Alton Towers Resort, Lodges Phase 2

Noise Assessment Report

Merlin Entertainments Limited – Alton Towers Resort

March 2016

Notice

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Executive Summary

This report outlines the assessment and findings relating to a sound assessment for the proposed Phase 2 Lodges, located within Alton Towers Resort.

Noise surveys have been undertaken to establish representative ambient noise levels at noise sensitive receivers (NSRs) around the perimeter of Alton Towers Resort. These measurements form the basis of the assessments undertaken.

An assessment has been undertaken in relation to potential construction impacts. This relates to both construction traffic and construction activities, throughout the construction duration. Construction traffic is not expected to increase existing noise levels at defined noise sensitive receivers (NSRs).

An assessment of construction activities has also been undertaken, in accordance with BS5228, based upon the assumed phased construction programme activities. The assessment predicts that there will not be any 'significant' impacts to defined receivers.

An operational sound assessment has been undertaken. Mechanical and electrical services noise has been considered. Generally, the Phase 2 development, will make use of Phase 1 services, which were assessed as part of the application for Phase 1 Lodges, reference SMD/2014/0107. An acoustic consultant will be engaged during the design process to ensure that noise from mechanical and electrical services installations are controlled to levels, as outlined within this report.

An assessment has been undertaken for operational sound from Phase 2 Lodges guest activities. When assessed, all NSRs comply with the requirements for sound levels to receivers relating to additional traffic attributed directly to the Phase 2 lodges development.

General Guest activities are expected to create a 1-2 dB increase in sound levels over a three year completion period. This relates to a 1 dB increase for development phase 2.1 (March 2019) and an additional 1 dB for the development phase 2.3 (2021 / 2022). This is Negligible when considering the time period of which the impacts are realised.

A maximum noise level for sound from the Phase 2 Tipis has been provided for reference.

Based upon the above it is considered that the proposed development will comply with the adopted criteria.

Furthermore, Alton Towers Resort will engage the services of an acoustic consultant during the design and construction stages to ensure that the above elements are considered as the design progresses and to ensure that building services comply with the adopted criteria set out in this report.

Section 1 of this report provides an overview of the proposed development. Section 2 outlines relevant policy and planning guidance. Section 3 outlines relevant calculation methodology, while section 4 describes the proposed criteria for the project. Section 5 outlines the details of baseline data for the surrounding area. Section 6 outlines the assessment for construction activities, while section 7 outlines the operational assessment. Section 8 discusses any residual effects. Section 9 outlines the report conclusions.

1. Introduction & Overview

1.1. CDC has been commissioned by Merlin Entertainments, Alton Towers Resort, to assess the impact from sound relating to the proposed Phase 2 Lodges development, to the nearest Noise Sensitive Receptors (NSRs), located outside of Alton Towers Resort boundary.

1.2. The proposed development will be located on an existing area of the overflow car park, to the north of the Phase 1 Lodges development, which is now operational.

1.3. This assessment considers the potential sound impacts from the proposed development to off Park receivers, from both construction and operational activities.

1.4. The proposals for the development of the Phase 2 Lodges include the following:

- Construction of 35 themed double lodges, providing 70 keys. Interconnecting doors will be incorporated into the lodges to allow a maximum capacity of 10 guests per double lodge and a maximum 5 guests per key. Modular constructions to be used, constructed off site.

- 3 x Service huts (26.8m^2 x 3) and a Reception Building (99m^2), to be constructed on site. The Reception Building will incorporate a feature facade and front terrace.

- Themed tipi structures for entertainment;

- Service core building (358m^2) to provide staff areas, maintenance facilities and storage.

- Cellar Extension to existing restaurant (19m^2), to provide additional storage and access to the main restaurant area.

- Water tank building (15m^2), to be attached to the north of the existing restaurant.

1.5. The development of Phase 2 Lodges will has been sub divided into separate construction phases. These are detailed as follows:

- Phase 2.1 – construction of 26 double lodges (52 keys), two service huts and service core building, water tank building and cellar extension. Landscape preparation and car park construction. Phase 2.1 commencement date is anticipated for June 2018, for a proposed March 2019 opening.

- Phase 2.2 – Erection of Tipis and extension to the service core building, to support the Tipis. Phase 2.2 commencement date is programmed for March 2020.

- Phase 2.3 – Remaining 9 double lodges (18 keys) to be constructed, in addition to construction of the reception building and one service hut. Phase 2.3 commencement date is anticipated to be in 2021.

