Contents – Noise & Acoustics

1. Introduction

1.1 The Application Site lies within the administrative boundary of Cherwell District Council (CDC) in the village of Yarnton, approximately 6km to the northwest of Oxford. It is bordered to the north and east by the A44 Woodstock Road and to the south by Cassington Road. The west of the Application Site is made up of greenfield land. The Application Site is proposed to be developed to provide up to circa 540 new dwellings, elderly / extra care residential floorspace and a community home work hub, together with associated green infrastructure, meadowland and community woodland.

1.2 The Application Site is also 1 km south of London Oxford airport, with aircraft passing approximately 400 m to the west of the Application Site, on approach or take off, depending upon wind direction.

1.3 It is therefore necessary to ensure that sound from traffic on Woodstock Road, or from passing aircraft, does not adversely affect the amenity of residents of the new dwellings.

1.4 As part of the development, a new sports field will be provided for William Fletcher Primary School, to the south of the Applicaiton Site. It is therefore also important to ensure that residents of existing dwellings along Rutten Lane, adjacent to where the sports field will be located, are not disturbed by noise associated with use of the sports field.

1.5 Acoustical Control Consultants has therefore been instructed to undertake appropriate acoustic surveys and analysis, in order to inform the design process of the proposed development, and to support the application through the planning process.

2. Scope

2.1 This acoustic assessment has informed the design of the development to ensure that residents of the proposed dwellings will benefit from good acoustic amenity and that the development will not adversely affect the amenity of residents of existing dwellings in the vicinity of the Application Site. In order to do this, the acoustic assessment has been undertaken in stages as the proposed development has evolved. The scope of this acoustic assessment therefore comprises:

2.1.1. a preliminary review of the proposed development to inform an initial acoustic survey.

2.1.2. an initial acoustic survey to inform assessment of the suitability of the site for the proposed development.

2.1.3. an assessment of the acoustic environment of the site to provide preliminary acoustic design advice for the proposed development.

2.1.4. an acoustic survey to better understand the acoustic environment of the complete site in order to provide more detailed acoustic design advice for the proposed development.

2.1.5. an assessment of the acoustic environment within the entire development site to provide more specific design advice for the proposed development.

2.1.6. a written acoustic assessment to support the planning application for the proposed development.

3. Site Description

3.1 The Application Site is a single parcel of primarily open farmland comprising approximately 99 hectares lying to the west and north of Yarnton. The north-eastern edge of the allocated area is defined by the built-up edge of Rutten Lane and Woodstock Road (A44).

3.2 Yarnton Medical Practice and associated car park lies within the allocation, although no changes to the Medical Practice itself are proposed.

3.3 The southern boundary runs adjacent to the access road serving both William Fletcher School and Yarnton Residential and Nursing Home. It then runs adjacent to College Mead and incorporates Hill Farm and some limited frontage to Cassington Road. The south west boundary is formed by Frogwelldown Lane.

3.4 To the north, the edge of the allocation is formed by Begbroke Wood, a designated ancient woodland. The boundary is then defined by Dolton Lane bridleway before turning through open farmland back to the A44.

3.5 The main acoustic features in the vicinity of the site are Woodstock Road, a 50mph restricted dual-carriageway, adjacent to much of the eastern site boundary; London Oxford airport, approximately 1 km to the north of the site, with aircraft heading north-south on departure and when landing, passing approximately 400m to the west of the site; the Cotswold railway line which connects Oxford and Hereford, running approximately 1 km to the south west of the site; and William Fletcher Primary School to the south of the site.

3.6 It is proposed that the eastern part of the site be used for residential development, with the western part providing meadowland and community woodland. This means that some of the proposed dwellings will be exposed to noise from traffic on Woodstock Road, but the dwellings will be relatively distant from the Oxford airport flight path.

3.7 The easternmost dwellings will be set back some distance from Woodstock Road so that they are a similar or greater distance from the road than other existing dwellings along both sides of Woodstock Road to

the south and north of the site. In addition to providing acoustic separation distance between Woodstock Road and the easternmost dwellings of the development, the buffer strip can also incorporate some acoustic screening between the road and the closest dwellings.

3.8 The easternmost dwellings will be the tallest buildings of the development. This means that they will provide acoustic screening to Woodstock Road, protecting the remainder of the site from this source of environmental noise.

3.9 As part of the development, a new sports field will be provided at the south eastern corner of the site, for William Fletcher Primary School. This will be specifically for school use, so will be used principally during school hours, with relatively limited levels of activity and associated noise, in comparison to a community sports facility.

3.10 The eastern boundary of the sports field will be adjacent to the ends of the gardens of dwellings along Rutten Lane at a similar elevation to these gardens in the south east corner, rising to about 1 m above the gardens' elevations to the north east corner of the sports field. The elevation of the sports field will rise to the west at increasing distance from these dwellings. The potential acoustic impact due to use of this sports field, at neighbouring dwellings along Rutten Lane will be considered as part of this acoustic assessment.

3.11 The development will incorporate two LEAPs (Local Equipped Area for Play) and one larger NEAP (Neighbourhood Equipped Area for Play). These can be a source of noise due to children making use of the play equipment, so will also be considered as part of this acoustic assessment.

4. Acoustic Surveys

4.1 Two separate fully attended site visits and acoustic surveys have been undertaken in September 2017 and January 2019 to inform this acoustic assessment. The results are still considered robust and sufficient for this stage of the assessment. There have not been opportunities to obtain any additional representative data since the most recent survey due to the restrictions in place in response to the Covid-19 pandemic. It is expected that some additional data may be gathered as part of the detailed design of the scheme, to inform detail design issues. Figure 4.1 shows the measurement locations used for both of these surveys.

Figure 4.1 Acoustic Survey Measurement Locations

First Survey: A – C. Second Survey 1 – 5

4.2 Measurements were taken at a height of approximately 1.2 m above ground and at least 3.5 m away from reflective surfaces, in line with the

requirements of the relevant environmental sound measurements standards including BS 7445. Operational reference checks were undertaken, using the calibrators, before and after the measurements were taken. The instruments displayed a negligible drift in calibration. In addition to the on-site operational check the instrumentation holds valid calibration certificates, which are available on request.

First Acoustic Survey

4.3 The first acoustic survey was carried out on Wednesday 13th and Thursday 14th September 2017 by Vince Taylor BSc (Hons), MSc, AMIOA.

4.4 Sound pressure level measurements were taken to assist with characterising the acoustic environment due primarily to traffic on Woodstock Road, which is the most significant acoustic source in the vicinity of the site, during both the daytime and night-time periods. Measurements were taken at different times and three different locations to inform acoustic modelling of sound levels due to the road traffic.

Instrumentation

- B&K Modular precision sound analyser type 2250, Serial No. 2626249
- B&K Calibrator Type 4231, Serial No. 2309678
- B&K Windshield
- Rion 1/3 Octave Band Analyser Type NA-28, Serial No. 01070575
- Rion Sound Calibrator Type NC-74, Serial No. 35173526
- Rion Windshield
- Skywatch Meteos Anemometer

4.5 Weather conditions were logged throughout the survey. The temperature was approximately 10°C to 15°C, with no to light cloud cover, a northerly breeze of between 0 and 2ms^{-1}, and dry ground surfaces.

4.6 It is considered that the local weather conditions at the time of the survey were within the limits set out in the relevant guidance e.g. BS 7445 and appropriate for measurements to be taken.

4.7 Graphs 1 to 3, in Appendix 1, shows the results of the measurements undertaken during the first survey, which are summarised in Table 4.1 below.

4.8 Throughout all these survey periods the soundscape was dominated by road traffic. Distant road traffic provided an underlying, relatively constant source with local traffic superimposed upon this.

4.9 Table 4.1 summarises the results of these measurements.

Table 4.1 Summary of First Acoustic Survey Results providing Key Acoustic Parameters at Positions 1 & 2

	Position 1	Position 2
$L_{A10,3h}$	69	70
$L_{A10,18h}$	68	69
L_{day}	66	67
L_{night}	57	58

Second Acoustic Survey

4.10 The second acoustic survey was carried out on Tuesday 15th and Wednesday 16th January 2019 by Louis Riley BSc (Hons) AMIOA. Five different measurement locations around the site were identified based on a detailed review of the acoustics features of the area and the proposed layout of the Application Site to provide a better understanding of the acoustic characteristics of the site. Measurements were taken simultaneously at multiple locations to provide a better understanding of the variation in sound level around the site.

Instrumentation

- Cirrus Optimus Sound Level Analyser Type CR 171, Serial No. G056106
- Cirrus Calibrator Type CR 515, Serial No. 70553
- Cirrus Windshield
- Cirrus Optimus Sound Level Analyser Type CR 171B, Serial No. G068809
- Cirrus Calibrator Type CR 515, Serial No. 73201
- Cirrus Windshield
- Rion 1/3 Octave Band Analyzer Type NL-52, Serial No. 00142667
- Rion Sound Calibrator Type NC-74, Serial No. 35173526
- Rion Windshield
- Skywatch Meteos Anemometer

4.11 Weather conditions were logged throughout the survey periods. The temperature was approximately 8°C to 10°C, with approximately 75%

cloud cover, an approximately easterly/ south easterly breeze of between 2 and 3 ms^{-1}, and damp ground surfaces.

4.12 The local weather conditions at the time of the survey were within the limits set out in the relevant guidance e.g. BS 7445 and appropriate for measurements to be taken.

4.13 Graphs 1 to 14, in Appendix 2, show the results of the measurements undertaken during the second survey which are summarised in Table 4.2 below.

4.14 Throughout nearly all of the survey periods the soundscape was dominated by road traffic. Distant road traffic provided an underlying, relatively constant source with local traffic superimposed on top of this. At MP2 to the north west of the site, distant road traffic was one of the most significant contributors to the acoustic environment during the evening and night time survey periods but, during the morning, aircraft frequently flew past whilst taking off, typically producing levels of up to around 75 to 80 dBA in this vicinity. It should be noted that this position is approximately 400m from the runway centreline, whereas the other measurement locations are approximately twice this distance or further away.

4.15 Table 4.2 provides a summary of the average sound levels during the different measurement periods around the site.

Table 4.2 - Summary of Average Sound Levels during Second Acoustic Survey

Location		Morning (dB LAeq)	Evening (dB LAeq)	Night (dB LAeq)	Notes
MP1	20m from A44	60 - 61	55 - 57	46 - 49	Road traffic dominant
MP2	NW of site	49 - 55	38	37 - 38	Aircraft dominant during morning
MP3	SE Corner of Site	49 - 55	40	36 - 37	Aircraft, road traffic, activity & school all significant sources
MP4	Eastern Site boundary along Rutten Lane	50	39	36 - 39	
MP5	Western Site boundary, west of		39	37 - 39	

	MP4				

5. Acoustic Design Principles & Criteria

National Planning Policy Framework (NPPF), Noise Policy Statement for England (NPSE) and National Planning Practice Guidance (NPPG)

5.1 There is a presumption in favour of sustainable development, and assessments should be proportionate to the proposed development. Local planning authorities should consider whether otherwise unacceptable development could be made acceptable through the use of conditions or planning obligations.

5.2 Below the No Observed Effect Level (NOEL) sound is unnoticeable and of no significance. Below the Lowest Observed Adverse Effect Level (LOAEL) sound may be heard but does not cause any changes in behaviour or attitude, although the acoustic character of the area may be slightly changed. Below the Significant Observed Adverse Effect Level (SOAEL) sound may cause slight changes in behaviour or attitude e.g. turning up volume of a television or closing windows. There is potential for some sleep disturbance and a perceived change in the acoustic character of the area and quality of life.

5.3 Areas of Tranquillity should be protected, but in general cases it may be inappropriate to achieve a level below the LOAEL as this provides no benefit but may require additional resources such as energy, materials, space, time and money, adversely affecting the sustainability of doing so. Noise above the LOAEL should be mitigated and reduced to a minimum, although it may be appropriate to exceed the LOAEL and create an adverse acoustic impact, if this provides other sustainability benefits that are of greater significance. Noise above the SOAEL should be avoided.

World Health Organisation

5.4 The WHO publication ‘Guidelines for Community Noise’ provides guidance regarding suitable levels of noise that will protect vulnerable groups against sleep disturbance. A steady level of 30dBA in bedrooms, with maximum internal event levels of 45dBA are identified as being suitable to achieve this, which in terms of this assessment is considered to be the LOAEL threshold.

5.5 The difference between a sound level outdoors and the resultant level indoors with open windows varies through Europe due to differing building characteristics and particularly window type. An average difference of around 15dBA is often used, although this is also dependent upon other factors such as the frequency spectrum of the incident sound.

5.6 This means that the corresponding targets for the night-time noise level outdoors are steady levels of up to about 45dBA and maxima of up to around 60dBA.

5.7 The more recent WHO guidance ‘Night Noise Guidelines for Europe’ is more concerned with the longer term average noise levels that are covered by the EU Directive on Environmental Noise, although this does appear to suggest slightly lower external maximum noise levels of around 57dB(A) outside bedrooms during the night.

British Standard 8233:2014

5.8 British Standard 8233:2014 Guidance on sound insulation and noise reduction in buildings, sets out guidance in respect of indoor ambient noise level suitable for protecting residential amenity throughout the daytime and night-time periods. These levels presented within Table 4 of the standard are considered to be the LOAEL threshold and are based upon the wider guidance presented in multiple World Health Organization publications.

5.9 NOTE 7 from section 7.7.2 of BS8233:2014 states that “where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved”.

5.10 NOTE 4 states that “Regular individual noise events (for example, …, passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or LAmax, depending on the character and number of events per night. Sporadic noise events could require separate values.”

5.11 The previous edition of BS8233 included quantitative guidance with respect to night-time LAmax noise levels in bedrooms in order to protect against sleep disturbance. However, BS8233:2014 does not provide any specific guidance. Guidance from the WHO indicates that the LOAEL threshold for sleep disturbance from regular short duration events is around 45 dB LAmax,inside and will form the criterion for typical noise events occurring throughout the night-time. Other occasional one-off noise events may exceed this threshold without disturbing sleep.

