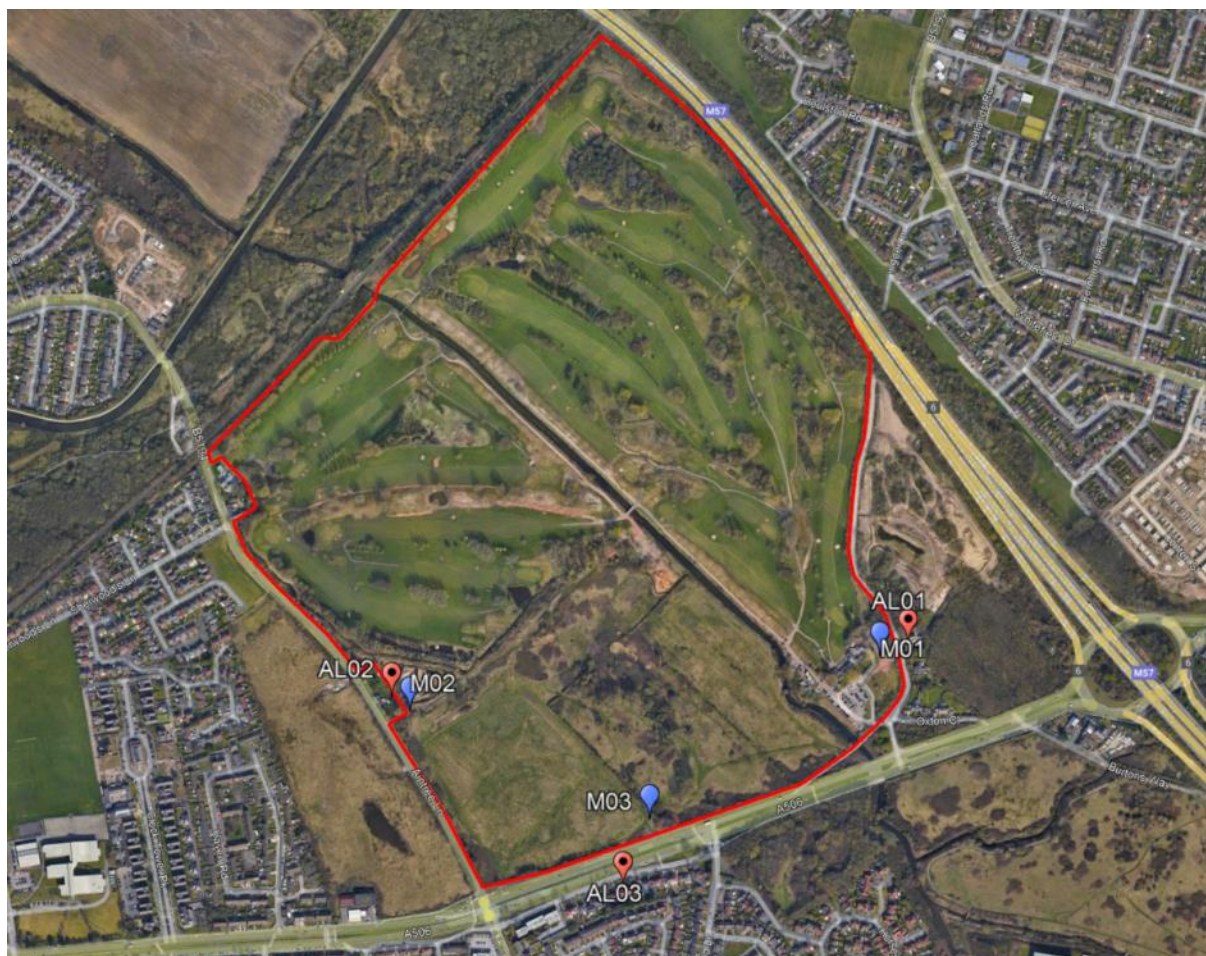
Level of Perceptibility	Tonal Correction	Impulsivity Correction	Correction for "Other sound characteristics"	Intermittency Correction
No Perceptibility	+0 dB	+0 dB	Where neither tonal nor Impulsive but clearly identifiable +3 dB	If intermittency is readily identifiable +3 dB
Just Perceptible	+2 dB	+3 dB		
Clearly Perceptible	+4 dB	+6 dB		
Highly Perceptible	+6 dB	+9 dB		

3 Baseline Survey Information & Results

3.1 Introduction

- 3.1.1 A baseline noise survey has been undertaken to determine the prevailing noise climate at locations representative of the closest noise-sensitive receptors to the proposed development site. Measurements were taken between Wednesday 15th and Thursday 16th November 2023.
- 3.1.2 Measurement locations adopted during the survey are identified in Figure 3-1. The figure also identifies the noise sensitive receptors in proximity to each of the adopted measurement positions.

Figure 3-1: Noise Survey Measurement Locations



- 3.1.3 The monitoring locations are detailed in Table 3-1 below. It is noted that all monitoring locations were within land owned by the golf course but are considered reasonable proxies for the identified receptor locations.

Table 3-1: Noise Monitoring Locations

Receptor	Approximate Grid Coordinates	
	Easting	Northing
M01	339900	397805
M02	339171	397713
M03	339538	397558

3.2 Weather Conditions

- 3.2.1 Observations of the prevailing weather conditions during the survey indicate that no rain fell though ground conditions were generally wet. Cloud cover was 100%. Wind speeds measured periodically throughout the survey were recorded at below 5m/s.
- 3.2.2 Overall, the recorded weather conditions were within acceptable parameters for noise monitoring and would have no significant impact on the reported values.

3.3 Measuring Equipment

- 3.3.1 The baseline noise survey was undertaken using the Class 1 specification noise measurement equipment detailed in Table 3-2. The equipment was calibrated using a portable calibrator immediately before and after the measurements with no significant drift in calibration observed. The sound level meters, pre-amplifiers and microphones were calibrated to traceable standards within the 24 months prior to the measurements. The portable calibrators were calibrated within the 12 months preceding the date of the survey.
- 3.3.2 The noise monitoring equipment used during the survey was set to record the $L_{Aeq,T}$, L_{A90} and L_{Amax} parameters.
- 3.3.3 The following set-up parameters were used on the sound level meter during all the noise measurements undertaken:

Time Weighting: Fast

Frequency Weighting: "A"

Table 3-2: Noise Monitoring Equipment

Position	Equipment	Make and Model	Serial Number	Calibration Due Date
ML1	Sound Level Meter	01dB Fusion	11327	Sept 2025
	Microphone	Gras 40CE	259479	
	Preamp	01dB PRE 22	1605201	
ML2	Sound Level Meter	SVAN 971	80342	Nov 2024
	Microphone	ACO 7052E	71683	
	Preamp	SV18	71576	
ML3	Sound Level Meter	SVAN 971A	113221	Feb 2024
	Microphone	ACO Pacific 7152	80629	
	Preamp	Svan18A	113722	
All	Calibrator	01dB – Stell Cal 21	3465335	Sept 2024

3.3.4 The external calibration documentation for the equipment used is available upon request.

3.4 Survey Details and Results

3.4.1 The measurements made at locations M01 and M02 were made by means of unattended monitoring stations, continuously logging throughout the survey period. Measurements at M03 were made by means of shorter duration, attended measurements. The results of the surveys are detailed in Table 3-3 below.