1.6. It is understood that the proposed Lodges will be similar in design and appearance to the Phase 1 Lodges.

1.7. The following figure outlines the current plant for the lodges.

Figure 1 Location of the proposed Phase 2 Lodges

1.8. The following figure illustrates the location of the phase 2 lodges, relative to the wider Alton Towers Resort.

Figure 2 Phase 2 lodges location relative to the wider Alton Towers Resort site

1.9. The nearest noise sensitive residential receivers (NSRs) from the proposed lodges have been defined as follows:

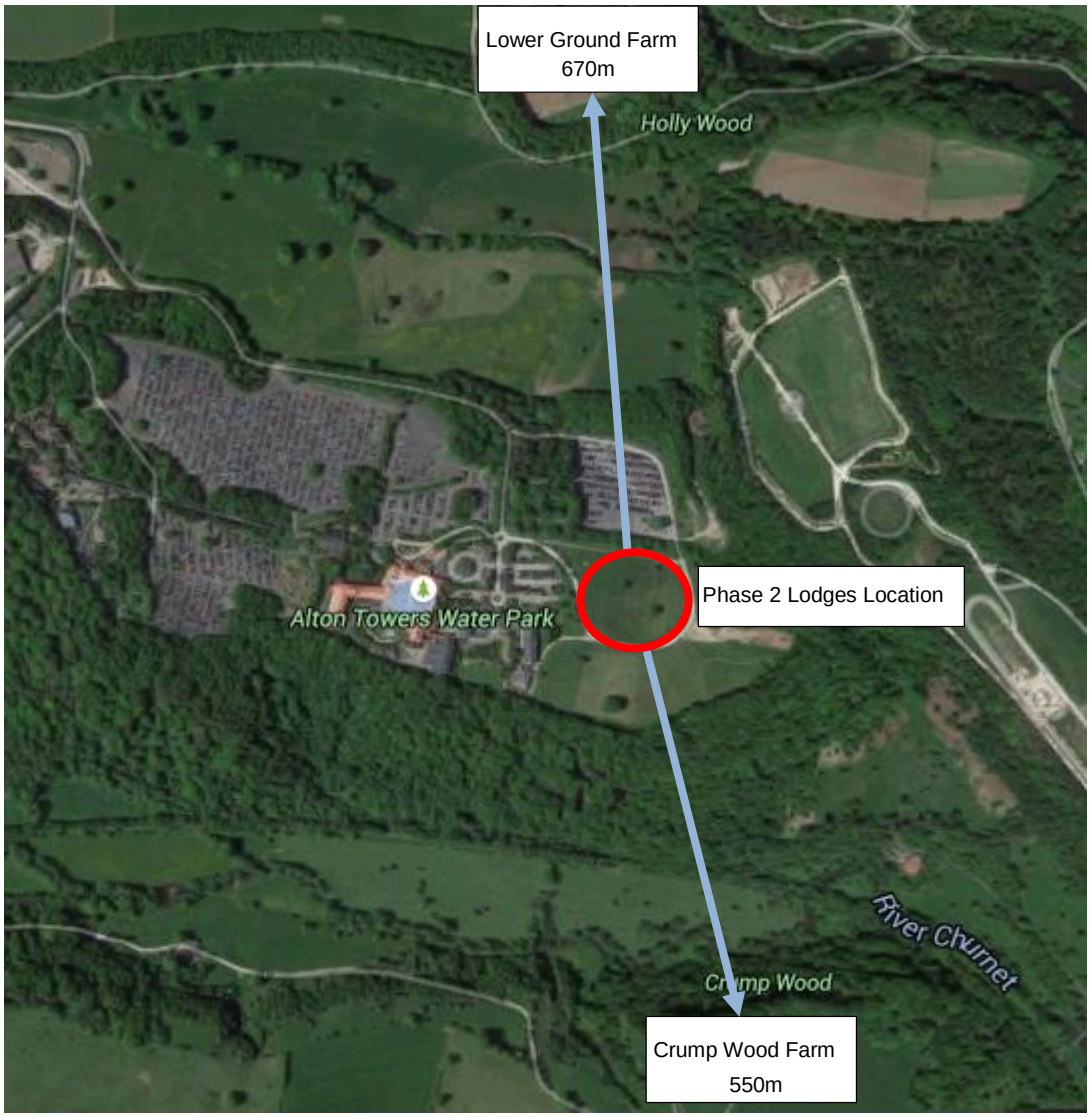
- Crump Wood Farm, approximately 550m to the **south**;

- Lower Ground Farm, off Wootton Lane, approximately 670m to the **north;**

1.10. All other receivers are at a greater distance than those presented above, with higher ambient noise levels compared to those above.

1.11. These NSRs are illustrated in the following figure.

Figure 3 NSR distances relative to the nearest boundary of the phase 2 lodges site



1.12. Criteria and calculation methodology has been developed based upon accepted code of practice for the assessment of environmental noise. For consistency of assessment, this report also makes reference to the Phase 1 report and assessment as developed for the Lodges and Treehouses (February 2014).

1.13. Further information is provided in Section 3 of this report.

2. Policy & Guidance Documents

2.1. National & Local Policy and Guidance

Noise Policy Statement for England

2.2. The Noise Policy Statement for England (NPSE) applies to all forms of noise including environmental noise, neighbour noise and neighbourhood noise but does not apply to noise in the workplace. The Government recognises that the effective management of noise requires a co-ordinated and long term approach that encompasses many aspects of modern society.

2.3. The long term vision of Government noise policy is set out to promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.

2.4. This long term vision is supported by three aims:

- avoid significant adverse impacts on health and quality of life;
- mitigate and minimise adverse impacts on health and quality of life; and
- where possible, contribute to the improvement of health and quality of life.

National Planning Policy Framework, 2012 (NPPF)

2.5. The National Planning Policy Framework (NPPF) includes the following statements relating to noise and the requirement to take it into account in the planning process:

2.6. Section 109 indicates that “The planning system should contribute to and enhance the natural and local environment by:

- preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability”.

2.7. Section 123 indicates that “Planning policies and decisions should aim to:

- avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
- mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;
- recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and
- identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.”

2.8. The NPPF does not therefore provide absolute limits on noise that are acceptable or unacceptable in a given situation. It does, however, set out the need to use planning decisions, including through the use of conditions, to avoid or mitigate adverse impacts on health and quality of life resulting from noise.

The Control of Pollution Act 1974

2.9. The Control of Pollution Act 1974 Section 61 sets out the procedures whereby contractors may obtain 'Prior Consent' for construction works within agreed noise limits. Applications for such consents would be made to the local authority and would contain a construction method statement and the steps to be taken to minimise noise. The local authority has the power to attach conditions to any consent given.

The Environmental Protection Act 1990

2.10. Under Part III of the Environmental Protection Act 1990 as amended by the Noise and Statutory Nuisance Act 1993, local authorities have a duty to investigate noise complaints relating to a variety of sources, excluding road traffic noise. If the local authority is satisfied that the noise amounts to a statutory nuisance it will serve an Abatement Notice which may require that the noise be stopped altogether or limited to certain times.

3. Assessment Methodology

3.1. The following British Standards, Codes of Practice and references have been referred to and used as part of the assessment:

- Construction noise activities have been considered in accordance with methodology and data contained within BS5228-2009+A1:2014 'Code of Practice for noise and vibration from construction and open sites-Part 1';
- Traffic noise impacts have been considered in accordance with guidance within DMRB (Design Manual for Roads and Bridges) and CRTN (Calculation of Road Traffic Noise);
- Operational noise from has been assessed in accordance with BS4142:1997 "Method for rating industrial noise affecting mixed residential and industrial areas", in line with Phase 1 assessments.