5.12 Section 7.7.3.2 of BS8233:2014 indicates that for traditional external amenity areas it is desirable that external noise levels should not exceed 50 dB LAeq,T with an upper guideline of 55dB LAeq,T. The upper guideline value is considered to be the onset of adverse effect above which mitigation should be introduced.

5.13 However, section 7.7.3.2 also states that “these guideline values are not achievable in all circumstances where development might be desirable. In higher noise area, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise level and other factors, …, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.”

5.14 This implies that whilst good acoustic design with the intent to provide noise sensitive developments with outdoor amenity spaces may be possible, external noise levels should not be the defining factor by which suitability is assessed and that the levels presented within BS8233:2014 should be treated as triggers where reasonable measures to minimise the noise level should be implemented.

Local Authority Guidance/ Policy

5.15 The Cherwell Local Plan 2011 – 2031 document adopted on 20 July 2015 contains a number of policies that reference noise, specifically in relation to the development of areas in the borough.

5.16 A common thread within these noise policies is the need to consider the design and layout of the development in order to manage and mitigate potential noise. The implementation of buffers, screens, and barriers to protect the amenity of the future users of the developments should also be considered, and for the utilisation and selection of such measures to be reviewed as part of a formal acoustic assessment.

5.17 Policies for other developments that are located in close proximity to, or adjacent to major roadways make specific mention of the potential impact of road traffic noise on future occupiers, and to ensure the potential impact is considered and to utilise mitigation measures to ensure that this impact is reduced to an acceptable level.

Acoustic Criteria

5.18 BS8233:2014 and ProPG indicate desirable internal average sound levels of 35 dBA for living rooms during the day and 30 dBA for bedrooms at night. For dining areas during the day, the criterion is 5 dBA higher than living rooms. Allowing a conservative differential of 10 dBA for windows partly open to provide ventilation, these equate to external free field sound levels of 45 dBA, or 50 dBA for dining areas during the day, and 40 dBA for bedrooms during the night respectively.

5.19 BS8233 also notes ‘where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved’. It also states that ‘For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB LAeq,T, with an upper guideline value of 55 dB LAeq,T which would be acceptable in noisier environments’.

5.20 To summarise these guidelines, it is desirable to achieve external free field day and night time average sound levels of around 45 dBA outside living rooms and 50 dBA for other outdoor amenity areas during the day, and 40 dBA outside bedroom windows during the night.

5.21 However, for aircraft noise a considerable amount of research has been carried. In CAP 1165 it is stated that 57 dBA Leq relates to the onset of annoyance as established by noise measurements and social surveys in the UK. This indicates an upper limit of 57dBA due to aircraft noise for areas to be used for dwellings, or external amenity space.

ProPG: Planning & Noise

5.22 ProPG: Planning & Noise, released in 2017 under a working group formed by the Association of Noise Consultants, Institute of Acoustics and the Chartered Institute of Environmental Health, provides guidance on planning and noise for new residential development.

5.23 The primary goal is to assist the delivery of sustainable development by promoting good health and wellbeing through the effective management of noise. ProPG uses the guidance provided in BS 8233 as the basis of achieving suitable internal and external sound levels.

5.24 ProPG: Planning & Noise advocates the use of holistic good acoustic design through all stages of the design and planning of new residential developments and presents a framework for assessment split into two stages, Initial Appraisal and Full Assessment.

5.25 For Stage 1 an initial noise risk assessment of the proposed development site is carried out. The noise risk assessment should identify whether the proposed site is considered to pose a negligible, low, medium or high risk from a noise perspective.

5.26 The outcome of this initial assessment is then used to inform Stage 2, which is a systematic consideration of four key elements, to be undertaken in parallel:

5.27 Element 1 – demonstrating a “Good Acoustic Design Process”

5.28 Element 2 – observing internal “Noise Level Guidelines”

5.29 Element 3 – undertaking an “External Amenity Area Noise Assessment”

5.30 Element 4 – consideration of “Other Relevant Issues”.

Assessment Stage 1 - Initial Appraisal

5.31 Figures A3.1 and A3.2 in Appendix 3 are derived from the results of the surveys used to inform a CadnaA acoustic model of sound from traffic on Woodstock Road. These show indicative site zoning for naturally ventilated residential development, without acoustic mitigation.

5.32 Based on the result of the acoustic survey and this indicative analysis, it is considered that the site poses a medium-high noise risk. Therefore, it is appropriate to undertake a detailed acoustic assessment to identify how the potential adverse impact of noise can best be mitigated.

Assessment Stage 2 – Detailed Assessment

5.33 ProPG provides guidance on the good acoustic design process. This involves consideration of ways to provide a good acoustic environment, without significantly adversely affecting other aspects of the amenity of residents of the proposed dwellings. It is therefore not appropriate, for example, to simply overcome high external sound levels by using sealed glazing and attenuated ventilation.

5.34 Part of the Good Acoustic Design process is therefore to identify appropriate internal noise levels within the dwellings and how these can best be achieved, which may involve methods such as internal layout, protecting the external façade, or improving the sound insulation of the external façade.

5.35 External amenity areas should also be protected against unsuitable ambient noise levels, which is also likely to best be achieved with an appropriate site layout.

5.36 The Good Acoustic Design process should also consider relevant national and local planning and noise policies.

5.37 The layout of a site should be considered, to ensure that appropriate mitigation is incorporated such as increasing the separation distance between noise sources and noise sensitive locations, or the use of acoustic barriers, for example.

5.38 For large sites adjacent to significant noise sources, a “barrier block” can be used to protect larger areas of the development from unsuitable noise levels.

5.39 The internal layout of dwellings can be used to minimize the exposure of more noise sensitive room uses to areas of higher external ambient noise, so that the need for ‘high performance’ acoustic facades can be minimized.

6. Existing Acoustic Sources – Road Traffic

6.1 It is not possible to directly compare the sound levels measured during the two acoustic surveys because the surveys were for different purposes necessitating the use of different parameters and measurement time periods for the two surveys. However, some indicative comparisons can be made which are of assistance.

6.2 For the second survey, MP1 was approximately double the distance from the carriageway in comparison to the previous survey Positions 1 to 3. For an acoustic 'line source' such as a road, the sound level reduces at a rate of approximately 3 dB per doubling of distance. Therefore, the morning level of 60 – 61 dBA at MP1 equates to around 63 – 64 dBA at 10 metres; and the night level of 46 – 49 dBA equates to around 49 – 52 dBA at 10 metres. The morning measurement period included some of the busier day time period, whereas the night period was from midnight to 1am. Taking all of these factors into account indicates that it is appropriate to use representative average levels of around 65 and 55 dBA at a distance of 10 metres from Woodstock Road for the day and night time periods respectively.

6.3 Standard acoustic prediction methodology i.e. the Calculation of Road Traffic Noise (CRTN) assumes the sound level from traffic at a roundabout is the same as that from the remainder of the road. Clearly this is not the case because traffic slows down on approach to a roundabout and accelerates away from it. In reality it can be expected that the sound level in the vicinity of the roundabout on Woodstock Road towards the south of the site will be slightly lower than further north, where the traffic flow is free flowing. Similarly, the traffic light-controlled junction at the entrance to Begbroke Science Park will slow traffic down and reduce the resultant sound level on occasion.

6.4 However, in order to provide a conservative assessment, these factors will be discounted and it will be assumed that the sound levels emitted by traffic on Woodstock Road are similar at the junctions to the uninterrupted flow elsewhere.

7. Existing Acoustic Sources – Aircraft

7.1 Appendix 4 shows the Oxford Airport day time average sound contours with PR9 superimposed. From this it can be seen that the north western corner of the site where it is proposed that dwellings will be constructed lies within the outer light blue contour.

7.2 The light blue contour shows levels of between 54 – 57 dBA, the next (inner) cerise contour shows levels of between 57 – 60 dBA.

7.3 This therefore indicates that some dwellings will be constructed where the sound level due to aircraft lies between 54 – 57 dBA. This has been identified as towards the upper limit of acceptability, with 57 dBA indicating the onset of annoyance threshold. A marginal reduction of only a few decibels would be sufficient to bring the sound level at even the most sensitive dwellings down to 54 dBA below which noise contours are not plotted.

7.4 It must therefore be borne in mind that these dwellings may require a small amount of appropriate protection, such as the provision of passive attenuated trickle vents, to achieve good internal sound levels and that outdoor amenity space in this area may be subject to slightly higher than desirable sound levels, although with careful design, it may be possible to protect outdoor spaces to some extent against aircraft noise by using buildings to provide some acoustic screening.

7.5 It should also be noted that post Covid-19 the frequency of aircraft activity can expect to be significantly reduced for some time. Excluding other factors, a halving of aircraft flight numbers equates to a 3 dB reduction in aircraft noise. By the time the proposed dwellings are constructed and occupied, it may be the case that aircraft activity has returned to pre Covid-19 levels. On the other hand, with increasing concern about global warming this may not be the case and in the longer term other measures such as the continuing introduction of quieter aircraft may be of benefit.

8. New Acoustic Sources – School Sports Field

8.1 In addition to the development introducing noise sensitive receptors (dwellings) to an area where some parts are subject to higher than desirable ambient sound levels, this development will also introduce a small number of potential sound sources.

8.2 Potentially, the most acoustically significant of these is the proposed School Sports Field. At present the area where this is proposed comprises open farmland. This means that when the sports field is in use, it is to be expected that children will be running around, with some shouting, potentially relatively close to the ends of some of the gardens of existing dwellings along Rutten Lane.

8.3 However, there are several factors that should first be considered:

8.4 The sports field is only intended for school use. This means that it will mainly be used during the school day when the residual sound level is higher than at other times, providing better masking to sound from the sports field. Also, at these times, residents of Rutten Lane are more likely to be at work or otherwise busy, so less likely to wish or be able to enjoy the amenity of their gardens. Therefore, for the vast majority of the time when the sports field will be used, the neighbouring gardens will be relatively insensitive to sound from the sports field.

8.5 The school is a relatively small primary school, not a large secondary school. This means that it is likely there will be a smaller number of children using the sports field and the amount of time it is used by a relatively small number of classes will be less than for a larger school. Therefore, the sound levels produced by a smaller number of children and the amount of time for which this occurs will be relatively low.

8.6 Although the edge of the sports facility will be adjacent to the ends of the neighbouring gardens, activity on the sports field will be further away from the gardens with activity occurring towards the far edge of the sports facility being up to approximately 60 metres further away from the gardens.

9. New Acoustic Sources – Miscellaneous

9.1 In addition to the sports facility, the development will provide LEAPs (Local Equipped Area for Play) and one larger NEAP (Neighbourhood Equipped Area for Play). These will be within the development so will not affect any existing dwellings in the vicinity of the site. However, there is the potential for sound associated with activity at these play areas to affect nearby dwellings if this is not considered during the design process.

9.2 Guidance for Outdoor Sport and Play - Beyond the Six Acre Standard provides guidance for play areas such as this. It is important to strike an appropriate balance between multiple competing demands. For example: there should be a sufficient number of suitable play areas so that they are reasonable accessible, but each needs to be large enough to provide appropriate facilities; and the areas should not be too isolated to provide security, but they should not be too close to dwellings to ensure that the residents of the dwellings are not disturbed.

9.3 For LEAPs the guidance recommends a buffer zone of at least 20 metres between the activity zone and the habitable room of any dwellings. For NEAPs the recommended minimum separation is 30 metres to the boundary of any dwellings.

9.4 These factors will need to be incorporated into detailed design of the development.

10. Good Acoustic Design

10.1 For acoustic amenity purposes a site layout design has been developed with the closest residential buildings separated from Woodstock Road (A44) by a buffer zone to provide distance attenuation to the sound level at these building facades that will be most exposed to road traffic noise.

10.2 In addition to the attenuation provided by the separation distance, an acoustic barrier can be constructed relatively close to Woodstock Road. By positioning the barrier close to the road, the screening attenuation it provides will be maximized. In order to avoid any significant adverse visual impact the barrier can comprise an earth bund, topped with a timber fence of a suitable design and construction. As appropriate, planting can be used for aesthetic reasons to further enhance the appearance of this feature, although such planting will have negligible acoustic effect.

10.3 The eastern most buildings of the site, towards Woodstock Road will also be the tallest buildings on the site. This is in order to provide a 'barrier block' to attenuate sound from Woodstock Road at other dwellings more distant from Woodstock Road. This design principle can ensure that the level and character of sound at these other dwellings provides good acoustic amenity for these residents without the need for other attenuation measures.

10.4 Figures A3.3 and A3.4 of Appendix 3 provide an indication of the benefits of using a barrier block to reduce the resultant sound levels across the remainder of the site, in comparison to the 'open' site levels, during the day and night.

10.5 These design measures can provide good acoustic amenity at all residential facades and outdoor areas in the vicinity of Woodstock Road, with the exception of the eastern façade of the dwellings closest to the road.

10.6 The acoustic barrier adjacent to the road will provide most benefit for the lower level windows of this elevation, with the screening attenuation reducing with increasing height up this façade.

10.7 For the dwellings closest to Woodstock Road, suitable sound levels can be achieved by means of a range of different attenuation systems, the appropriateness of which will vary depending upon factors such as the relative position and layout of sources and receptors, receptor sensitivity, and the effect of any other measures which may provide attenuation. As the layout of the site is further developed the most appropriate attenuation solutions can be incorporated into the design at these times.

10.8 Residents should be able to choose to open windows if they desire, e.g. for purge ventilation. The additional attenuation required for these more exposed areas to properly protect the residents can be assisted by good design such as the layout of this part of the site and individual buildings. For example, using internal building layout to put more noise sensitive rooms on the western (facing away from Woodstock Road) façade, or possibly putting more noise sensitive room use on lower floors of the eastern façade than less sensitive uses if practicable.

10.9 For the limited number of dwellings where the external façade level remains higher than desirable, the building façade can be designed to incorporate appropriate mitigation to ensure good internal sound levels. This may be achieved through a combination of different methods such as window configurations to provide attenuation when open, appropriate ventilation arrangements to provide sufficient airflow with windows closed, and suitable glazing configurations to properly control sound breaking in through closed windows.

10.10 For the small number of dwellings around the north western corner of the site, noise from aircraft may be marginally above a desirable level. This is potentially more difficult to attenuate than road traffic noise because it is coming from an elevated source so acoustic barriers may be ineffective.