3.4.2 A graphical representation of the survey data at each measurement location is shown in Appendix A.

Table 3-3: Summary Baseline Survey Results, dB

Location	Period	Duration hh:mm	Measured Sound Pressure Level (dB)			
			Average ¹ L _{Aeq,T}	L _{Afmax} ²	Background Sound Level, L _{A90}	
					Min	Mean ³
M01	Day (07:00 – 23:00)	16:00	53.5	78.1	43.0	53.2
	Night (23:00 – 07:00)	8:00	52.0	64.0	38.0	46.2
M02	Day (07:00 – 14:00)	16:00	54.3	80.0	39.0	48.5
	Night (04:00 – 07:00)	08:00	50.3	66.8	36.0	43.0
M03	Day (11:00 – 14:00)	03:00	59.1	87.4	49.8	50.9
	Evening (21:00 – 23:00)	02:00	57.8	80.9	51.5	52.5

¹ Logarithmic average L_{Aeq,15mins} sound pressure levels during relevant periods
² Maximum L_{Afmax,15mins} sound pressure level
³ Arithmetic average L_{A90,15mins} sound pressure level during relevant survey period

3.5 Context

Measurement Location 1 (M01)

- 3.5.1 Monitoring was undertaken at M01 over a 24-hour period commencing at 15:00 on Wednesday 15th November 2023. The microphone was located in free-field conditions at 1.5m above local ground level and approximately 10m to the west of Ingoe Lane. M01 was selected to determine the prevailing noise climate at a location representative of noise sensitive receptors to the east of the proposed redevelopment site (i.e., those off Ingoe Lane).
- 3.5.2 During the attended periods, the baseline noise climate was noted to be dominated by road traffic from the M57 and natural sounds (birdsong, tree-rustle etc.).

Measurement Location 2 (M02)

- 3.5.3 Monitoring was undertaken at M02 over a 24-hour period commencing at 15:30 on Wednesday 15th November 2023. The microphone was located in free-field conditions at 1.5m above local ground level and approximately 25m east of Aintree Lane adjacent to the curtilage of a nearby residential property.
- 3.5.4 M02 was selected to determine the prevailing noise climate at a location representative of noise sensitive receptors to the west of the proposed development site. During periods of attendance on-site, the baseline noise climate was noted to be dominated by road traffic on the A506 to the south, and Aintree Lane to the west. Noise from the M57 was also noted to be audible during evening periods.

Measurement Location 3 (M03)

- 3.5.5 Monitoring was undertaken at M03 from 11:00 until 14:00 and from 20:00 until 22:00 on Thursday 16th November 2023. Measurement equipment was located in free-field conditions at a height of 1.5m above local ground level and approximately 22m to the north of the nearside kerb edge of the eastbound carriageway of the A506.
- 3.5.6 M03 was selected to determine the prevailing noise climate at a location representative of noise sensitive receptors to the south of the proposed development site (i.e., those to the south of the A506, which are also located 20m from the nearside kerb edge of the A506). During periods of attendance on-site, the baseline noise climate was noted to be dominated by road traffic on the A506. Noise from the M57 was also noted to be audible during evening periods.

4 Assessment of Construction Noise

4.1 Introduction

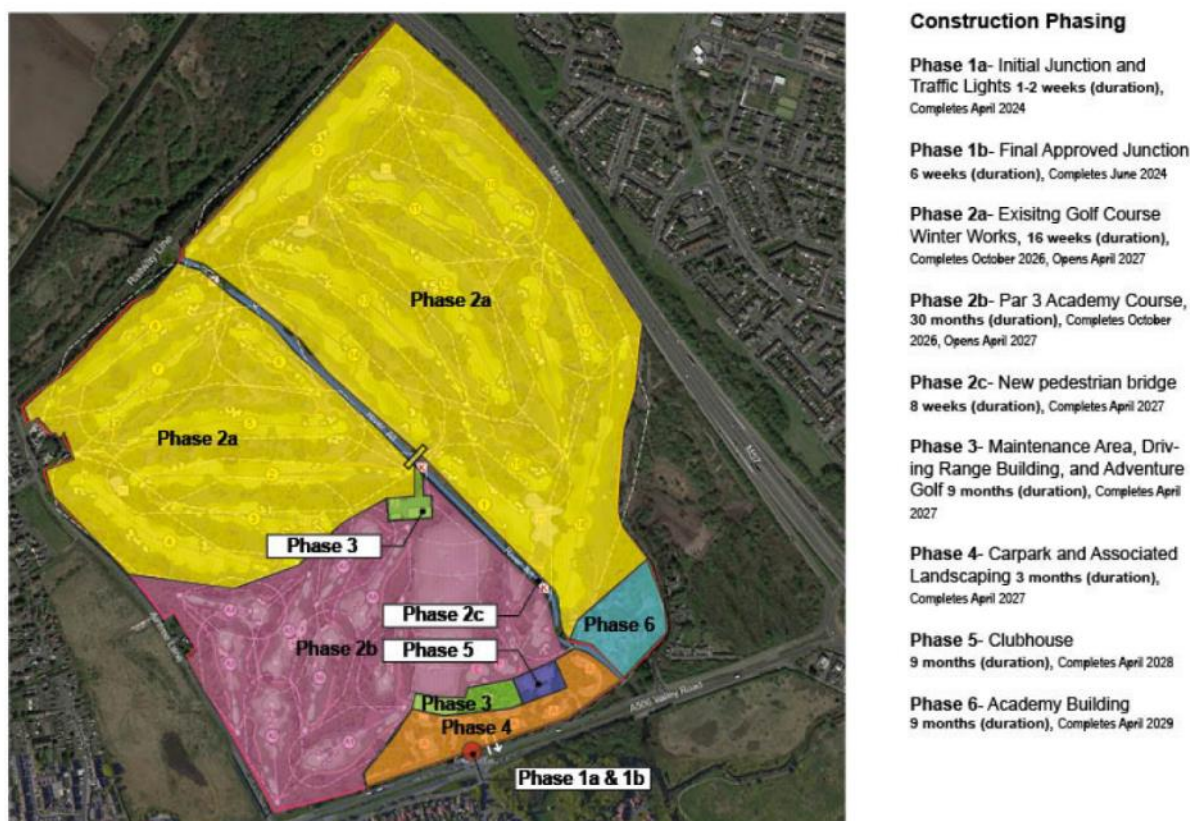
4.1.1 Information relating to the construction phase(s) is detailed in the Construction Method Statement (CMS) dated November 2023. The document sets out the proposed construction timeline, main construction phases and other relevant information.

4.2 Construction Phases

4.2.1 The construction works are to be phased over several years, with the construction of the revised access road and junction with Valley Road to be completed in April 2024. By April 2027 phases 2 to 4 would be completed. This includes works on the existing golf course, construction of the academy course and the car parking provision.

4.2.2 The phasing plan is detailed in Figure 7 of the CMS. This is presented as figure 4-1 below.

Figure 4-1: Construction Phasing Plan



4.2.3 Based on the above and the receptor locations detailed in Figure 1-1 above, the following can be derived:

AL01 – Receptors in this vicinity are more likely to be impacted during Phases 2a and 6 of the redevelopment. This includes works to the existing golf course (Phase 2a) and construction of the academy building (Phase 6);

AL02 – Phases 2a and 2b of the redevelopment may impact on this receptor location. This is assumed to be earthworks, etc., associated with the existing golf course and the academy course; and

AL03 – This receptor may be impacted by several phases, including Phases 1a and 1b (establishing the junction with Valley Road), Phase 2b earthworks for the academy course, and Phase 4 (car park works).

4.2.4 No specific details are provided of construction activities during each specific phase. However, the CMS does provide details on the plant likely used during the earthmoving operations. These include the following:

- Various excavators (from 2- to 23-tonne);
- Various dumper trucks (6- to 40-tonne);
- Bulldozers (13- and 48-tonne); and,
- Other equipment including front loading JCB and a small, mobile crane.

4.2.5 The details of where and when these plant items are likely to operate are not provided in the CMS.

4.2.6 The construction hours are expected to be:

- Monday to Friday 07:30 to 17:30hrs;
- Saturday 07:30 to 13:00hrs; and,
- No working on Sundays or Bank Holidays.

4.3 Construction traffic

4.3.1 Vehicle movements are to be controlled by a dedicated traffic management plan which is to govern vehicle movements during the various phases of the scheme.

4.3.2 Delivery hours are to be as follows:

- Monday to Friday 08:00 to 16:30hrs;
- Saturday 08:00 to 12:30hrs; and,
- No deliveries on Sundays and Bank Holidays.

4.3.3 Control measures will be in place both within the site and at the entrance/exit to minimise the impact of vehicle movements. Those measures include:

- Vehicle movements through the site would be limited to 5mph;
- No on-street parking for contractors or sub-contractors; and,
- Deliveries to/from the site would be programmed around peak traffic flow hours.