BS5228-2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Noise

3.2. There are no statutory limits regarding construction noise. BS5228-1:2009+A1:2014 '*Code of practice for noise and vibration control on construction and open site – Part 1: Noise'*, provides guidance on assessing the potential significance of noise effects from construction activities in Annex E. Within the guidance there are two approaches described for threshold limits and noise level changes.

3.3. The following table has been reproduced from table E.1 in BS5228-1:2009+A1:2014, and shows the 'ABC criteria' thresholds for potential significant effect.

3.4. The ambient noise level is determined through baseline noise survey at, or within the vicinity of, the nearest residential properties and then rounded to the nearest 5dB to determine the appropriate category (A, B or C) and subsequent threshold value. This is compared with the noise level predicted from construction activity. A potential significant effect is indicated if the construction noise level exceeds the appropriate category threshold value. If the existing ambient level exceeds the threshold category threshold values, then a potential significant impact is indicated if the total

noise level, including both the ambient noise and the various contributions of construction noise, is greater than the ambient noise level by more than 3dB.

Table 1 Construction Activity Noise Levels: Example Threshold of Potential Significant Effect at Dwellings (BS5228-1:2009+A1:2014)

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 total $L_{Aeq,T}$ 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 the 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: Applied 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.			

Department for Transport Memorandum, Calculation of Road Traffic Noise, 1988

3.5. The Department for Transport Memorandum, Calculation of Road Traffic Noise provides methods for measuring and calculating noise levels from road traffic, which is assessed over an 18 hour period from 06:00 to 24:00, using annual average weekday traffic (AAWT) flows. The basic noise level for a road segment can be calculated using the traffic flow, traffic speed and percentage heavy vehicles for a road segment. The traffic data will be based on the construction methods that are to be employed and information from the traffic assessment (TA).

Design Manual for Roads and Bridges part 11:3:7

3.6. The advice note entitled 'Design Manual for Roads and Bridges, Volume 11, Section 3, Part 7 HD 213/11 Noise and Vibration' dated 2011 provides guidance on the assessment of the impacts that road projects may have on levels of noise and vibration. Where appropriate, this advice may be applied to existing roads.

3.7. It provides guidance on the significance of changes in road traffic noise, identifying that changes in noise smaller than 1 dBA are not perceptible in the short term. Assuming no changes to percentage composition of heavy goods vehicles or traffic speeds, an increase in traffic volume of 25% is required to alter the noise levels by 1 dBA.

3.8. The advice note gives an example classification of magnitude of impacts for opening year road traffic noise impacts, as shown in Table 2:

Table 2 DMRB Noise Changes and Magnitude of Opening Year Impacts

Noise change, $L_{A10,18h}$	Magnitude of Impact
0	No change
0.1 – 0.9	Negligible
1 – 2.9	Minor
3 – 4.9	Moderate
5+	Major

3.9. Although advice is given on the magnitude of impacts, no specific guidance is provided on the significance of the effect of these changes.

BS 4142: 1997 Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas

3.10. BS 4142:1997 describes methods for determining and assessing noise levels from fixed noise sources with a view to determining the likelihood of complaints. BS4142 has recently been updated (2014), however, for consistency with the Phase 1 assessment, this project refers to the 1997 revision. This approach has been agreed with the Local Authority.

3.11. The likelihood of complaints about noise from the occupiers of nearby residential properties can be assessed using the method described in BS4142:1997. This method compares the rating noise level to the measured background noise level in the absence of the source. Rating noise level is defined as the noise level from the source, adjusted for certain acoustical features. It is measured in terms of dB L_{Aeq} which is an energy based acoustic indicator. The standard defines the 'specific noise level' as the L_{Aeq} of the source, and the 'background level' as the L_{A90} level without the source operating.

3.12. Guidance on how to measure the background noise level, L_{A90}, is also provided in the standard. The length of measurement should be sufficient to obtain a representative value for the background noise level and should cover all periods when the specific noise will operate.

3.13. The standard states that "Certain acoustic features can increase the likelihood of complaint over that expected from a simple comparison between the specific noise level and the background noise level. Where present at the assessment location, such features are taken into account by adding +5 dBA to the specific noise level to obtain the rating noise level. A +5 dBA correction is applied if one or more of the following features occur, or are expected to be present for new or modified noise sources:

- The noise contains a distinguishable, discrete, continuous note (whine, hiss, screech, hum, etc.).
- The noise contains distinct impulses (bangs, clicks, clatters, or thumps).
- The noise is irregular enough to attract attention.

The standard then rates the likelihood of complaints by comparing the rating noise level with the background noise level:

- Where the rating noise level is more than 10 dB above the background level, then complaints are likely.

- Where the rating noise level is more than 10 dB below the background noise level, then this is a positive indication that complaints are unlikely.
- Where the rating noise level is 5 dB above the background noise level, then this is of marginal significance.

Guidelines for Environmental Noise Impact Assessment – version 1.2:2014 (IEMA)

3.14. This document prepared by The Institute of Environmental Management and Assessment (IEMA), offers guidelines for acoustic professional for the development of noise impact assessments.

3.15. Although not a statutory guidance document, it presents a useful resource for establishing a common approach to environmental assessment of noise.

3.16. The guidelines offer a number of examples to demonstrate potential relationships between noise impacts (magnitude), effect and significance.

3.17. The following table is able from the guideline document, in relation to impacts from relative changes in noise levels.