10.11 Without any attenuation, although slightly above desirable, the sound levels will still be below the generally accepted ‘annoyance’ threshold. However, good acoustic design can be used to enhance the acoustic amenity of these residents through measures such as the external and internal layout of these dwellings as appropriate.

10.12 Taking into account the various factors regarding use of the proposed sports field indicates that the impact on residents of the adjacent dwellings along Rutten Lane will be relatively slight. However, this can be further mitigated by installing a suitably designed and constructed fence, along the eastern boundary of the sports field. A 2 metre high screen can provide significant attenuation, particularly when considering that most of the sound will be produced by children of primary school age, who will therefore be not as tall as adults, so the head height at which the sound is produced will be lower relative to the top of the fence.

10.13 The sports field will be at a similar level to the adjacent gardens in the south eastern corner, rising to about 1 metre above adjacent gardens to the north east corner of the sports field. The acoustic fence should therefore be 2 metres higher than the local level of the sports field rather than the gardens. It can be set back from the gardens i.e. closer to the 'active' part of the sports field, which will maximize the attenuation it provides and reduce any visual impact.

10.14 As with the acoustic barrier along Woodstock Road, this screen can consist of a low earth bund, topped with a suitable timber fence, so that the top of the fence is 2 metres above the level of the sports field in that area.

11. Conclusion

11.1 In order to ensure that the development will provide good acoustic amenity for its residents and will not adversely affect the amenity of existing residents in the vicinity of the Application Site, Acoustical Control Consultants has been involved in the design process for the development of the layout of the proposed site.

11.2 Analysis of the acoustic survey data shows that, in accordance with ProPG guidance, the site is of medium-high risk so more detailed acoustic design has been undertaken for relevant aspects of the site development. This process should continue for more detailed development of the site layout as matters progress and will be secured by planning condition(s).

11.3 This has resulted in the dwellings closest to Woodstock Road being set significantly further back to provide distance attenuation and enhancing this by means of an acoustic barrier close to the road. These measures will significantly reduce the sound level at the closest residential facades to suitable levels.

11.4 Designing these buildings appropriately to act as a 'barrier block' can then ensure good acoustic amenity for the other dwellings further from Woodstock Road.

11.5 For the façade directly exposed to Woodstock Road, a range of design measures such as the internal layout of the buildings, design of the external façade, use of appropriate glazing configurations, and attenuated ventilation can ensure good acoustic amenity for these residents.

11.6 Depending upon the longer term effects of Covid-19 on the aviation industry, sound levels for the relatively small number of dwellings to the north-west corner of the site may be slightly higher than desirable due to aircraft taking off from or landing at Oxford Airport. However, the excess is only marginal and can be mitigated where appropriate by good design such as appropriate internal and external layout of these dwellings in order to achieve suiatble sound levels.

11.7 The impact of sound from the sports field to the south will be minimal for residents in the adjacent gardens along Rutten Lane and will be mitigated by means of an acoustic fence along this boundary.

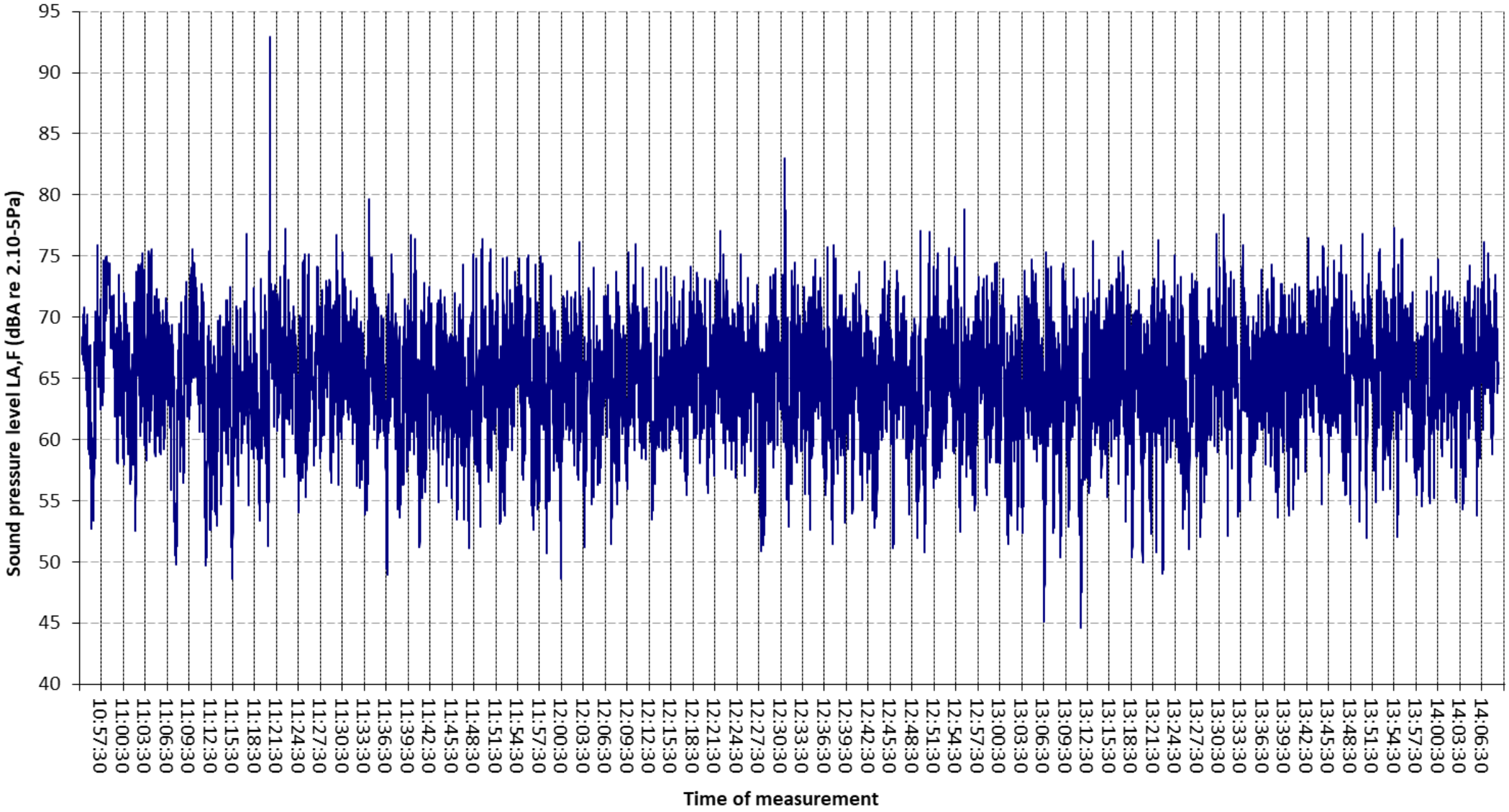
11.8 Sound at the nearest dwellings associated with use of the LEAP & NEAP play areas will be controlled consistent with appropriate design guidance.

11.9 The principles of Good Acoustic Design are being adhered to in order to ensure that this proposed development will provide good acoustic conditions for residents of the new dwellings and of the existing neighbouring dwellings alike.

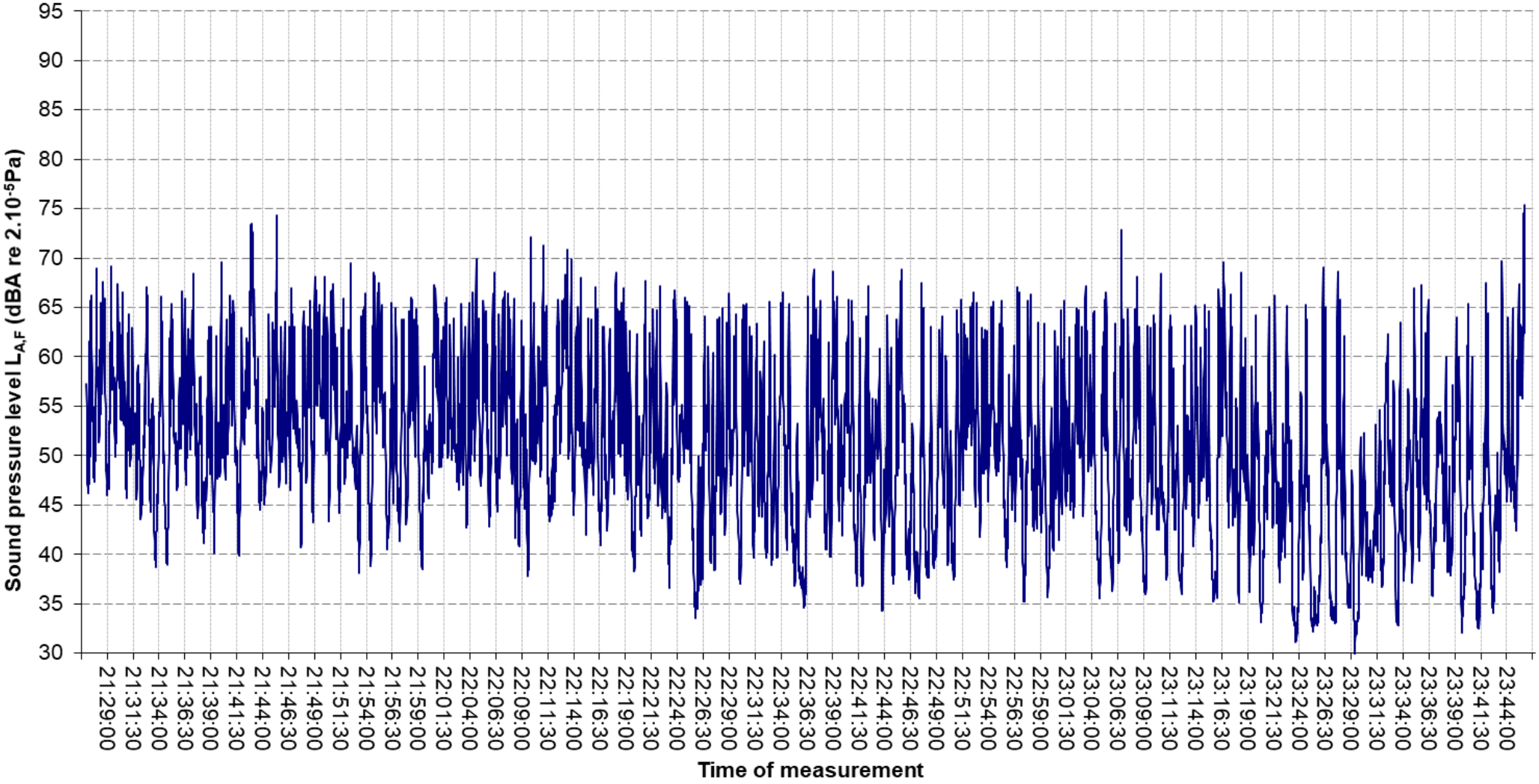
11.10 These principles will continue to be applied through the more detailed design of the development as it progresses.