- 4.3.4 Vehicles exiting the site will have their wheels washed down to avoid materials being carried on to the local road network. In addition, a road sweeper will be in operation between the hours of 08:00 to 17:00, Monday to Friday.

4.4 Construction Mitigation

- 4.4.1 Aside from the control measures for traffic movements, the CMS includes several other measures to control the potential impact of noise arising from the site. These measures are detailed in Section 13 of the CMS and include:

- 2m high hoarding around the site; and,
- Site roads are to be well maintained and kept clean, presumably addressing any defects, etc., when identified.

- 4.4.2 In addition to the above, it is recommended that good site practice methods are followed during construction operations. There are several safeguards which exist to minimise the effects of construction noise, including:

- The various EC Directives and UK Statutory Instruments that limit noise emissions from construction plant;
- The guidance contained in BS5228-1:2009+A1:2014; and,
- The powers that exist for local planning authorities, under the relevant sections of the current version of the Control of Pollution Act, to control environmental noise and pollution on construction sites.

- 4.4.3 The following generic measures are given to illustrate the range of best practice techniques available. The adoption of Best Practicable Means, as defined by COPA, is usually the most effective means of controlling noise from construction sites. In addition, the following measures should be considered where appropriate:

- Strategic phasing of construction works to minimise potential impacts;
- Any compressors, etc., used on site should be silenced and fitted with acoustic enclosures or sound reduced models used;
- All pneumatic tools should be fitted with silencers/mufflers;
- Delivery vehicles should be prohibited from idling either within or outside the site;
- Care should be taken when unloading vehicles to avoid creating unnecessary noise;
- All plant items should be properly maintained and operated according to the manufactures' recommendations;
- Potential problems concerning construction noise can sometimes be avoided by taking a considerate and neighbourly approach to relations with nearby residents; and,
- Construction works should not be undertaken outside of the hours agreed with the Local Planning Authority.

4.5 Construction Thresholds

- 4.5.1 The guidance of BS5228 allows the derivation of appropriate noise thresholds at each receptor which can be implemented within a Construction Environmental Management Plan (CEMP).
- 4.5.2 The thresholds are derived using the methodologies detailed in Annex E of BS5228 and are presented in Table 4-1 below.

Table 4-1: Daytime Construction Noise Thresholds

Receptor	Average Measured dB L _{Aeq,T}	Column 2 rounded to the nearest 5dB "ABC Method", dB	BS5228 Methodology	
			"ABC" Method	" +5dB Change" Method
AL01 - Croxteth House	53.5	55	65	65
AL02 – Mathers Cottage	54.3	55	65	65
AL03 – 842 Moor Lane	59.1	60	65	65

- 4.5.3 Based on the existing ambient noise levels, the corresponding construction noise thresholds at all receptor locations would be 65dB L_{Aeq}.

4.6 Construction Noise Predictions

- 4.6.1 Some details of the construction programme have not been confirmed at this time including specifics of what plant would operate in which areas of the site, etc. That said, some indicative calculations are possible based on several assumptions.

Earthworks – Mobile Plant Calculations

- 4.6.2 Using the methodology detailed in section F.2.4 of BS5228 -1, calculations of noise arising from mobile plant working in a defined area can be calculated. These are considered indicative of earthmoving activities such as reprofiling the golf course.
- 4.6.3 The calculations assume an excavator and dozer were working at the closest point to the respective receptors, for approximately 5-hours, working over a traverse area of approximately 50m. No screening or reflections are included in the calculations.
- 4.6.4 Based on this, the following calculations can be made:

Table 4-2: Mobile Plant Construction Noise Calculations

Receptor Location	Plant Item	BS5228 Reference	Sound Pressure Level at 10m, dB	Distance, m	Distance Correction, dB ¹	Resultant L _p , dB	Traverse Distance, m	On-time Correction, dB ²	Activity, L _{Aeq} , 10h, dB	Total L _{Aeq} , 10h, dB
AL01	20t Dozer	Table C.2 ref 12	81	85	-18.6	62.4	50	-4	58.4	59.0
	15t Excavator	Table C.2 ref 24	73	85	-18.6	54.4	50	-4	50.4	
AL02	20t Dozer	Table C.2 ref 12	81	50	-14.0	67.0	50	-6	61.0	61.6
	15t Excavator	Table C.2 ref 24	73	50	-14.0	59.0	50	-6	53.0	
AL03	20t Dozer	Table C.2 ref 12	81	75	-17.5	63.5	50	-4	59.5	60.1
	15t Excavator	Table C.2 ref 24	73	75	-17.5	55.5	50	-4	51.5	
Notes 1) Distance correction calculated for hard ground. 2) Calculated using equation F5 in section F2.4.2 of BS5228										

- 4.6.5 The calculations above demonstrate that noise from mobile plant, undertaking earthworks at the golf course would fall well below the 65dB construction noise thresholds and require no additional noise mitigation measures.

Clubhouse and Academy Building – Static Plant

- 4.6.6 Phases 5 and 6 of the construction programme, completing in 2028 and 2029 respectively, will see the construction of the new clubhouse and works on the academy building. These structures would be located in the southern portion of the site, towards Valley Road.
- 4.6.7 Again, no specific details regarding their construction programme are available; however, it is likely to include some degree of ground works (foundations), the lifting of materials/structural elements and the use of smaller, localised plant, i.e., cement mixers, etc. It is assumed that no piling is required.
- 4.6.8 The calculations below are indicative of the noise levels generated by some construction plant which could be used in the construction of the clubhouse or academy building. Note, for brevity, calculations have been undertaken to receptor AL01, which is closer to the site of the academy building and is likely to be exposed to marginally higher construction noise levels than the other receptors.

Table 4-3: Static Plant Construction Noise Calculations

Plant Item	BS5228 Reference	Noise Level at 10m, dB	Assumed Distance, m	Distance Correction, dB	On-time	On-time Correction, dB	Resultant L_{Aeq} , dB
Excavator	Table C.2 Ref 24	73	70	-16.9	75%	-1.2	54.9
Concrete Pump	Table C.4 Ref 29	80	70	-16.9	75%	-1.2	61.9
Cement Mixer	Table C.4 Ref 29	61	70	-16.9	75%	-1.2	42.9
Mobile Crane	Table C.4 Ref 29	77	70	-16.9	75%	-1.2	58.9
Diesel Genset	Table C.4 Ref 29	74	70	-16.9	75%	-1.2	55.9

- 4.6.9 The calculations assume no screening between the noise source and receptors and include no reflections from vertical elements.
- 4.6.10 Table 4.3 demonstrates that static plant noise levels at the closest receptor would fall well below the identified noise thresholds (ref. Table 4-1). Evidently there is a reasonable possibility that multiple plant items may operate concurrently; however, in these instances the noise levels are not likely to exceed the 65dB threshold value.
- 4.6.11 Based on the results of the construction noise assessment, it is considered that specific mitigation measures to reduce potential noise impacts are not required. However, temporary localised acoustic screen barriers, such as Heras Acoustic Barriers, could be used to minimise the potential impact during closest approach operations.
- 4.6.12 Good site practices should be followed during the life of the construction works.

5 Assessment of Operational Noise

5.1 Operational Noise

- 5.1.1 The operational facilities are likely to include several noise generating activities including noise from vehicle movements in the car parking areas; noise from patrons using the facilities; and noise from any fixed/static plant associated with the club house and academy buildings. There is also the potential for noise from grounds keeping activities to impact on nearby residents; however, this is in keeping with the existing use and therefore unlikely to be significant.
- 5.1.2 Noise from actual golfing activities on the 18- and 9-hole courses is likely to be sporadic in nature and is unlikely to be audible beyond the site boundary. Noise from the driving range (impact noise from hitting of balls, etc.) is likely to be more consistent; however, given the distance between the site and receptors, and the enclosed nature of the driving bays, noise impacts are unlikely at any of the receptors.
- 5.1.3 Furthermore, the site has a history of use as a golf course and with that historic use, a degree of habituation to noise generated is assumed. To that end, noise from golfing activities is not considered in any detail in this noise report.