Table 3 Impact from change in noise levels

Long Term Impact Classification (>5 years)	Short Term Impact Classification (<5 years)	Sound level change dB LAeq,T (positive or negative) T=either 16hr day or 8hr night
Negligible	Negligible	≥ 0 dB and < 1 dB
	Minor	≥ 1 dB and < 3 dB
Minor	Moderate	≥ 3 dB and < 5 dB
Moderate	Major	≥ 5 dB and < 10 dB
Major		≥ 10 dB

4. Proposed Criteria

4.1. For the purposes of this assessment, the following criteria has been used as a guideline.

4.2. Impacts relating to transportation have been considered in accordance with guidance outlined within DMRB, based upon changes in ambient noise levels. This relates to both construction and operational transportation.

4.3. Noise from construction activities have been assessed in accordance with guidance outlined within BS5228. In this instance, based upon ambient noise levels at receivers, the Threshold value is 65 dB $L_{Aeq.}$ Predicted construction noise impacts above this Threshold would be deemed a 'significant' impact. Where levels are predicted to be below the Threshold, impacts are deemed not to be 'significant'.

4.4. Operational impacts have been considered in accordance with BS 4142;1997, to remain consistent with the Phase 1 assessment. Operational impacts have been further assessed with reference to IEMA guidance.

5. Baseline Data Collection

5.1. A baseline survey of the sound environment in the proximity of Alton Towers Resort was undertaken over a representative weekend period, on Sunday 15th March 2015.

5.2. Measurements were taken at a number of receiver locations around the perimeter of the Alton Towers Resort. However, for the purposes of this assessment, only measurements taken at, or near, the defined receivers for this assessment have been presented.

5.3. Measurements representative of Crump Wood Farm were undertaken down further down the track leading to the farm. These measurements were taken in a similarly remote rural location as Crump Wood Farm.

5.4. Measurements representative of Lower Ground Farm were undertaken at Wootton Lane cattle grid, beside the gate that leads to the farm.

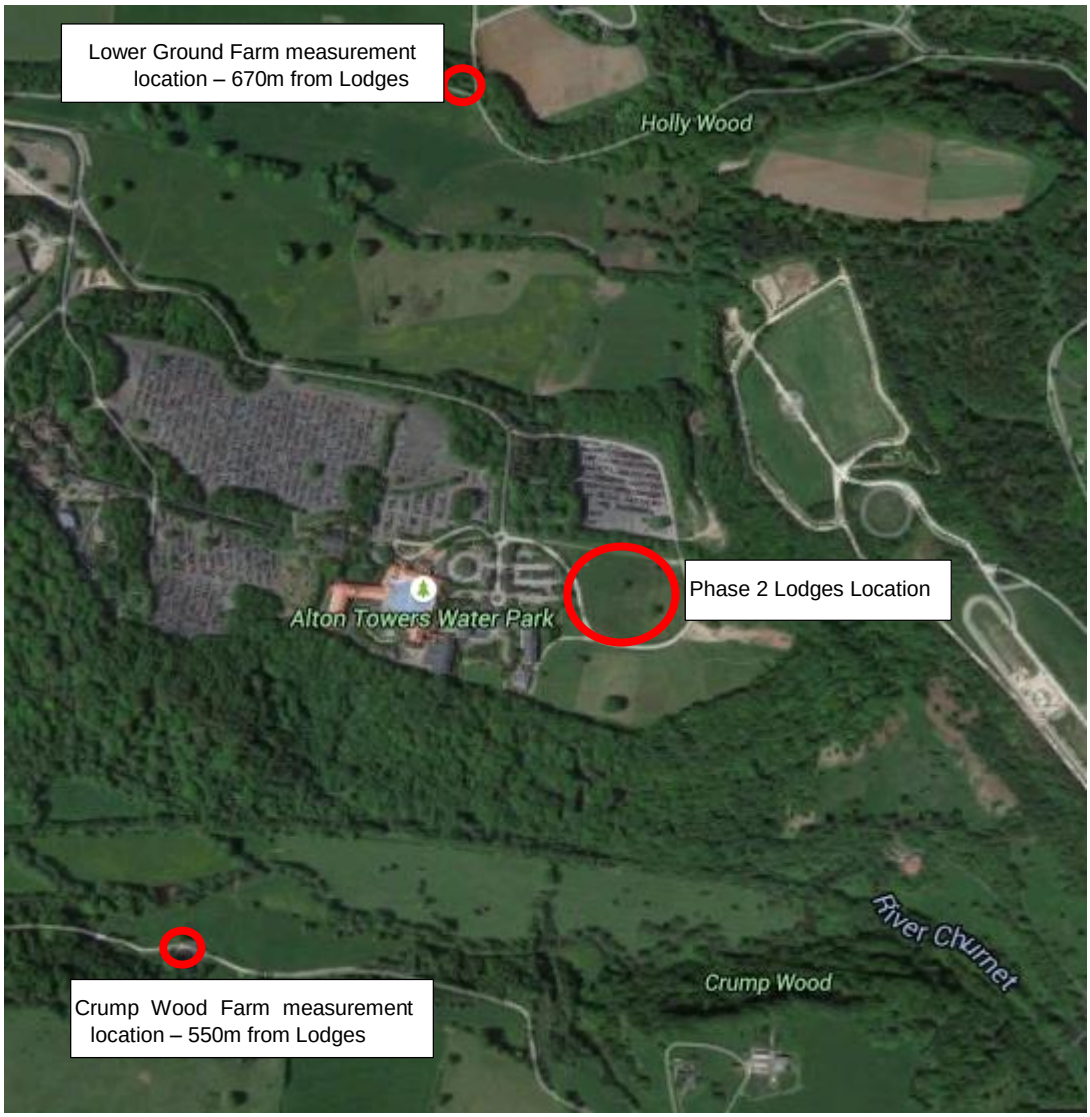
5.5. Measurements at these locations were undertaken between 11:33AM and 14.48PM.

5.6. The measurement equipment was calibrated before and after measurements were taken and no drift was observed. Details of the equipment used for the survey are included in Appendix B of this report.

5.7. Meteorological conditions during the measurement period were in line with recommendations for environmental noise surveys, with minimal wind (<5m/s) during all surveys. An air temperature of 15°C was noted during surveys. The cloud cover was minimal over both the 9th and 10th measurement days. Meteorological conditions did not affect the measurement results.