12. Appendix 1 – First Survey Measurements

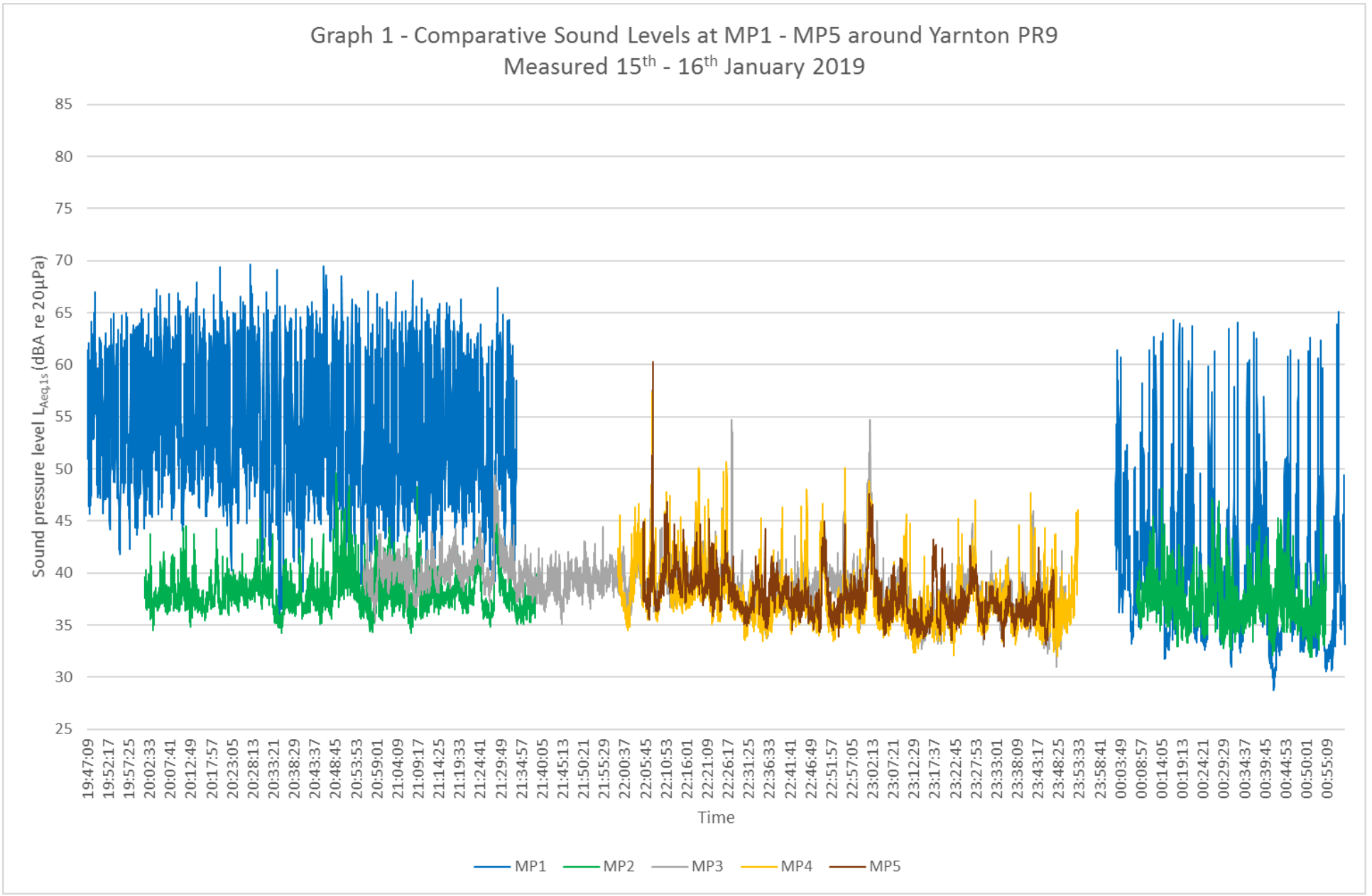
Graph 1 - Position 1 Daytime

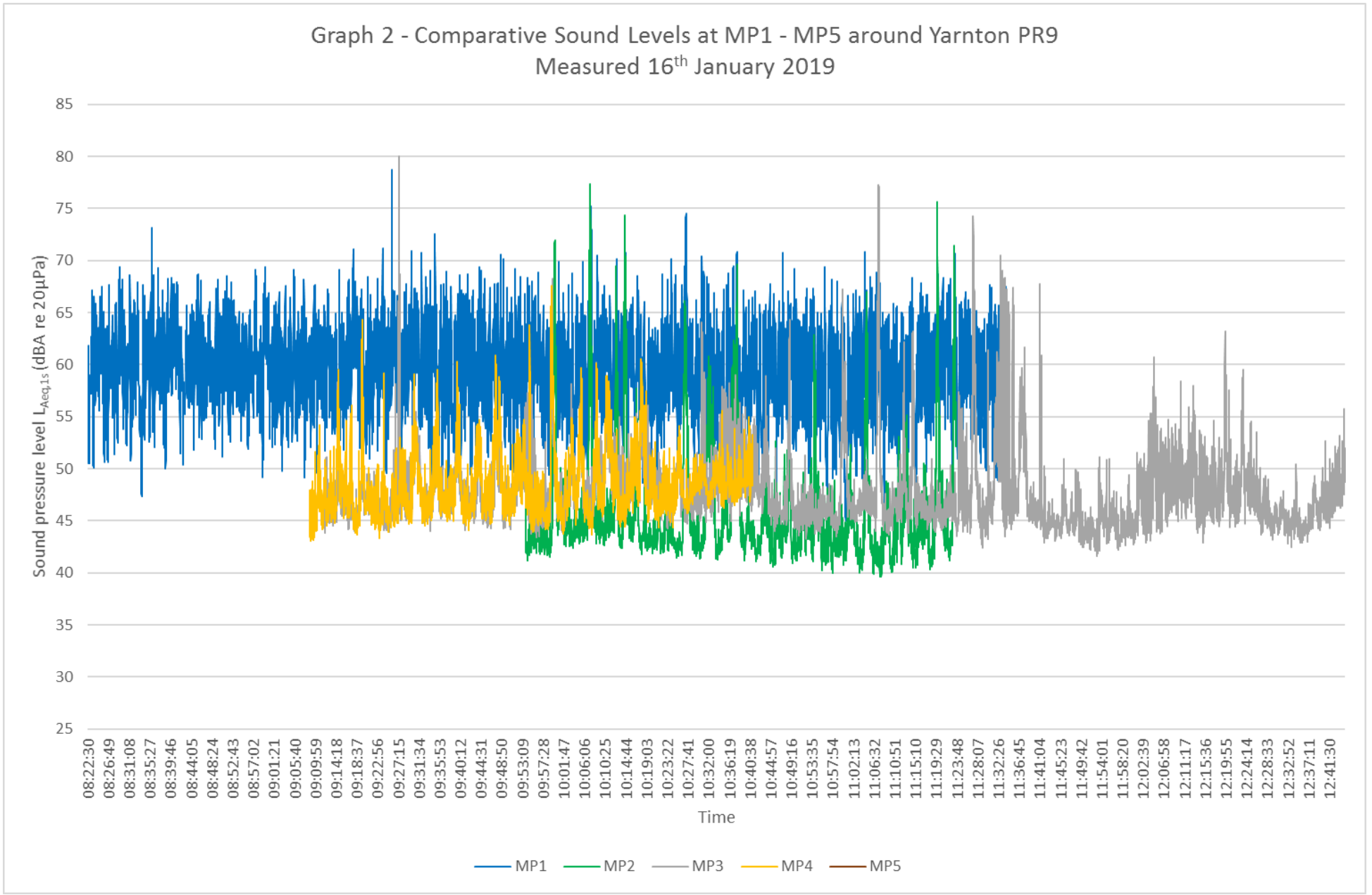


Graph 3 - Position 3 Evening & Night 10m from Carriageway

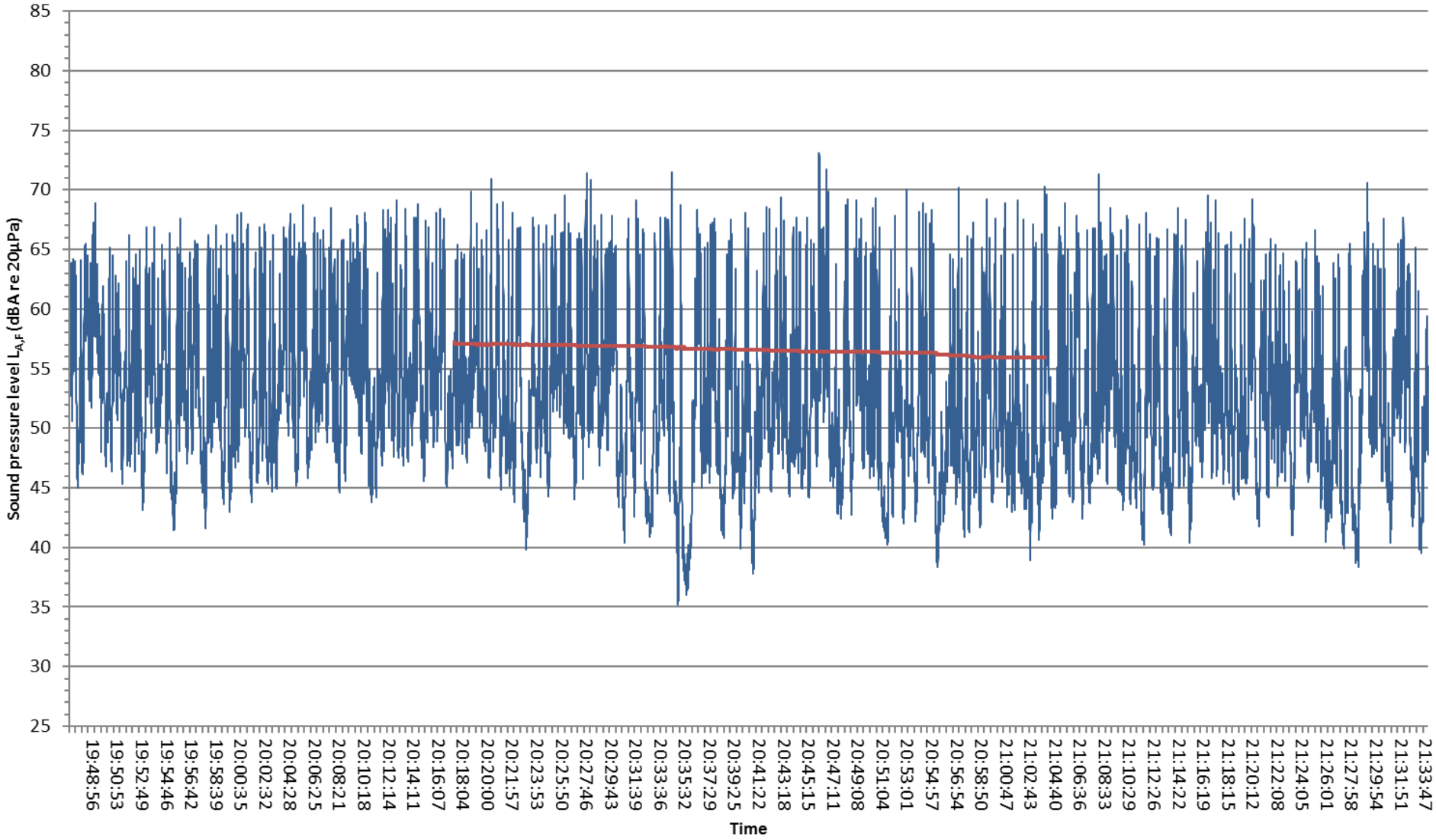


13. Appendix 2 – Second Survey Measurements

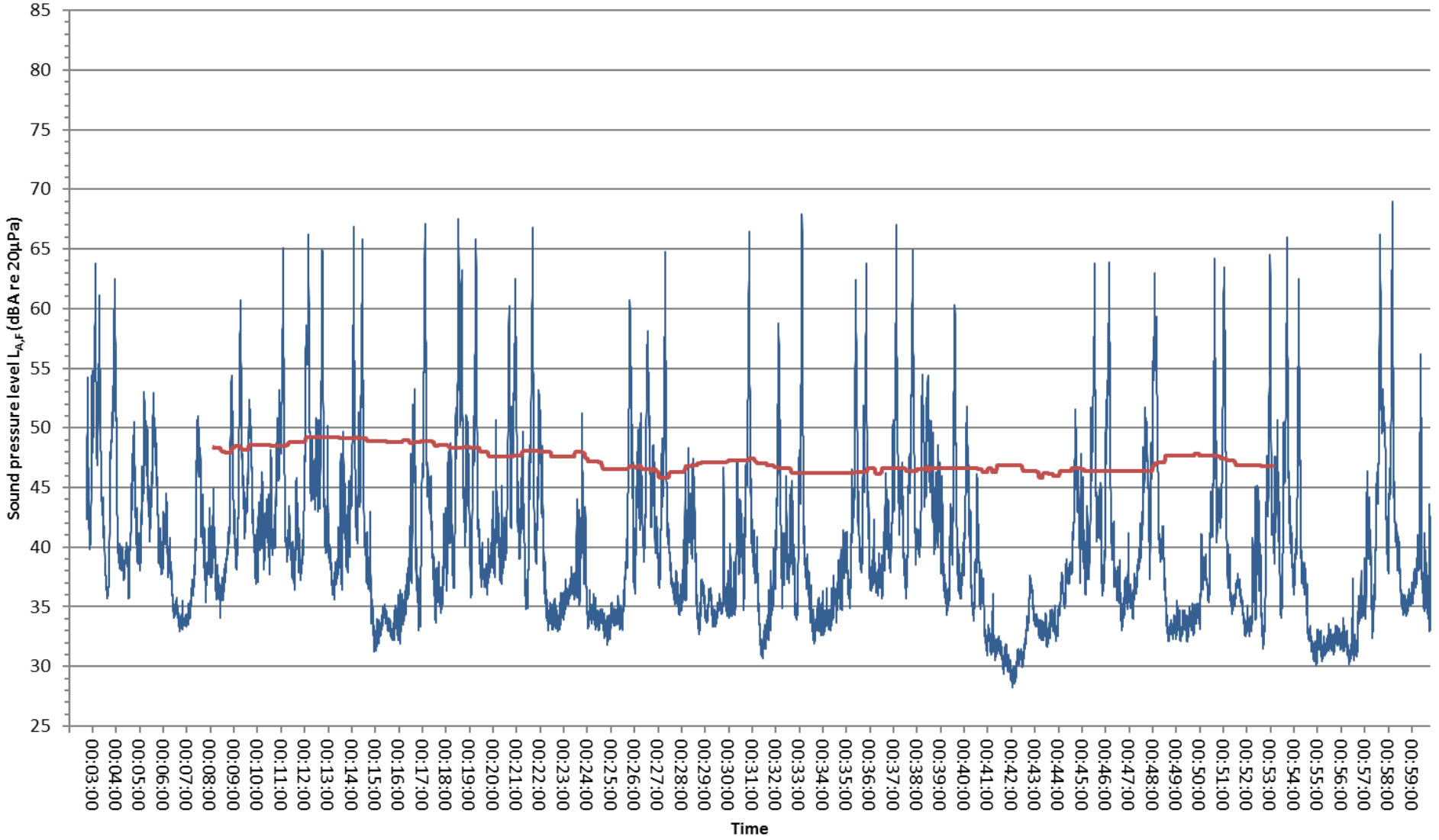

Graph 1 - Comparative Sound Levels at MP1 - MP5 around Yarnton PR9
Measured 15th - 16th January 2019
Sound pressure level $L_{Aeq,1s}$ (dBA re 20µPa)
85
80
75
70
65
60
55
50
45
40
35
30
25
19:47:09
19:52:17
19:57:25
20:02:33
20:07:41
20:12:49
20:17:57
20:23:05
20:28:13
20:33:21
20:38:29
20:43:37
20:48:45
20:53:53
20:59:01
21:04:09
21:09:17
21:14:25
21:19:33
21:24:41
21:29:49
21:34:57
21:40:05
21:45:13
21:50:21
21:55:29
22:00:37
22:05:45
22:10:53
22:16:01
22:21:09
22:26:17
22:31:25
22:36:33
22:41:41
22:46:49
22:51:57
22:57:05
23:02:13
23:07:21
23:12:29
23:17:37
23:22:45
23:27:53
23:33:01
23:38:09
23:43:17
23:48:25
23:53:33
23:58:41
00:03:49
00:08:57
00:14:05
00:19:13
00:24:21
00:29:29
00:34:37
00:39:45
00:44:53
00:50:01
00:55:09
Time
MP1
MP2
MP3
MP4
MP5


Graph 2 - Comparative Sound Levels at MP1 - MP5 around Yarnton PR9
Measured 16th January 2019
Sound pressure level L_{Aeq1s} (dBA re 20µPa)
85
80
75
70
65
60
55
50
45
40
35
30
25
08:22:30
08:26:49
08:31:08
08:35:27
08:39:46
08:44:05
08:48:24
08:52:43
08:57:02
09:01:21
09:05:40
09:09:59
09:14:18
09:18:37
09:22:56
09:27:15
09:31:34
09:35:53
09:40:12
09:44:31
09:48:50
09:53:09
09:57:28
10:01:47
10:06:06
10:10:25
10:14:44
10:19:03
10:23:22
10:27:41
10:32:00
10:36:19
10:40:38
10:44:57
10:49:16
10:53:35
10:57:54
11:02:13
11:06:32
11:10:51
11:15:10
11:19:29
11:23:48
11:28:07
11:32:26
11:36:45
11:41:04
11:45:23
11:49:42
11:54:01
11:58:20
12:02:39
12:06:58
12:11:17
12:15:36
12:19:55
12:24:14
12:28:33
12:32:52
12:37:11
12:41:30
Time
MP1
MP2
MP3
MP4
MP5