5.2 Car Park Vehicle Movements

- 5.2.1 The redeveloped facility is to include several car parking areas arranged to the south of the site, towards Valley Road. In total there are to be 257no. parking spaces. The largest car park area is to be located to the southeast of the site and serve the golf academy. Other, smaller car parks are located close to the clubhouse and the driving range buildings.
- 5.2.2 Vehicle movements in and around the car parking areas are likely to be sporadic and slow moving. Traffic data for the scheme indicates up to 986no. vehicle movements on the new access road, giving an estimated average of 99no. vehicle movements per hour (≈ 49 no. vehicles), assuming a 10-hour day.
- 5.2.3 The existing access via Ingoe Lane would see a marked reduction in vehicle movements though would still see approximately 280no. vehicle movements over the day. This is assumed to give an average of 28no. vehicle movements per hour (14no. vehicles).
- 5.2.4 In this assessment, the SEL of vehicles moving has been informed by Enzygo library data and is taken as being 78dB L_{AE} at 1m. This is empirical data established for vehicles moving slowly within a car park area, which is appropriate in this instance. The SEL is the noise level generated by the source (car movements), normalised to a 1-second reference period.
- 5.2.5 Based on the SEL above, the assumed number of vehicle movements per hour and the relative distances between the car parks and the identified receptors, the following noise levels can be calculated.

Table 5-1: Predicted Car Park Noise Levels

Receptor	SEL at 1m	Distance, m	Distance Attenuation, dB	SEL at Receptor, dB	No. of Movements	Assessment Period, sec	Specific Level at Receptor L_{Aeq} , dB
AL01	78.0	62	-17.9	60.1	14	3600	36.0
AL02	78.0	320	-25.1	52.9	49	3600	34.2
AL03	78.0	85	-19.3	58.7	49	3600	40.0

5.2.6 The noise levels predicted above are relatively low in absolute terms. The levels would generally fall well below the existing ambient (L_{Aeq}) noise levels at all receptors. Additionally, vehicle movements are already a significant contributor to the existing noise climate, therefore vehicle movements in the car park areas are unlikely to be audible over the prevailing noise climate and would not lead to any adverse noise impacts.

5.3 Static Plant

5.3.1 The clubhouse and academy building may include some degree of static plant, including kitchen plant (extraction, chillers), beer coolers and other, air conditioning/HVAC plant. In the absence of any detailed plant information, including the number, location, and operational noise levels of the plant, it is not possible to undertake specific calculations in line with BS4142. As such, noise limits are proposed based on the existing noise climate to advise future plant noise calculations.

5.3.2 As indicated in subsection 2.3 above, BS4142 considers parity with the 'typical' background noise level an indication of the noise source having a low impact, depending on the context. Given this, noise limits have been derived to achieve a 'low noise impact' at the identified receptors. Table 5-2 below demonstrates the noise limits for each receptor location. It is noted that the 'typical' background noise levels are taken as being the arithmetic average of the $L_{A90,15min}$ values during the respective periods.

Table 5-2: BS4142 Noise Limits

Receptor Location	Period	'Typical' Background noise level, L_{A90} , dB	Rating Noise Limit, L_{Ar} , dB
AL01	Daytime	53	53
	Night	46	46
AL02	Daytime	49	49
	Night	43	43
AL03	Daytime	51	51
	Night ¹	53	51 ²
Notes 1) Night-time noise levels taken from evening noise data. 2) Night-time noise limit based on typical daytime L_{A90} being lower than the evening value.			

5.3.3 The above limits are defined as rating noise limits indicating factors such as tonality, impulsivity and intermittency are considered, and a weighting factor applied where appropriate.

6 Conclusion

- 6.1.1 Enzygo Limited has been commissioned by Green Circle Estates Limited to undertake a noise impact assessment to support a planning application for the redevelopment of the Kirkby Valley Golf Course, off Valley Road, Knowsley near Liverpool.
- 6.1.2 This noise impact assessment has been undertaken to assess the potential impacts of the proposed development, in accordance with the relevant standards and guidance, at the nearest noise-sensitive receptors to the site, and to provide outline mitigation advice where necessary.

6.2 Noise Assessment Outcomes

- 6.2.1 The construction phase of the development is outlined in the Construction Method Statement in terms of the phasing plan, timescales, and likely equipment.
- 6.2.2 The construction phase assessments indicate noise thresholds at the nearest receptors of 65dB L_{Aeq} . Calculations during the earthworks and construction of the new facilities indicates these threshold values are readily achievable with no requirement for significant noise mitigation measures. Notwithstanding this, a range of Best Practical Means (BPM) are presented to ameliorate any impacts.
- 6.2.3 Given the historical use of the site as a golf course, receptors in the vicinity are assumed to have developed a degree of habituation to the type of noise generated by typical golfing activities, i.e., hitting balls, patrons walking and talking at conversational levels and general landscaping activities, etc. Given this, operational noise impacts considered in this assessment centre on the use of the parking facilities and fixed/static plant associated with the new buildings.
- 6.2.4 Noise from vehicles accessing the parking areas is relatively low in absolute terms and would fall well below the prevailing ambient (L_{Aeq}) noise climate. To that end, noise from vehicle movements is not likely to be readily audible and is unlikely to result in any adverse noise impacts.
- 6.2.5 No details on the number, location or operational noise levels of any fixed/static plant associated with the clubhouse or academy buildings is available at this time. As such, noise limits have been presented to ensure a 'low noise impact' if the limits are adhered to. It is recommended that additional plant calculations be undertaken once the plant complement has been confirmed.
- 6.2.6 Given the above, noise generated during the operational phase of the development is considered at the No Observed Adverse Effect Level (NOAEL) in accordance with the Planning Practice Guidance.

6.3 Overall

- 6.3.1 Given the above, it is demonstrated that there are no reasons on noise grounds why planning consent for the proposed development cannot be granted.

Glossary of Terminology

Noise is defined as unwanted sound. The range of audible sound is known to be from 0dB (threshold of hearing) to 140dB (threshold of pain). Examples of typical noise levels relating to 'everyday' occurrences are given in Table G-1 below.

Table G-1: Typical Noise Levels

Source	Sound Pressure Level in dB(A)	Subjective Level
Gun shot	160	Perforation of eardrum
Military Jet take-off	140	Threshold of pain
Jet Aircraft at 100m	120	Very Loud
Rock Concert, front seats	110	Threshold of Sensation
Pneumatic Drill at 5m	100	Very Loud
Heavy goods vehicle from pavement	90	
Traffic at kerb edge	70 – 85	Loud
Vacuum Cleaner, Hair Dryer	70	
Normal conversation at 1m	60	Moderate
Typical Office	50 – 60	
Residential area at night	40	Quiet
Rural area at night, still air	30	
Leaves Rustling	20	
Rubbing together of fingertips	10	
	0	Threshold of hearing

The frequency response of the human ear to noise is usually taken to be around 18Hz (number of oscillations per second) to 18,000Hz. However, the human ear does not respond equally to different frequencies at the same level; it is more sensitive in the mid-frequency range than lower and higher frequencies and, because of this when undertaking the measurement of noise, the low and high frequency components of any given sound are reduced in importance by applying a filtering (weighting) circuit to the noise measuring instrument. The weighting which is widely accepted to correlate best with the subjective nature of human response to noise and is most widely used to quantify this is the A-weighted filter set. This is an internationally accepted standard for noise measurement.

For variable noise sources within an area an increase of 3dB(A) would be the minimum perceptible to the human ear under normal conditions. It is generally accepted that an increase/decrease of 10dB(A) corresponds to a doubling or halving in perceived loudness. The 'loudness' of a noise is a purely subjective parameter, dependant not only upon the sound pressure of the event but also on the dynamics of the listener's ear, the time of the day and the general mood of the person.