5.8. Several measurements were taken at each defined location. Measurements were undertaken over 15 minute time periods. The measurement locations are shown in the following Figure.

Figure 4 Measurement locations



5.9. The measurement locations illustrated in the above Figure are further detailed below:

Crump Wood Farm: Located south of the proposed lodges site. This location is down a quiet track accessed from Alton Village. The soundscape consists of wildlife sounds, water running sounds from nearby river and the occasional car and dog walker.

Lower Ground Farm: The location was at the eastern end of Wootton Lane. The soundscape consisted of wildlife sounds and the occasional car.

5.10. The following table outlines the averaged results of the measurements. The L_{Aeq} values are the logarithmic averages while the L_{A90} values are the lowest measured.

Table 4: Averaged measured noise levels

Location	Averaged L_{Aeq} dB	Lowest L_{A90} dB	Relative distance from proposed attraction to receiver
Crump Wood Farm	49 dB	44 dB	550m

Lower Ground Farm	43 dB	32 dB	670m

5.11. Although the above levels were measured during representative daytime hours, given the remote locations of the receivers and measurement locations, these levels are expected to be representative of evening hours also.

5.12. The above levels form the basis of the assessment undertaken for this project.

5.13. Detailed measurement results are included in Appendix A of this report.

6. Construction Noise Assessment

Construction Overview

6.1. It is understood that the construction programme will be phased over a number of years. The construction periods are anticipated to be phased as follows:

- Development phase 2.1 - June 2018 to March 2019
- Development phase 2.2 – March 2020 to TBC
- Development phase 2.3 – March 2021 to TBC

6.2. It is understood that the construction of the Phase 2 Lodges will replicate the Phase 1 Lodges in terms of methods and procedure, with construction elements remaining the same. The lodges themselves will follow a modular construction approach, with the main construction process being undertaken off site.

6.3. The Tipis will be constructed from lightweight tensile materials and will be erected on site. The other structures (huts, reception, service core, water tank and extension to the restaurant cellar), will be constructed on site in-situ, using traditional methods and materials, such as concrete bases and brick / block structural elements.

Construction Traffic

6.4. Development phase 2.1 construction activities are expected to be undertaken over a nine month period. Approximately six months of the construction programme will be undertaken when the Resort is closed for the winter. It is anticipated that construction equipment and materials will be stored on site, thereby reducing the number of trips from construction vehicles to and from the site.

6.5. Although the exact construction periods for phases 2.2 and 2.3 are currently not confirmed, they are expected to be shorter than 2.1.

6.6. At the time of writing, it was unknown the extent of construction vehicles that will arrive at the Resort, however, the daily numbers are expected to be low in comparison to the overall traffic in the area, even during Alton Towers Resort winter shut down period. As a worst case assumption a number of ten construction vehicles a day has been considered. This is a negligible percentage (<1%) of the overall total trips to Alton Towers on a daily basis, which is predicted to be in excess of 6,000 on a peak day.

6.7. It is anticipated that any construction traffic would use the main Farley Road entrance to enter and leave the site. All construction traffic will arrive during Alton Towers Resort normal opening hours, or just before Resort opening. No night time deliveries will be made. No construction transportation is anticipated during weekends.

6.8. It should be noted that there were no adverse construction noise impacts during the development of Phase 1 Lodges and that Alton Towers Resort are experienced in the management of construction activities, including construction transportation, within the Resort.

6.9. Construction workers will arrive by personal or shared transportation, but again, the number of vehicles will be small in comparison to the overall visitor vehicles arriving at the site on any given day, or general traffic in the areas during winter shut down.

6.10. In terms of noise impacts from transportation, anything less than a 25% increase in flows equates to a change of less than 1 dB and so is not considered an impact. In this case the predicted flows from construction traffic will be significantly less than 25% and so the impact is considered as 'No Change'.

6.11. Therefore, the impact from construction traffic is expected to be 'No Change'.

Construction Activities

6.12. All construction activities will be undertaken during daytime hours, as defined in BS5228, between 07:00 – 18:00 Monday to Friday and Saturdays between 07:00 – 13:00.

6.13. Based upon measured ambient levels at the defined NSRs, the Threshold value for 'significance' has been defined as 65 dBL_{Aeq}, in accordance with BS5228. Predicted construction noise impacts above this Threshold would be deemed a 'significant' impact. For levels predicted to be below the Threshold, impacts are deemed not to be 'significant'.

6.14. The following table presents a worst case construction equipment list, assuming all the equipment in the list operates simultaneously during development phase 2.1. The resulting 87 dB L_{Aeq} at 10m from sources, is the logarithmic addition of all the equipment noise levels. Phase 2.1 is considered a worst case example and phases 2.2 and 2.3 will result in noise levels less than those predicted for phase 2.1, given that the scale of development for these phases will be less than Phase 2.1.

Table 5 Assumed construction equipment and associated noise levels (ref. BS5228)

Assumed Construction Equipment	L_{Aeq} (dB) at 10m
Dozer 20 tonne	75
Concrete mixer truck (discharging) & concrete pump (pumping)	75
Tracked Excavator 14 tonne	70
Telescopic Handler 10 tonne	71
Roller 18 tonne	73
Hand held electric circular saw x 2	84
Compressors for hand tools x 2	73
Club hammer x 2	82
Total (dB) L_{Aeq} at 10m	**87**

6.15. Assuming the above equipment all operates simultaneously, during phase 2.1, the resulting noise level would be 87 dB (A) at 10m from the construction sources.

6.16. The following table outlines the predicted impact from construction activities.

Table 6 Construction noise assessment in accordance with BS5228 A, B, C method

Location	Relative distance from proposed attraction to receiver	Distance correction based upon point source attenuation, dB	Defined Threshold value, BS5228, L_{Aeq} dB	Predicted noise level (construction + ambient)	Significant Impact Predicted?
Crump Wood Farm	550m	35 dB	65 dB	54 dB	No Significant Impact Predicted
Lower Ground Farm	670m	37 dB	65 dB	51 dB	No Significant Impact Predicted

6.17. Soft ground corrections and shielding from Alton Towers Resort buildings and attractions have not been considered in this instance and would reduce the predicted levels further.