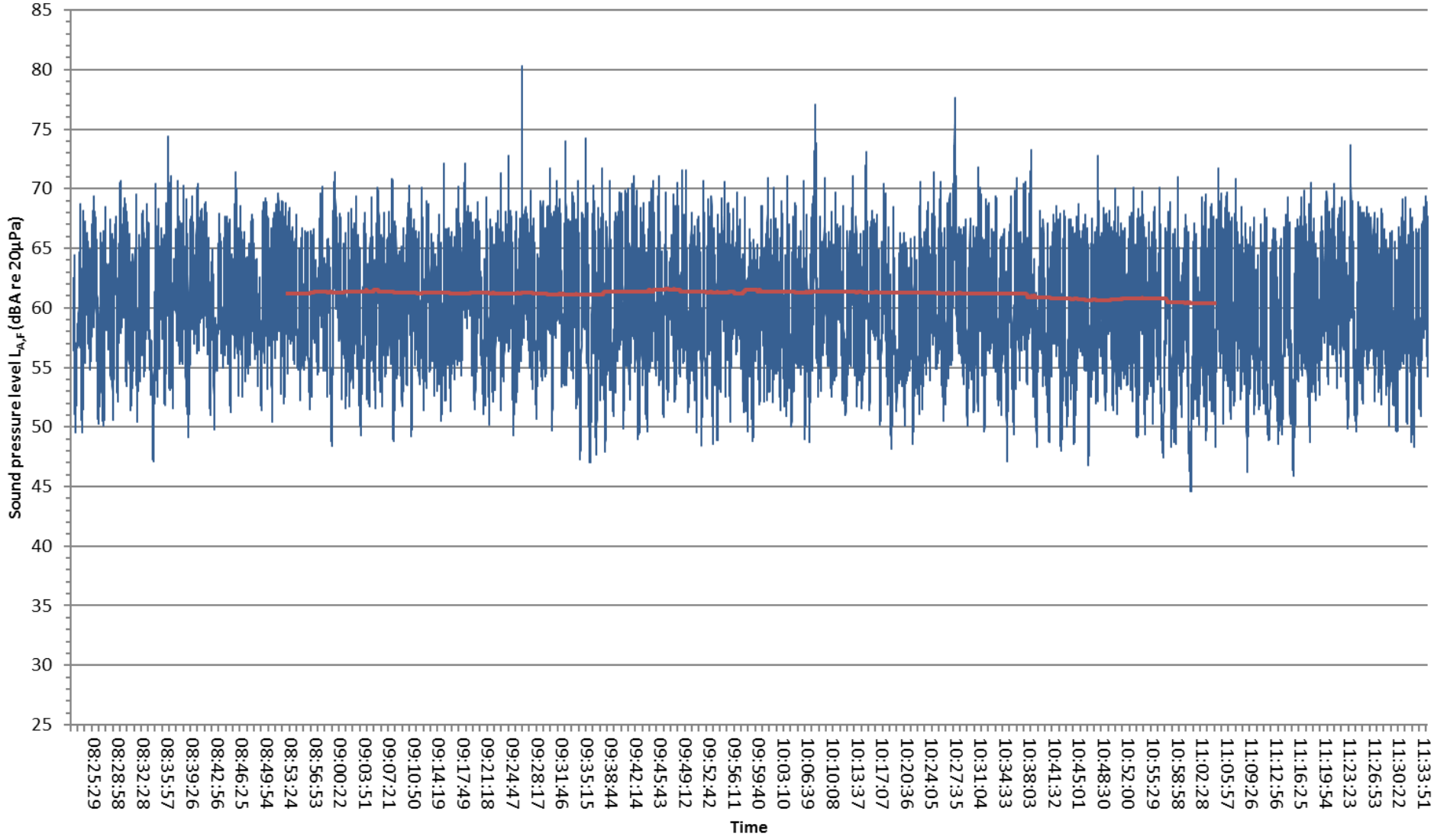
Graph 3 - Existing evening ambient sound level at MP1 at Yarnton PR9
Measured 15th January 2019



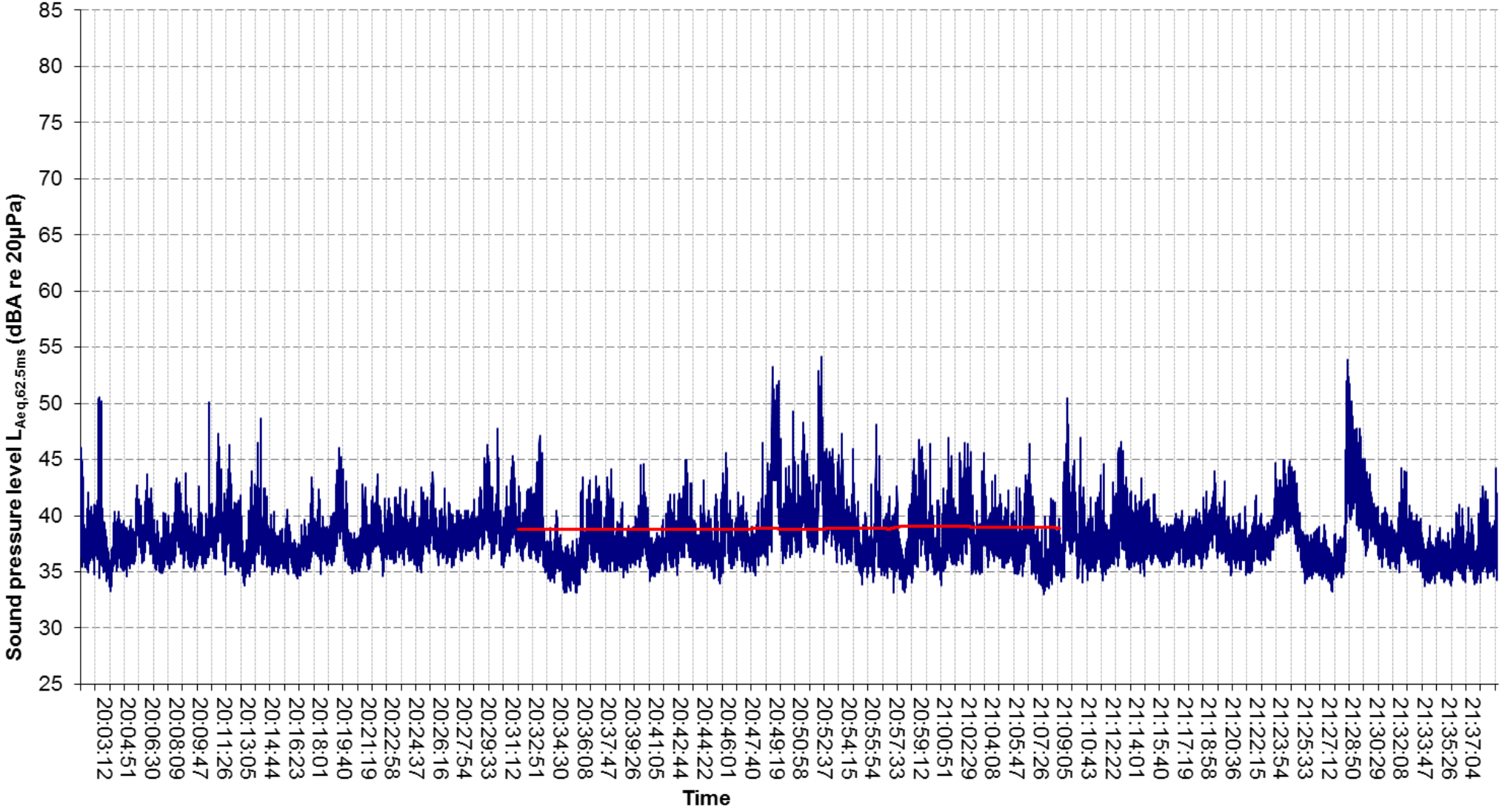
Graph 4 - Existing night time ambient sound level at MP1 at Yarnton PR9
Measured 16th January 2019



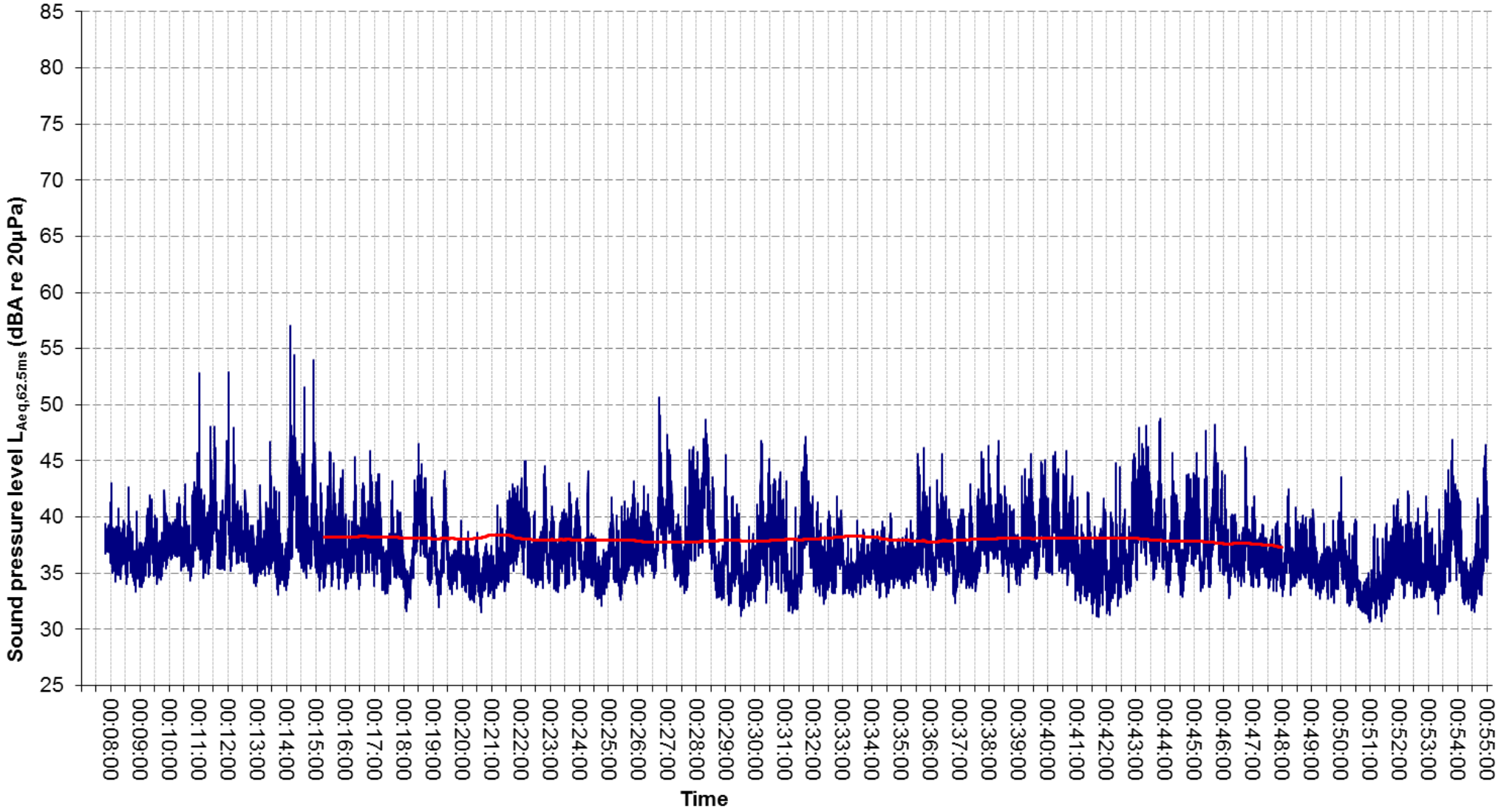
Graph 5 - Existing day time ambient sound level at MP1 at Yarnton PR9
Measured 16th January 2019