With regards to environmental noise levels (in the open air), these are rarely steady but rise and fall according to the activities being undertaken within the surrounding area at any given time. Attempting produce a figure that relates this variable nature of noise to human subjective response, various statistical noise metrics have been developed. These and other useful terminology and descriptors are presented in Table G-2 below.

Table G-2: Terminology

Term	Definition
Sound	Pressure fluctuations in a fluid medium within the audible range of amplitudes and frequencies which stimulate the organs of hearing.
Noise	Unwanted sound emitted from a source and received by the sensitive receptor.
Decibel (dB)	Unit most often used to describe the sound pressure level. A logarithmic number, it correlates closely to the way in which humans perceive sound. Its wide range of values helps quantify sound pressures from a large variety of magnitudes.
A-Weighting (dB(A))	Human perception of sound is frequency dependant. A-weighting applies a range of corrections at each frequency to provide a 'human-averaged'. Can be frequency band or broadband values.
Frequency (Hz)	The number of cycles per second, for sound this is closely related (and often mistaken for) pitch.
Frequency Spectrum	A more detailed analysis of the frequency components that comprise a sound source.
L_{A10,T}	The 10 th statistical percentile of a measurement period, i.e., the level that is exceeded for 10% of the measurement duration. Closely correlates with traffic sources, A-weighted.
L_{A90,T}	The 90 th statistical percentile of a measurement period, i.e., the level that is exceeded for 90% of the measurement duration. Used to describe background sound levels, as this value is affected less by short, transient sound sources, A-weighted.
L_{Amax}	The root mean square (RMS) maximum sound pressure level within a measurement period, A-weighted.
Ambient Sound	The total sound climate of all noise sources incident at one location, both in the near- and far-field (<i>The ambient sound comprises the residual sound and the specific sound when present</i>).
Ambient Sound Level L_a = L_{Aeq,T}	Equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually from many sources near and far, at the assessment location over a given time interval, T.
Background Sound Level L_{A90,T}	A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels.
Equivalent Continuous A-weighted Sound	Value of the A-weighted sound pressure level in decibels of continuous steady sound that, within a specified time interval, T = t ₂ – t ₁ , has the same mean-squared sound pressure as a sound that varies with time, and is given by the following equation:

Term	Definition
Pressure Level $L_{Aeq,T}$	$L_{Aeq,T} = 10 \lg_{10} \left\{ \left(\frac{1}{T} \right) \int_{t_1}^{t_2} \left[p_A \frac{(t)^2}{p_0^2} \right] dt \right\}$ Where p_0 is the reference sound pressure (20μPA); and $p_A(t)$ is the instantaneous A-weighted sound pressure level at time t.
Measurement Time Interval T_m	Total time over which measurements are taken (<i>This may consist of the sum of several non-contiguous, short-term measurement time intervals</i>)
Rating level L_{Ar,T_r}	Specific sound level plus any adjustment for the characteristic features of the sound, over time, T .
Reference Time Interval, T_r	Specified interval over which the specific sound level is determined (This is 1hr during the day from 07:00 to 23:00 hours and a shorter period of 15-min at night from 23:00 to 07:00 hours).
Residual Sound	Ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound.
Residual sound level $L_r = L_{Aeq,T}$	Equivalent continuous A-weighted sound pressure level of the residual sound in a given situation at the assessment location over a given time interval, T .
Sound Pressure Level	The level of fluctuation in air pressure, caused by airborne sound sources. Measured in Pascals (Pa).
Sound Power Level	The rate at which sound is radiated by a source. This parameter is useful as it describes sound energy before environmental or decay factors. Quantified in dB and notated usually as L_w or SWL.
Specific sound level $L_s = L_{Aeq,T_r}$	Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given time interval, T .
Specific Sound Source	Sound source being assessed.

Statement of Uncertainty

This report is based upon a range of measurements, a system of calculations and noise predictions. As such, this report attempts to quantify fluctuations in air pressure and is subject to the effects of meteorology, physical and perceived anomalies, tolerances within the measuring and monitoring equipment and accuracy margins within the noise modelling software. In the interests of repeatability, this report must be considered as being affected by common factors involved in the measurement and calculation of noise propagation.

All measurement values, outcomes and assumptions are subject to a margin of uncertainty. This has been quantified and assessed as follows:

- Rounding errors – systemic tolerance of $\pm 1\text{dB}$;
- Meteorology – allowance of $\pm 1.9\text{dB}$; and
- CadnaA® noise propagation modelling software – operational accuracy of $\pm 2.1\text{dB}$

The most influential uncertainty factors for the assessment of noise are deemed to be equipment tolerances, meteorology and software accuracy. A root-sum-square statistical average has been used to provide an overall margin of uncertainty of $\pm 3\text{dB}$.

Statement of Competency

The assessment has been undertaken by Mr Mark Harrison, Principal Acoustic Consultant at Enzygo Limited. Mr Harrison holds a Bachelor of Science degree in Music Technology and a post graduate Diploma in Acoustics and Noise Control.

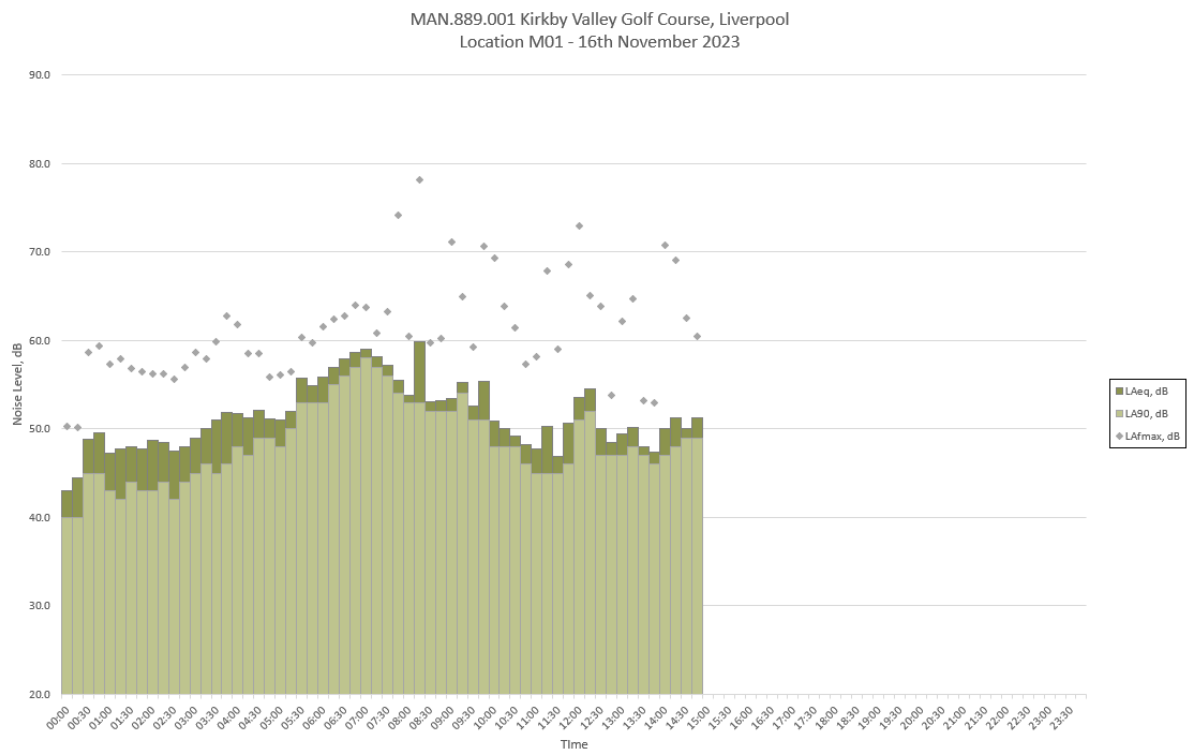
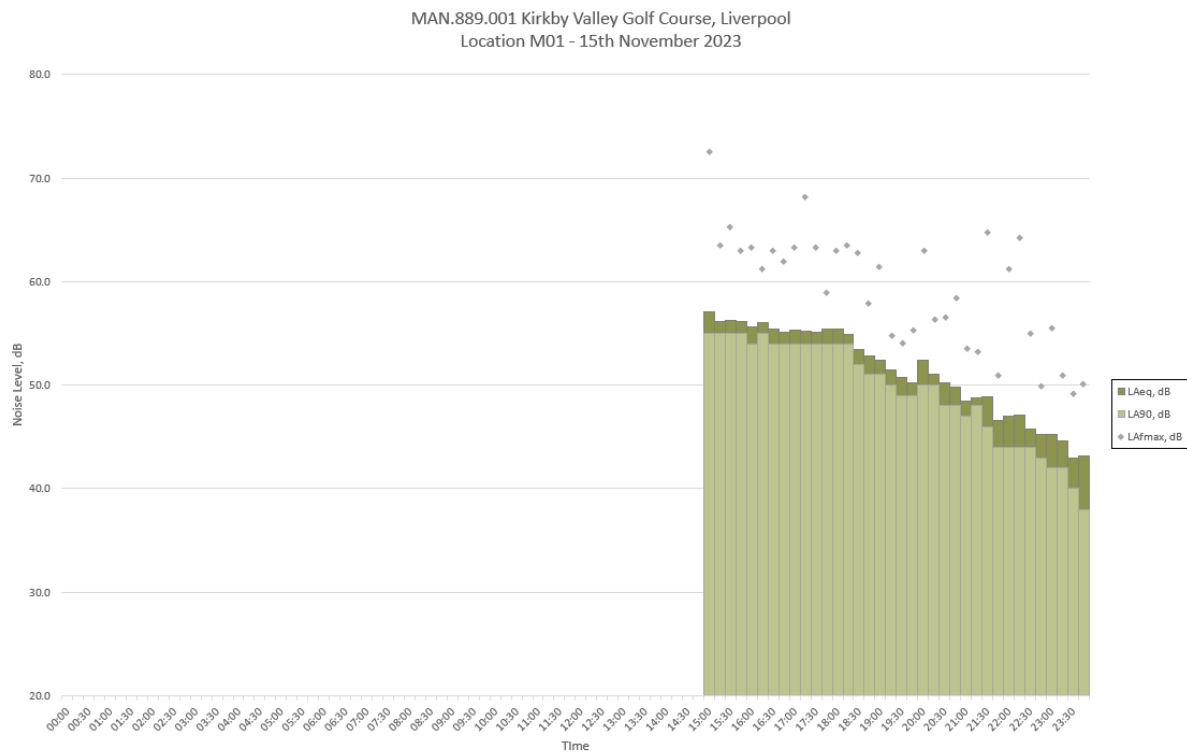
Mr Harrison has worked in acoustic consultancy since 2007 and has worked on noise and vibration assessments in several sectors including industrial / commercial developments; power generation and distribution; residential developments; transport schemes; and mineral extraction and processing.