6.18. It can be seen from the above assessment that the predicted construction levels do not exceed the outlined Threshold Values as outlined in BS5228. Therefore, no 'significant' impact is predicted from construction activities.

6.19. Phases 2.2 and 2.3 will be undertaken from March 2020 and March 2021, respectively. Construction noise levels from these phases of development will be less than phase 2.1, due to the reduced extent of construction overall, relative to phase 2.1.

6.20. The time period difference between the early construction phases and the later phases has been considered within this assessment. However, ambient noise levels in the study area are not expected to change significantly over this time period and the conclusions outlined above will remain valid.

7. Operational Noise Assessment

Transportation

7.1. A traffic assessment has been undertaken for the proposed Phase 2 Lodges development. The assessment concludes that approximately 85% of guests using the Phase 2 Lodges would be visiting the Resort anyway. The assessment predicts that the proposals would result in a maximum of nine additional trips per day, directly relating to the Phase 2 Lodges. This is a negligible percentage of the overall total trips to Alton Towers on a daily basis, which is predicted to be in excess of 6,000 on a peak day.

7.2. This takes into account all three phases of the development.

7.3. In terms of noise impacts from transportation, anything less than a 25% increase in flows equates to a change of less than 1 dB and so is not considered an impact. In this case the predicted flows from construction traffic will be significantly less than 25% and so the predicted impact is considered as 'No Change'.

7.4. Therefore, the predicted impact of sound relating directly to operational transportation for these events, would be 'no change'.

Mechanical & Electrical Services Noise

7.5. Service areas form part of the proposals for the Phase 2 Lodges. These comprise mainly of storage areas, waste disposal, garage space and buried services. Furthermore, a large part of the service distribution to the proposed lodges and associated spaces will be provided from Phase 1 mechanical and electrical installations.

7.6. Potential noise impacts from Phase 1 Lodges and Treehouses were assessed and approved under a separate planning application in 2014, reference SMD/2014/0107. This included assessment of all proposed plant in accordance with BS4142:1997.

7.7. It is understood that an acoustic consultant will be engaged during the detailed design process for the Lodges and so consideration will be given to the impact of building services plant, as the design develops and plant noise levels become available.

7.8. All phase 2 plant will be assessed to ensure that the Rating level that does not exceed existing background noise levels (expressed as L_{A90} dB), at defined noise sensitive receivers. This assessment should be carried out in accordance with BS4142:1997, as agreed with the Local Authority and consistent with the Phase 1 lodges development. An assessment in accordance with BS4142:2014, would also be acceptable providing the resulting cumulative noise level from all mechanical and electrical installations are not higher than those outlined above.

7.9. This assumes building services equipment will operate during day time and evening hours only.

7.10. Therefore, sound from building services relating directly to Phase 2 Lodges will be assessed as part of the design process to ensure that there are no impacts from noise. This is easily achievable within the current designs and the project presents no constraints in this regard.

Operational Sound from Guest Activities

General Guest Noise

7.11. Development phase 2.1 will increase the current lodge accommodation numbers in this area by 26 lodges (52 keys). The Phase 1 lodges development included 122 Lodges and 10 Tree Houses. Therefore, the phase 2.1 construction proposals will increase the lodge accommodation by approximately 30%.

7.12. The total Phase 2 lodge proposals will increase the current lodge accommodation numbers in this area by 35 lodges (70 keys). Therefore the Phase 2 proposals will increase the Lodge accommodation by approximately 50%. However, the Phase 2 development will not be completed until late 2021 at the earliest.

7.13. The Phase 1 Lodge and Treehouse development has been fully operational since April 2015, with no impacts to receivers.

7.14. In terms of impacts from development phase 2.1 lodge guests, this increase would present a potential 1 dB impact over and above the current Phase 1 development, from guest activities, based upon increases in guest numbers.

7.15. In terms of impacts from the completed Phase 2 lodge development, this increase would present a potential 2 dB impact over and above the current Phase 1 development, from guest activities, based upon increases in guest numbers. This 2 dB would be realised over a minimum three year period and would likely increase both L_{Aeq} and L_{A90} levels by this same amount.

7.16. In accordance with IEMA guidance, this would present a potential 'Minor' impact in the short term and a 'Negligible' impact in the long term. Given that the impacts will be realised by 1 dB increases for each phase (1dB for phase 2.1 and an additional 1 dB on completion), it is considered that the overall impact will be 'Negligible'.

7.17. Development phase 2.3 will be undertaken from March 2021. The time period difference between the early construction phases and the later phases has been considered within this assessment. However, ambient noise levels in the study area are not expected to change significantly over this time period and the conclusions outlined above will remain valid.

Guest Entertainment

7.18. Generally the Phase 2 proposals make use of Phase 1 facilities for food and beverage and entertainment, with extensions to accommodate the additional guest numbers. These activities would be included in the potential 1-2 dB impact outlined above.

7.19. The exception to this would be the addition of new Tipis provided for Phase 2, to be used for entertainment. The entertainment provided in the Tipis is expected to be relatively informal with low noise activities, without the excessive use of amplified music or speech.

7.20. In order to comply with the adopted criteria for Phase 1 and continued for Phase 2, operational entertainment activities should achieve a minimum of 10 dB below the existing background (expressed as L_{A90} dB) noise levels at defined receivers

7.21. The following table outlines the maximum noise levels that should not be exceeded within the entertainment tent, in order for adopted criteria to be achieved. The following levels make allowance for distance corrections to the defined receivers and allows a conservative 5 dB loss for the fabric of the tent itself. No further corrections have been applied, such as ground correction or shielding from and structures between the tents and the receivers. Therefore, this should be considered a conservative assessment.