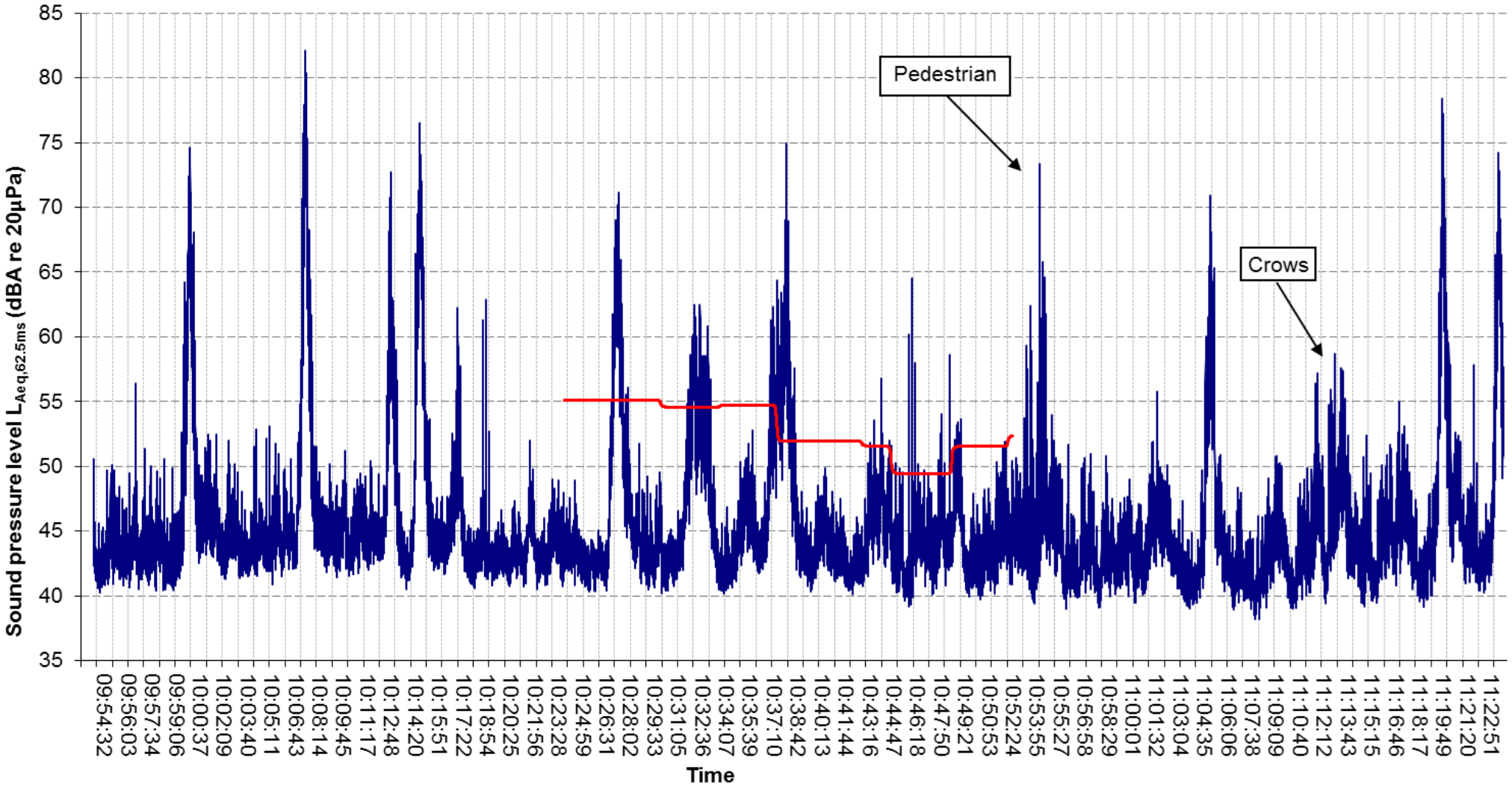
Graph 6 - Existing evening ambient sound level at MP2 at Yarnton PR9
Measured 15th January 2019



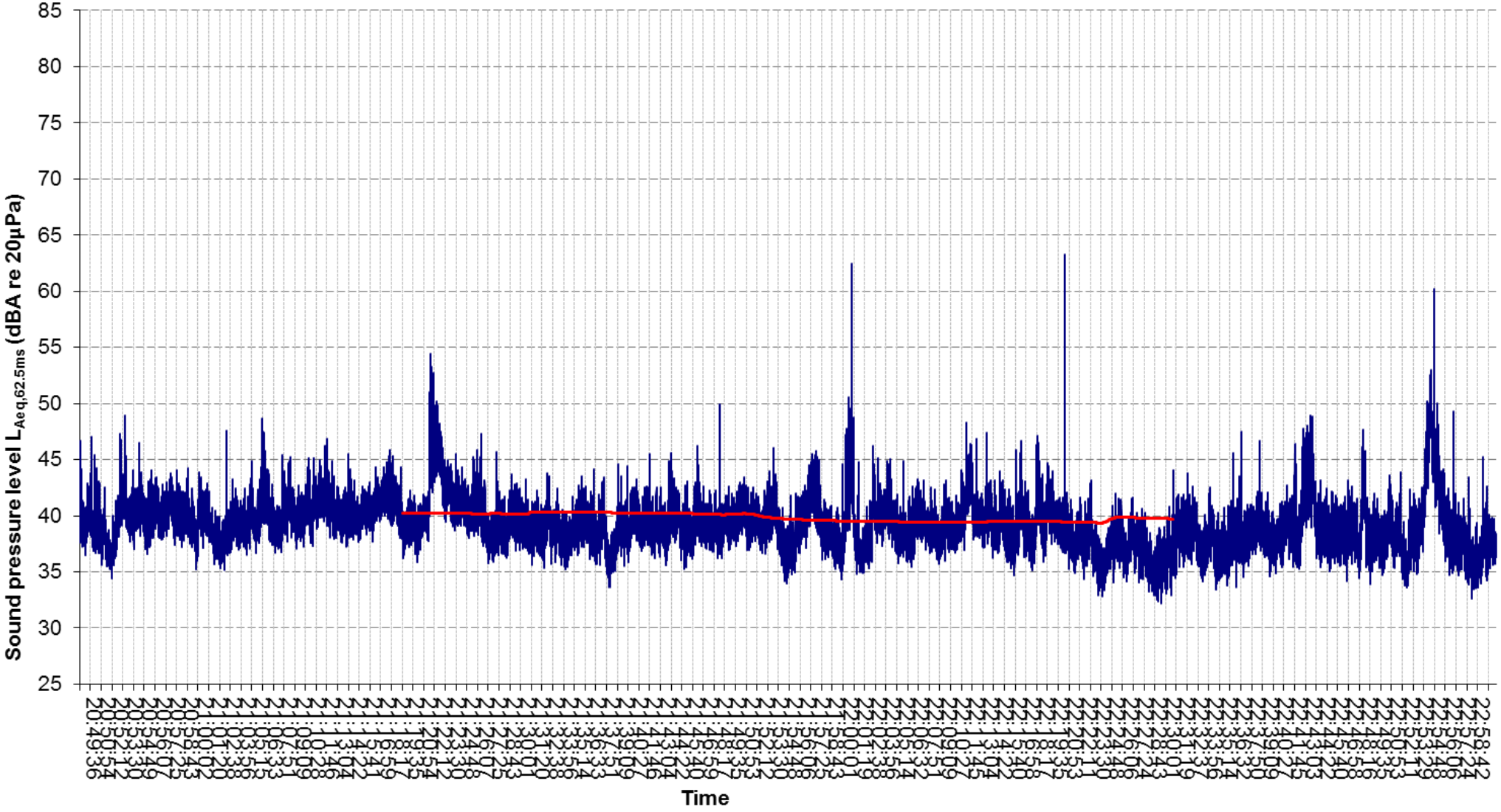
Graph 7 - Existing night ambient sound level at MP2 at Yarnton PR9
Measured 16th January 2019



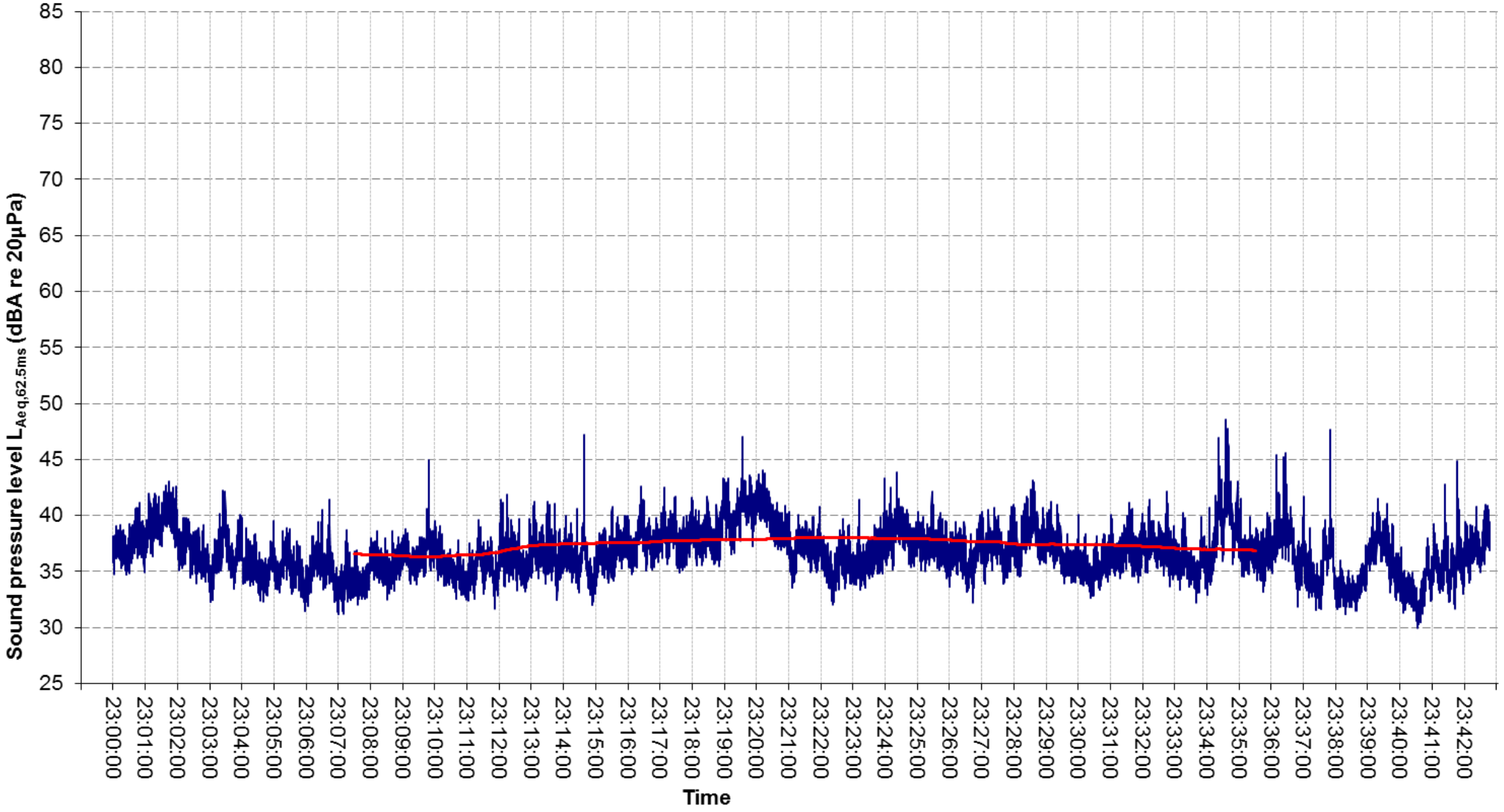
Graph 8 - Existing morning ambient sound level at MP2 at Yarnton PR9
Measured 16th January 2019



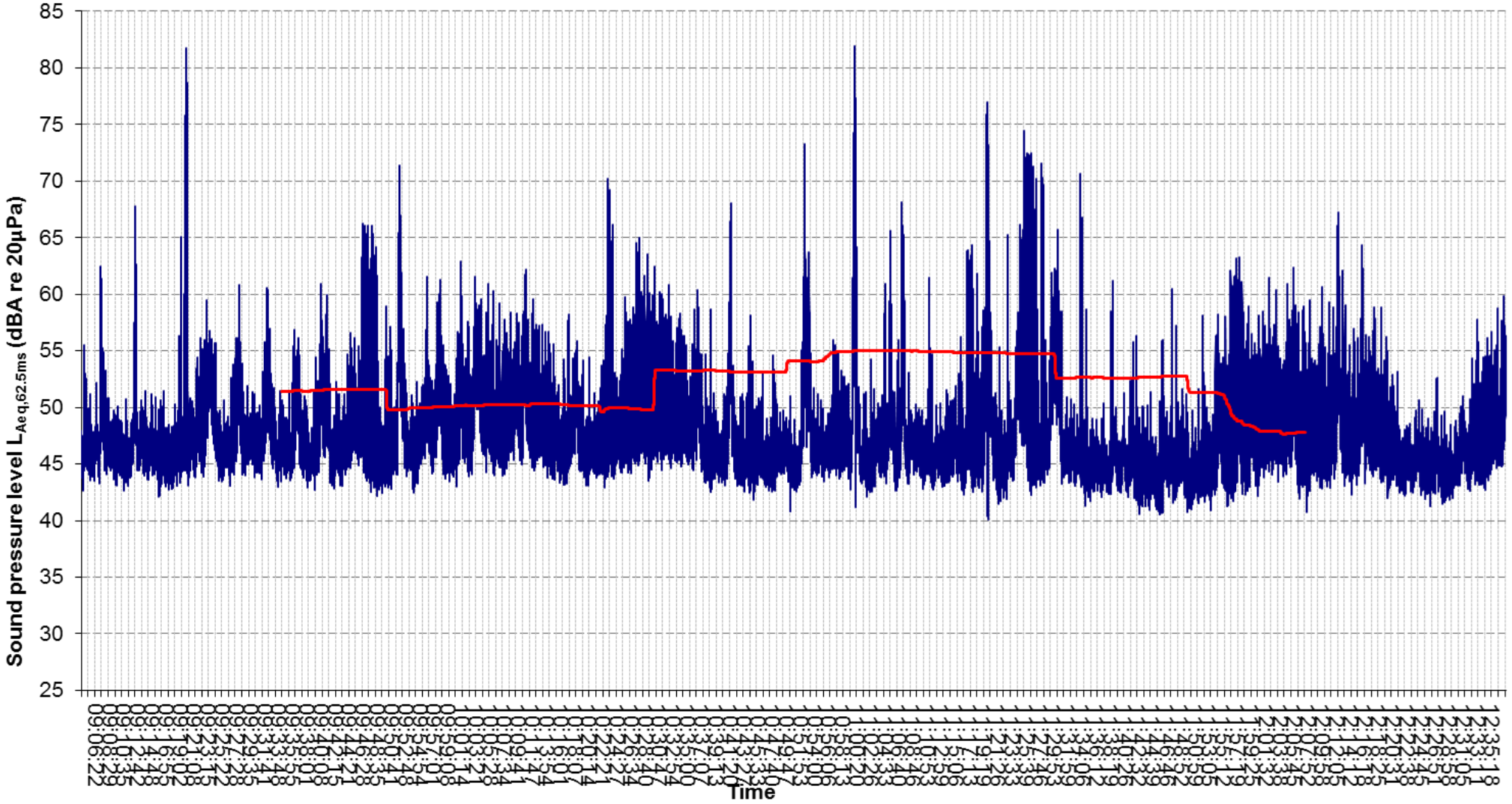
Graph 9 - Existing evening ambient sound level at MP3 at Yarnton PR9
Measured 15th January 2019