The report has been prepared under the supervision of Mr. Darren Lafon-Anthony who is the Director of Acoustics at Enzygo Limited. Mr. Lafon-Anthony holds a Master of Science Degree in Applied Acoustics and has been a Corporate Member of the Institute of Acoustics since July 2004 having previously been an Associate Member of the institute since October 2001. Mr. Lafon-Anthony is also a Fellow of the Institute of Quarrying based on his contribution to minerals and mining noise assessment and mitigation, a qualification he has held since September 2014.

Mr. Lafon-Anthony has worked in acoustics since January 1981. Initially as an engineer designing and overseeing manufacture of noise control equipment for the water industry, standby power diesel generator and power generation markets for several noise control equipment manufacturers and, since February 2004, as an environmental noise consultant in various sectors, including mineral and mining sites, waste disposal and recycling sites, large industrial developments, energy supply projects (Efw, STOR and Battery Energy sites) and residential developments in the UK, Europe and sub-Saharan Africa.

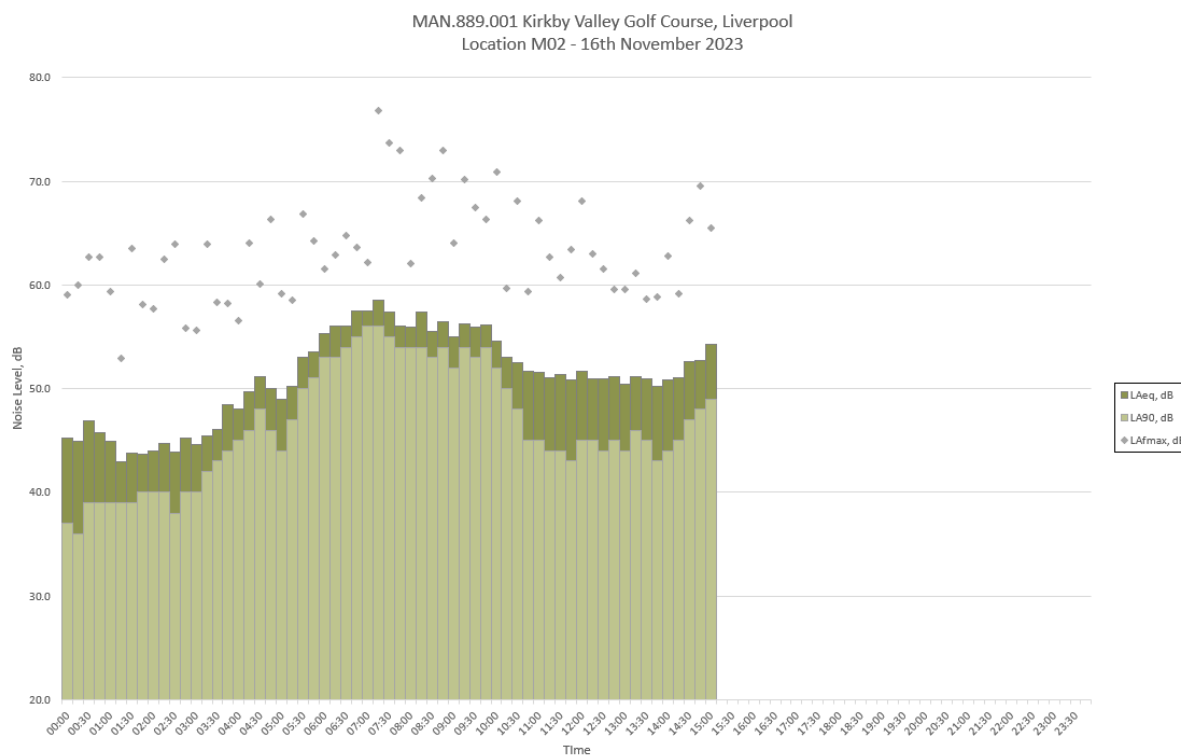
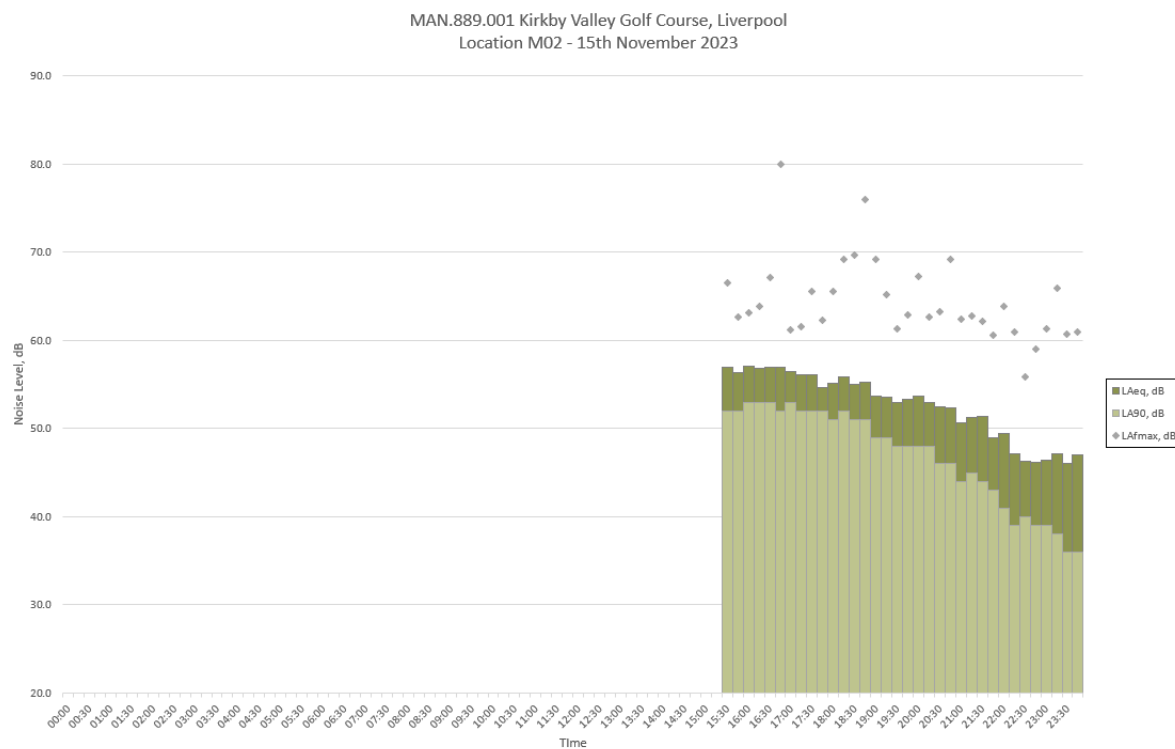
Appendix A – Baseline Noise Data