7.22. These levels are not appropriate to minimise impacts within the Resort itself. The potential impact of entertainment noise within the Resort (to other guests) should be considered under the general operational management plan for the development.

7.23. These levels would apply to all development phases of the proposed Phase 2 lodges.

Table 7 Maximum noise levels from entertainment tent

Receiver location	Distance correction (dB)	Correction for tent structure (dB)	Maximum average noise levels within tent, to achieve adopted criteria ($L_{Aeq,\ 15mins}$)

Crump Wood Farm	55 dB	5 dB	104 dB
Lower Ground Farm	57 dB	5 dB	94 dB

7.24. It can be seen from the above table that the averaged noise levels within the entertainment tent should not exceed a worst case level of 94 dB $L_{Aeq,15mins}$, averaged across the tent. This assumes the entertainment will act as a point source.

7.25. This also assumes that entertainment will be provided during daytime and evening hours only.

7.26. Given the nature of the proposed entertainment, it is unlikely that this level will be reached, however, the provision of an audio limiter has been included in the design to be incorporated into the signal line of the audio system. This will ensure that the above levels are not exceeded.

7.27. It should be ensured that any entertainment provided within the tent does not have excessive low frequency content, in the 63Hz and 125Hz octave bands.

7.28. The operational management plan should include the control of sound levels from entertainment noise.

Car Parking Areas

7.29. It is anticipated that the Phase 2 lodge guests will make use of the existing car parking facilities located to the north of the proposed site (Car Park J).

7.30. This area is currently used as a car park. The guests for the lodges are likely to arrive throughout the day rather than arriving all at a similar time, as is currently the case for the use of this car park. Therefore, in terms of noise impact, the situation is likely to be an improvement on the current scenario.

8. Residual Effects

8.1. At this stage, no residual effects are predicted from the proposed construction and operations of the Phase 2 Lodges. However, an acoustic consultant will be engaged throughout the design and construction process to ensure this remains the case as the design develops.

9. Conclusions

9.1. This report outlines the assessment and findings relating to a sound assessment for the proposed Phase 2 Lodges, located within Alton Towers Resort.

9.2. Noise surveys have been undertaken to establish representative ambient noise levels at noise sensitive receivers (NSRs) around the perimeter of Alton Towers Resort. These measurements form the basis of the assessments undertaken.

9.3. An assessment has been undertaken in relation to potential construction impacts. This relates to both construction traffic and construction activities, throughout the construction duration. Construction traffic is not expected to increase existing noise levels at defined noise sensitive receivers (NSRs).

9.4. An assessment of construction activities has also been undertaken, in accordance with BS5228, based upon the assumed construction programme activities. The assessment predicts that there will not be any 'significant' impacts to defined receivers.

9.5. Mechanical and electrical services noise has been considered. Generally, the Phase 2 development, will make use of Phase 1 services, which have been assessed separately. However, an acoustic consultant will be engaged by Alton Towers Resorts during the design process for Phase 2 Lodges to ensure that any building services do comply with the adopted criteria outlined within this report.

9.6. An operational noise assessment has been undertaken for operational sound from Phase 2 Lodges. General Guest activities are expected to increase noise levels by a maximum 1 dB following the completion of phase 2.1 of the development (adding an additional 26 lodges / 52 keys).

9.7. An additional 1 dB impact may prevail with the completion of phase 2.3 lodges (adding an additional 9 lodges / 18 keys) by late 2021, at the earliest. These impacts are considered Negligible.

9.8. Sound levels from entertainment activities within Tipis tensile structures have been considered. Levels from the entertainment tent should not exceed the worst case scenario of 94 dBA, within the tent. This assumes daytime and evening activities.

9.9. Based upon the above it can be seen that the proposed development will comply with the adopted criteria.

9.10. Furthermore, Alton Towers Resort will engage the services of an acoustic consultant during the design and construction stages to ensure that these elements are considered as the design progresses and that the development continues to comply with the relevant criteria.

APPENDIX A – Measurement Results

- Crumpwood Farm

Start Time	15/03/2015 11:33							
Measurement Time	00d 00:15:00.0							
	Main	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
Leq	48.3	52.7	47.1	49.8	46.6	43.2	37.3	34.7
LE	77.9	82.3	76.7	79.4	76.2	72.8	66.9	64.3
Lmax	61.6	55.0	45.7	47.5	53.0	59.3	53.0	48.5
Lmin	43	55.9	46.5	40.2	39.4	38.8	34.4	29.3
L90	44.6	45.1	40.8	42.4	41.6	39.8	35.2	28.7
Start Time	15/03/2015 11:48							
Measurement Time	00d 00:15:00.0							
	Main	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
Leq	47.9	53.1	48.7	49.7	46.7	42.4	36.4	30.9
LE	77.5	82.7	78.3	79.3	76.3	72.0	66.0	60.5
Lmax	63.5	59.5	53.7	59.1	60.8	62.2	41.8	32.0
Lmin	41.8	45.6	36.8	36.5	38.0	37.6	34.6	28.5
L90	43.9	45.0	39.4	41.6	40.8	39.2	35.0	28.7
Address	3							
Start Time	15/03/2015 12:03							
Measurement Time	00d 00:15:00.0							
	Main	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
Leq	47.6	53.5	46.8	49.5	46.1	42.1	36.6	31.5
LE	77.2	83.1	76.4	79.1	75.7	71.7	66.2	61.1
Lmax	57.3	52.5	49.1	61.5	57.0	49.0	39.5	32.1
Lmin	42.3	49.2	38.0	37.5	38.5	38.2	35.0	28.8
L90	44.4	45.4	39.4	42.9	41.5	39.6	35.2	29.0
Address	4							
Start Time	15/03/2015 12:18							
Measurement Time	00d 00:15:00.0							