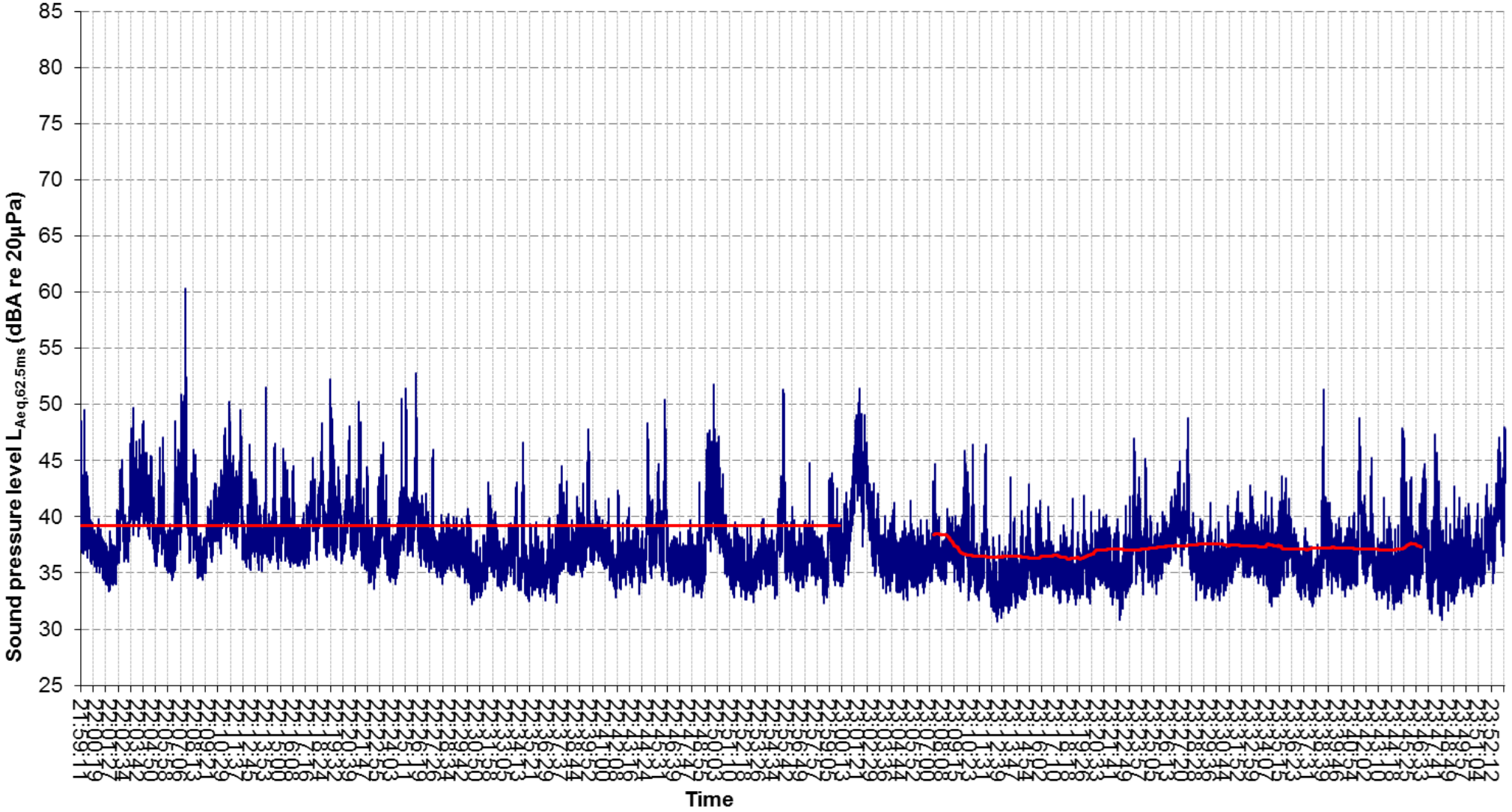
Graph 10 - Existing night ambient sound level at MP3 at Yarnton PR9
Measured 15th January 2019



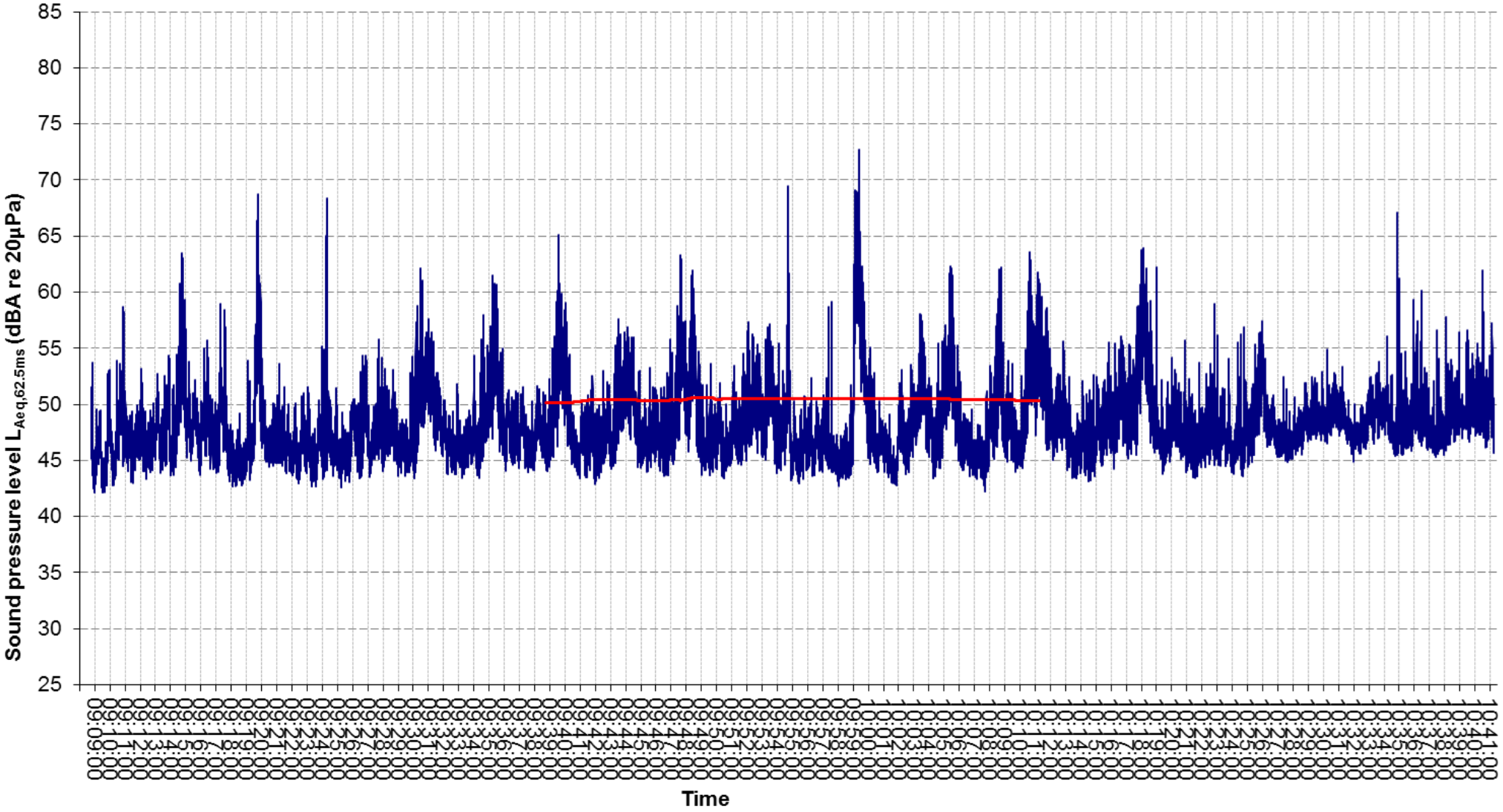
Graph 11 - Existing morning ambient sound level at MP3 at Yarnton PR9
Measured 16th January 2019



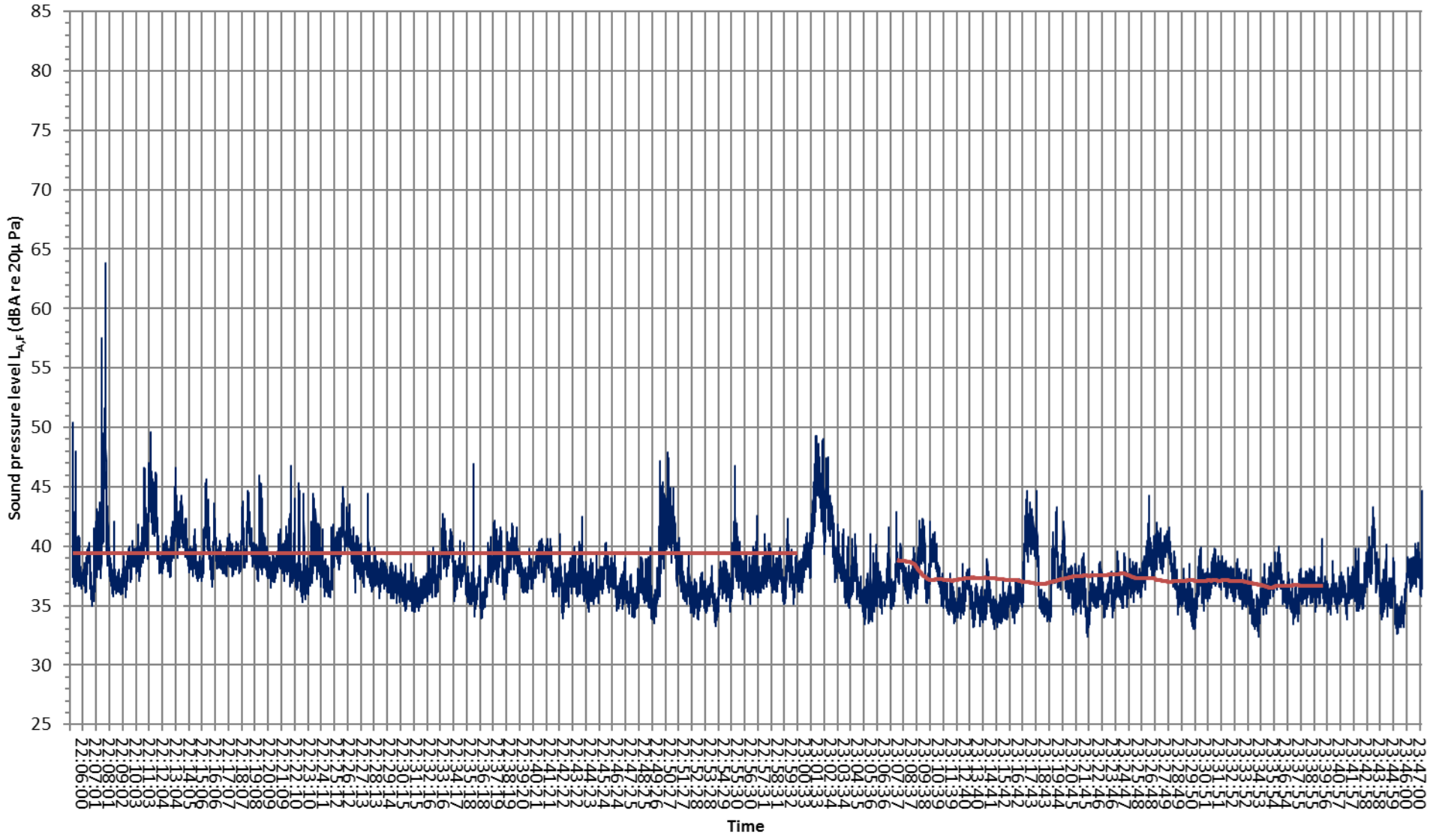
Graph 12 - Existing evening & night time ambient sound level at MP4 at Yarnton PR9
Measured 15th January 2019



Graph 13 - Existing morning ambient sound level at MP4 at Yarnton PR9
Measured 16th January 2019



Graph 14 - Existing evening & night time ambient sound level at MP5 at Yarnton PR6
Measured 15th January 2019