Monitoring Location M01



Period Start	L _{Aeq} dB	L _{Afmax} dB	L _{A10} dB	L _{A90} dB	Period Start	L _{Aeq} dB	L _{Afmax} dB	L _{A10} dB	L _{A90} dB
15/11/2023 15:00	57.1	72.6	58.1	55.0	16/11/2023 03:00	48.9	58.7	51.0	45.0
15/11/2023 15:15	56.1	63.5	57.0	55.0	16/11/2023 03:15	50.0	57.9	52.6	46.0
15/11/2023 15:30	56.2	65.4	57.2	55.0	16/11/2023 03:30	51.0	59.9	53.9	45.0
15/11/2023 15:45	56.1	63.0	56.8	55.0	16/11/2023 03:45	51.9	62.8	54.9	46.0
15/11/2023 16:00	55.6	63.2	56.6	54.0	16/11/2023 04:00	51.7	61.8	54.4	48.0
15/11/2023 16:15	56.0	61.3	56.7	55.0	16/11/2023 04:15	51.3	58.5	53.4	47.0
15/11/2023 16:30	55.4	63.1	56.3	54.0	16/11/2023 04:30	52.1	58.5	54.0	49.0
15/11/2023 16:45	55.1	62.0	55.8	54.0	16/11/2023 04:45	51.1	55.9	52.5	49.0
15/11/2023 17:00	55.3	63.2	56.3	54.0	16/11/2023 05:00	51.0	56.1	52.8	48.0
15/11/2023 17:15	55.2	68.0	56.0	54.0	16/11/2023 05:15	52.0	56.5	53.4	50.0
15/11/2023 17:30	55.1	63.3	55.9	54.0	16/11/2023 05:30	55.7	60.4	57.1	53.0
15/11/2023 17:45	55.4	58.8	56.2	54.0	16/11/2023 05:45	54.9	59.7	56.6	53.0
15/11/2023 18:00	55.4	63.0	56.3	54.0	16/11/2023 06:00	55.8	61.6	58.0	53.0
15/11/2023 18:15	54.9	63.5	55.6	54.0	16/11/2023 06:15	57.0	62.4	58.5	55.0
15/11/2023 18:30	53.4	62.6	54.3	52.0	16/11/2023 06:30	57.9	62.8	59.3	56.0
15/11/2023 18:45	52.8	57.9	53.7	51.0	16/11/2023 06:45	58.7	64.0	60.4	57.0
15/11/2023 19:00	52.4	61.5	53.3	51.0	16/11/2023 07:00	59.0	63.7	59.9	58.0
15/11/2023 19:15	51.5	54.7	52.4	50.0	16/11/2023 07:15	58.2	60.8	59.0	57.0
15/11/2023 19:30	50.7	54.1	51.8	49.0	16/11/2023 07:30	57.2	63.3	58.0	56.0
15/11/2023 19:45	50.2	55.2	51.1	49.0	16/11/2023 07:45	55.5	74.2	56.6	54.0
15/11/2023 20:00	52.4	63.0	54.8	50.0	16/11/2023 08:00	53.8	60.5	54.7	53.0
15/11/2023 20:15	51.1	56.4	52.2	50.0	16/11/2023 08:15	59.9	78.1	58.9	53.0
15/11/2023 20:30	50.2	56.6	51.4	48.0	16/11/2023 08:30	53.1	59.7	54.1	52.0
15/11/2023 20:45	49.8	58.4	51.4	48.0	16/11/2023 08:45	53.2	60.2	54.8	52.0
15/11/2023 21:00	48.5	53.6	49.7	47.0	16/11/2023 09:00	53.4	71.1	54.4	52.0
15/11/2023 21:15	48.8	53.2	49.7	48.0	16/11/2023 09:15	55.3	65.0	56.2	54.0
15/11/2023 21:30	48.9	64.7	49.7	46.0	16/11/2023 09:30	52.6	59.3	53.3	51.0
15/11/2023 21:45	46.6	51.0	47.9	44.0	16/11/2023 09:45	55.4	70.7	56.9	51.0
15/11/2023 22:00	47.0	61.1	48.2	44.0	16/11/2023 10:00	50.9	69.3	51.7	48.0
15/11/2023 22:15	47.1	64.2	48.3	44.0	16/11/2023 10:15	50.1	63.9	51.2	48.0
15/11/2023 22:30	45.8	55.0	47.1	44.0	16/11/2023 10:30	49.2	61.4	50.1	48.0
15/11/2023 22:45	45.2	49.8	46.5	43.0	16/11/2023 10:45	48.2	57.3	49.6	46.0
15/11/2023 23:00	45.2	55.6	46.7	42.0	16/11/2023 11:00	47.7	58.2	49.2	45.0
15/11/2023 23:15	44.6	51.0	46.7	42.0	16/11/2023 11:15	50.3	67.8	51.1	45.0
15/11/2023 23:30	43.0	49.0	44.8	40.0	16/11/2023 11:30	46.9	59.0	48.1	45.0
15/11/2023 23:45	43.2	50.2	45.6	38.0	16/11/2023 11:45	50.7	68.6	52.6	46.0
16/11/2023 00:00	43.0	50.3	45.5	40.0	16/11/2023 12:00	53.5	73.0	54.4	51.0
16/11/2023 00:15	44.5	50.2	46.7	40.0	16/11/2023 12:15	54.5	65.1	55.7	52.0
16/11/2023 00:30	48.8	58.6	50.9	45.0	16/11/2023 12:30	50.1	63.9	52.1	47.0
16/11/2023 00:45	49.5	59.4	52.2	45.0	16/11/2023 12:45	48.5	53.8	49.3	47.0
16/11/2023 01:00	47.2	57.3	49.9	43.0	16/11/2023 13:00	49.4	62.1	51.1	47.0
16/11/2023 01:15	47.7	57.9	50.8	42.0	16/11/2023 13:15	50.2	64.7	50.8	48.0
16/11/2023 01:30	48.0	56.8	50.8	44.0	16/11/2023 13:30	48.0	53.2	49.1	47.0
16/11/2023 01:45	47.7	56.5	50.3	43.0	16/11/2023 13:45	47.4	53.0	48.5	46.0
16/11/2023 02:00	48.7	56.2	51.5	43.0	16/11/2023 14:00	50.1	70.8	51.8	47.0
16/11/2023 02:15	48.5	56.2	51.3	44.0	16/11/2023 14:15	51.3	69.1	53.8	48.0
16/11/2023 02:30	47.5	55.6	50.3	42.0	16/11/2023 14:30	50.1	62.5	51.2	49.0
16/11/2023 02:45	48.0	57.0	50.6	44.0	16/11/2023 14:45	51.2	60.5	52.3	49.0

Monitoring Location M02



Period Start	L _{Aeq} dB	L _{Afmax} dB	L _{A10} dB	L _{A90} dB	Period Start	L _{Aeq} dB	L _{Afmax} dB	L _{A10} dB	L _{A90} dB
15/11/2023 15:30	57.0	66.5	59.5	52.0	16/11/2023 03:45	48.4	58.2	50.9	44.0
15/11/2023 15:45	56.4	62.6	58.9	52.0	16/11/2023 04:00	48.0	56.5	50.1	45.0
15/11/2023 16:00	57.1	63.1	59.5	53.0	16/11/2023 04:15	49.7	64.0	52.0	46.0
15/11/2023 16:15	56.8	63.8	58.9	53.0	16/11/2023 04:30	51.2	60.1	53.7	48.0
15/11/2023 16:30	57.0	67.1	58.9	53.0	16/11/2023 04:45	50.0	66.3	52.7	46.0
15/11/2023 16:45	56.9	80.0	59.0	52.0	16/11/2023 05:00	49.0	59.2	51.9	44.0
15/11/2023 17:00	56.5	61.2	58.5	53.0	16/11/2023 05:15	50.2	58.5	52.1	47.0
15/11/2023 17:15	56.1	61.5	58.3	52.0	16/11/2023 05:30	53.0	66.8	55.1	50.0
15/11/2023 17:30	56.1	65.5	58.1	52.0	16/11/2023 05:45	53.5	64.2	55.6	51.0
15/11/2023 17:45	54.6	62.3	56.6	52.0	16/11/2023 06:00	55.3	61.5	57.0	53.0
15/11/2023 18:00	55.1	65.6	57.5	51.0	16/11/2023 06:15	56.0	62.9	57.8	53.0
15/11/2023 18:15	55.9	69.2	58.1	52.0	16/11/2023 06:30	56.0	64.8	57.6	54.0
15/11/2023 18:30	55.0	69.7	57.0	51.0	16/11/2023 06:45	57.5	63.6	59.0	55.0
15/11/2023 18:45	55.3	76.0	56.7	51.0	16/11/2023 07:00	57.5	62.2	58.9	56.0
15/11/2023 19:00	53.7	69.2	56.0	49.0	16/11/2023 07:15	58.5	76.8	59.1	56.0
15/11/2023 19:15	53.6	65.2	56.1	49.0	16/11/2023 07:30	57.4	73.7	58.6	55.0
15/11/2023 19:30	53.0	61.3	55.7	48.0	16/11/2023 07:45	56.0	73.0	56.8	54.0
15/11/2023 19:45	53.3	62.9	55.9	48.0	16/11/2023 08:00	55.9	62.1	57.5	54.0
15/11/2023 20:00	53.7	67.2	56.3	48.0	16/11/2023 08:15	57.4	68.4	58.9	54.0
15/11/2023 20:15	53.0	62.7	56.1	48.0	16/11/2023 08:30	55.5	70.3	56.7	53.0
15/11/2023 20:30	52.5	63.3	55.9	46.0	16/11/2023 08:45	56.4	73.0	58.2	54.0
15/11/2023 20:45	52.4	69.2	55.1	46.0	16/11/2023 09:00	55.0	64.0	56.7	52.0
15/11/2023 21:00	50.6	62.4	53.8	44.0	16/11/2023 09:15	56.2	70.2	57.6	54.0
15/11/2023 21:15	51.3	62.8	54.7	45.0	16/11/2023 09:30	55.9	67.5	57.3	53.0
15/11/2023 21:30	51.4	62.1	54.8	44.0	16/11/2023 09:45	56.1	66.3	57.7	54.0
15/11/2023 21:45	49.0	60.6	52.5	43.0	16/11/2023 10:00	54.6	70.9	56.2	52.0
15/11/2023 22:00	49.4	63.8	53.0	41.0	16/11/2023 10:15	53.0	59.7	55.2	50.0
15/11/2023 22:15	47.1	61.0	51.4	39.0	16/11/2023 10:30	52.5	68.1	54.8	48.0
15/11/2023 22:30	46.3	55.8	50.2	40.0	16/11/2023 10:45	51.7	59.4	54.5	45.0
15/11/2023 22:45	46.2	59.0	50.5	39.0	16/11/2023 11:00	51.6	66.2	54.3	45.0
15/11/2023 23:00	46.4	61.3	50.5	39.0	16/11/2023 11:15	51.0	62.7	54.1	44.0
15/11/2023 23:15	47.1	65.9	50.0	38.0	16/11/2023 11:30	51.4	60.7	54.2	44.0
15/11/2023 23:30	46.1	60.7	49.6	36.0	16/11/2023 11:45	50.8	63.4	53.9	43.0
15/11/2023 23:45	47.0	60.9	51.0	36.0	16/11/2023 12:00	51.7	68.1	54.3	45.0
16/11/2023 00:00	45.2	59.0	48.6	37.0	16/11/2023 12:15	50.9	63.0	53.9	45.0
16/11/2023 00:15	44.9	60.0	48.2	36.0	16/11/2023 12:30	50.9	61.5	53.8	44.0
16/11/2023 00:30	46.9	62.7	49.4	39.0	16/11/2023 12:45	51.1	59.6	54.0	45.0
16/11/2023 00:45	45.7	62.7	48.8	39.0	16/11/2023 13:00	50.4	59.6	53.4	44.0
16/11/2023 01:00	44.9	59.4	47.9	39.0	16/11/2023 13:15	51.2	61.1	53.8	46.0
16/11/2023 01:15	42.9	52.9	45.3	39.0	16/11/2023 13:30	50.9	58.6	54.2	45.0
16/11/2023 01:30	43.8	63.5	45.7	39.0	16/11/2023 13:45	50.2	58.8	53.4	43.0
16/11/2023 01:45	43.7	58.1	45.9	40.0	16/11/2023 14:00	50.8	62.8	53.9	44.0
16/11/2023 02:00	44.0	57.7	46.2	40.0	16/11/2023 14:15	51.0	59.1	54.2	45.0
16/11/2023 02:15	44.7	62.5	47.0	40.0	16/11/2023 14:30	52.6	66.2	54.8	47.0
16/11/2023 02:30	43.9	63.9	46.7	38.0	16/11/2023 14:45	52.7	69.5	55.1	48.0
16/11/2023 02:45	45.2	55.8	48.1	40.0	16/11/2023 15:00	54.3	65.5	56.8	49.0
16/11/2023 03:00	44.6	55.6	46.8	40.0	16/11/2023 15:15	0.0	0.0	0.0	0.0
16/11/2023 03:15	45.4	63.9	47.8	42.0	16/11/2023 15:30	0.0	0.0	0.0	0.0
16/11/2023 03:30	46.1	58.3	48.1	43.0	16/11/2023 15:45	0.0	0.0	0.0	0.0

Monitoring Location M03

Start date & time	L _{Aeq,T_r} dB	L _{AFmax_r} dB	L _{A90,T_r} dB
16/11/2023 11:00	58	72	50
16/11/2023 11:15	59	68	50
16/11/2023 11:30	60	83	50
16/11/2023 11:45	59	68	51
16/11/2023 12:00	59	74	51
16/11/2023 12:15	59	69	51
16/11/2023 12:30	59	68	51
16/11/2023 12:45	59	67	51
16/11/2023 13:00	58	71	52
16/11/2023 13:15	59	68	53
16/11/2023 13:30	59	67	51
16/11/2023 13:45	61	87	51
Start date & time	L _{Aeq,T_r} dB	L _{AFmax_r} dB	L _{A90,T_r} dB
16/11/2023 21:00	58	67	54
16/11/2023 21:15	58	65	52
16/11/2023 21:30	59	81	52
16/11/2023 21:45	57	65	53
16/11/2023 22:00	58	77	52
16/11/2023 22:15	58	67	53
16/11/2023 22:30	57	72	52
16/11/2023 22:45	58	66	52



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