14. Appendix 3 – Woodstock Road Traffic Sound Contours

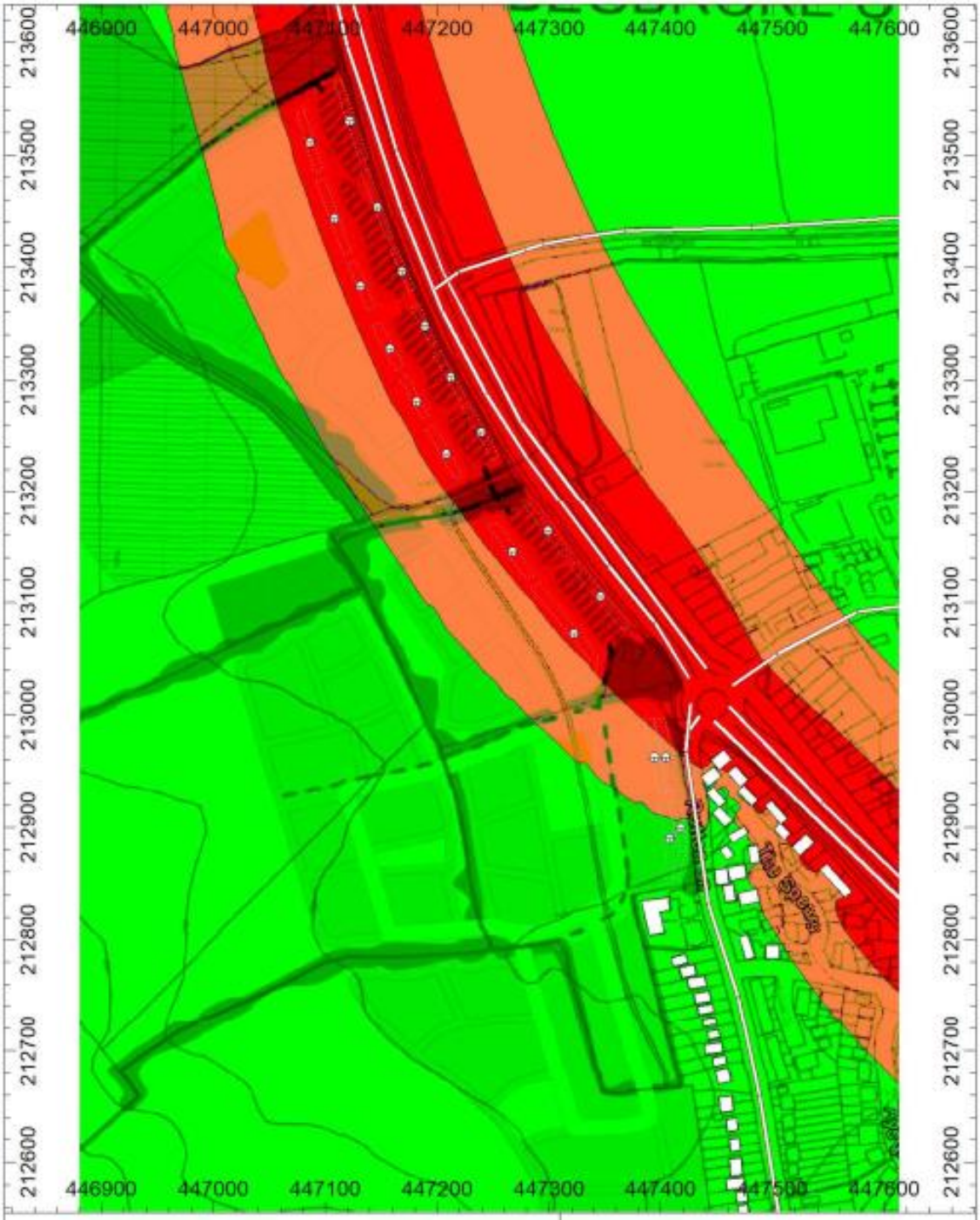


Figure A3.1
Land West of Yarnton
Open Site - Daytime Sound Levels

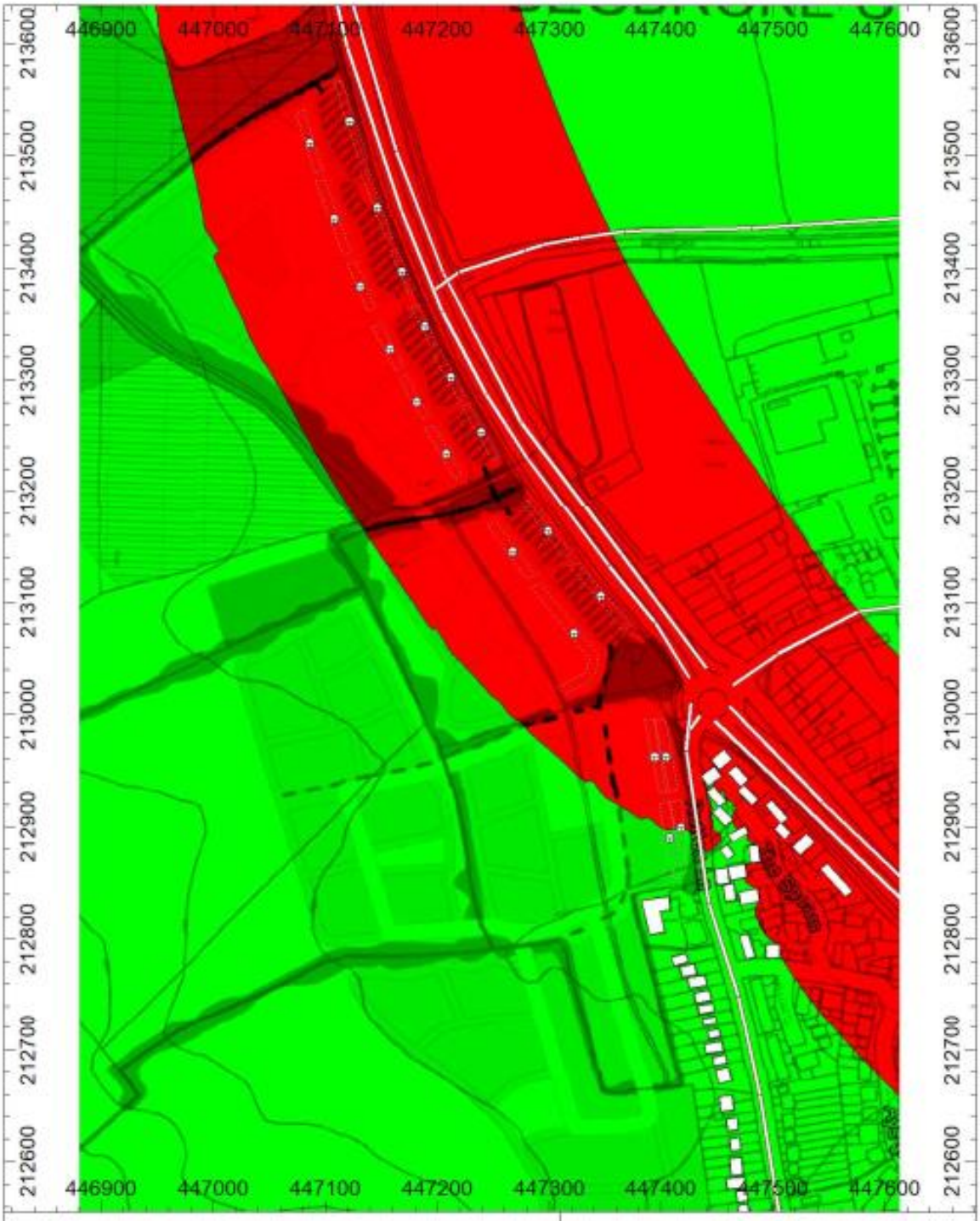


Figure A3.2
Land West of Yarnton
Open Site - Night-time Sound Levels

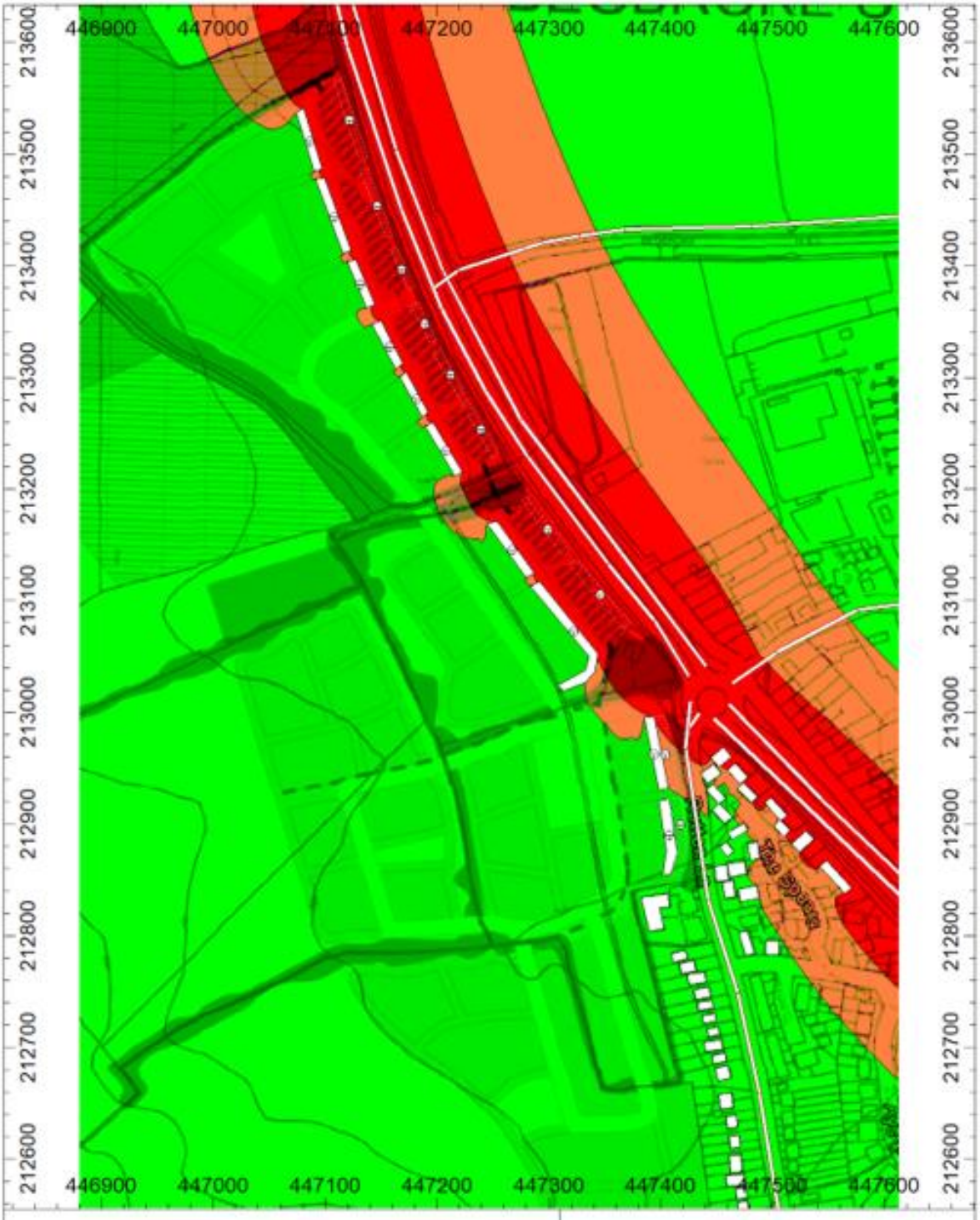


Figure A3.3
Land West of Yarnton
Revised Proposal
Daytime Sound Levels

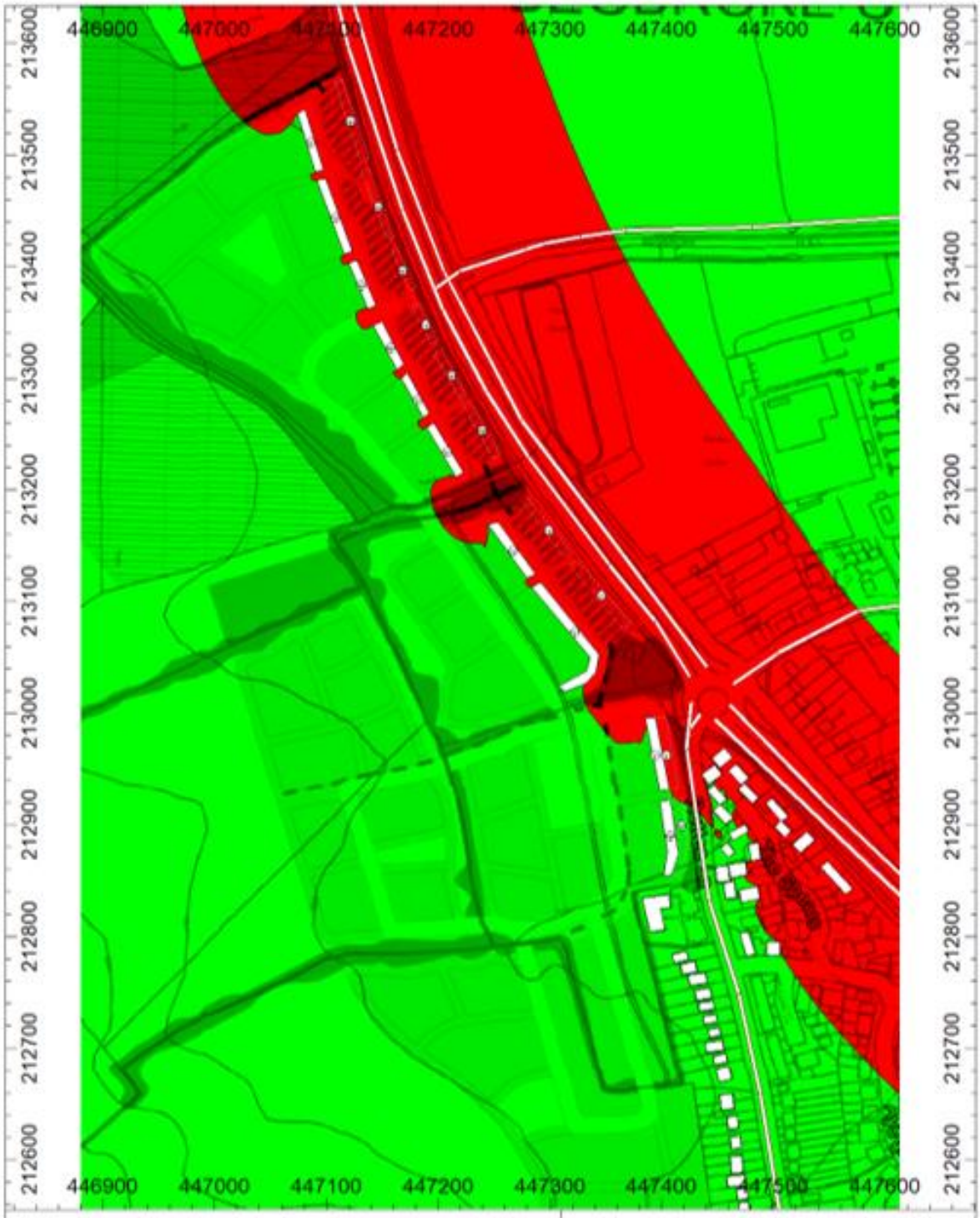


Figure A3.4
Land West of Yarnton
Revised Proposal
Night-time Sound Levels

Appendix 4 – Oxford Airport Sound Contours


DERNE

Appendix 5 – References

National Planning Policy Framework
Ministry of Housing, Communities & Local Government. 2012 (Updated 2021)

Noise Policy Statement for England
Department for Environment, Food & Rural Affairs. 2010

National Planning Practice Guidance
Ministry of Housing, Communities & Local Government. 2014 (Updated for Noise 2019)

Guidelines for Community Noise
World Health Organisation. 1999

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Association of Noise Consultants, Institute of Acoustics and Chartered Institute of Environmental Health. 2017

BS8233: 2014 Guidance on sound insulation and noise reduction for buildings

BS7445: 1991 Description and measurement of environmental noise – Part 2: Guide to the acquisition of data pertinent to land use

Guidance for Outdoor Sport and Play - Beyond the Six Acre Standard
The National Playing Fields Association. 2015