	Main	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
Leq	47.3	52.0	51.1	49.4	45.5	41.4	36.6	31.5
LE	76.9	81.6	80.7	79.0	75.1	71.0	66.2	61.1
Lmax	60.9	65.8	76.5	60.5	53.1	43.3	36.4	33.3
Lmin	41.9	49.0	38.5	38.2	37.8	38.1	34.1	28.7
L90	44	45.1	39.0	41.6	40.9	39.2	35.2	28.9
Address	5							
Start Time	15/03/2015 12:33							
Measurement Time	00d 00:15:00.0							
	Main	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
Leq	47.2	51.8	46.0	49.2	45.6	41.5	36.3	33.1
LE	76.8	81.4	75.6	78.8	75.2	71.1	65.9	62.7
Lmax	57.6	52.2	56.2	58.3	58.7	50.6	35.3	29.5
Lmin	42.5	47.6	38.7	38.5	39.2	38.1	34.6	29.2
L90	44	45.5	39.3	41.6	40.8	39.1	35.0	29.0
Address	6							
Start Time	15/03/2015 12:48							
Measurement Time	00d 00:15:00.0							
	Main	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
Leq	47.3	51.8	47.5	48.8	45.8	41.8	36.8	32.6
LE	76.9	81.4	77.1	78.4	75.4	71.4	66.4	62.2
Lmax	56.7	48.3	50.5	62.1	55.8	47.1	39.4	29.6
Lmin	42.3	49.2	37.2	38.6	38.5	38.0	34.7	29.5
L90	44.3	46.0	40.0	42.2	41.4	39.5	35.3	29.3
Address	7							
Start Time	15/03/2015 13:03							
Measurement Time	00d 00:15:00.0							
	Main	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
Leq	47.8	52.3	46.9	50.1	46.4	42.1	36.7	31.8
LE	77.4	81.9	76.5	79.7	76.0	71.7	66.3	61.4
Lmax	57.4	53.7	51.0	58.9	58.8	49.3	37.4	32.3
Lmin	42.5	44.3	38.3	39.1	39.2	38.0	34.7	29.2
L90	44.4	45.8	39.7	42.7	41.5	39.6	35.2	29.1
Address	8							
Start Time	15/03/2015 13:18							
Measurement Time	00d 00:15:00.0							
	Main	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
Leq	49	53.1	46.8	51.7	47.5	43.4	37.5	32.6
LE	78.6	82.7	76.4	81.3	77.1	73.0	67.1	62.2

Lmax	65.7	54.1	52.7	58.6	55.4	65.4	50.8	37.1
Lmin	42	46.6	38.1	40.2	37.8	37.8	34.2	29.3
L90	44.8	45.7	39.8	43.6	41.9	39.9	35.4	29.1
Address	9							
Start Time	15/03/2015 13:33							
Measurement Time	00d 00:15:00.0							
	Main	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
Leq	48.5	53.3	46.1	50.8	46.8	42.9	37.6	33.3
LE	78.1	82.9	75.7	80.4	76.4	72.5	67.2	62.9
Lmax	60.4	56.2	53.4	55.1	53.7	58.8	51.8	43.7
Lmin	43	42.3	38.2	41.1	39.5	38.9	34.8	29.4
L90	45	46.0	40.1	44.0	42.4	40.1	35.5	29.4
Address	10							
Start Time	15/03/2015 13:48							
Measurement Time	00d 00:15:00.0							
	Main	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
Leq	48.8	50.5	45.2	51.9	47.3	43.1	37.1	31.6
LE	78.4	80.1	74.8	81.5	76.9	72.7	66.7	61.2
Lmax	62.5	52.0	51.1	63.3	59.2	60.9	41.4	30.2
Lmin	42.5	46.8	37.5	38.2	39.4	38.3	34.8	28.8
L90	45	45.4	39.5	44.4	42.2	40.0	35.4	28.9
Address	11							
Start Time	15/03/2015 14:03							
Measurement Time	00d 00:15:00.0							
	Main	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
Leq	54.4	56.4	56.0	54.0	52.0	49.2	46.7	36.0
LE	84	86.0	85.6	83.6	81.6	78.8	76.3	65.6
Lmax	76.3	75.7	75.9	72.0	71.6	73.9	68.4	50.8
Lmin	42.2	48.1	38.4	38.9	38.3	38.0	34.9	29.8
L90	44.4	45.4	39.2	43.0	41.5	39.6	35.3	29.0
Address	12							
Start Time	15/03/2015 14:18							
Measurement Time	00d 00:15:00.0							
	Main	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
Leq	47.9	54.2	48.5	50.1	46.0	42.5	36.8	31.8
LE	77.5	77.2	69.7	75.8	70.7	67.2	61.6	56.1
Lmax	57.6	54.2	44.3	42	43.2	47.3	40.3	30.8
Lmin	41.8	46.8	33.8	31	33.6	33.6	28.6	23.2
L90	44.2	41.6	33.3	38	36.1	34.9	30.5	23.8

Address	13							
Start Time	15/03/2015 14:33							
Measurement Time	00d 00:15:00.0							
	Main	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
Leq	49	50.0	44.9	51.9	47.4	43.2	37.1	34.2
LE	78.6	76.5	67.2	77.5	72.2	67.8	61.8	55.8
Lmax	62.2	50.3	41.2	66.7	55.6	47.3	36.4	27
Lmin	43.1	43.2	33.1	35.1	34.6	33.9	29.8	25.4
L90	45	41.6	33.9	39.5	37	35.4	30.8	24
Address	14							
Start Time	15/03/2015 14:48							
Measurement Time	00d 00:09:32.3							
	Main	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
Leq	47.7	51.7	47.7	49.4	45.9	42.5	37.2	32.3
LE	75.3	75.1	67.5	72.8	68.6	65.4	60.1	55
Lmax	60.2	46.1	36.1	44.3	43.5	46.9	43.7	51.8
Lmin	43.6	46.8	34.1	37.2	36.2	34.3	29.7	23.5
L90	44.9	41.9	33.8	39.6	37.3	35.4	30.8	23.9

- **Lower Ground Farm**

Start Time	15/03/2015 13:05							
Measurement Time	00d 00:15:00.0							
	Main	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
Leq	39.8	49.1	46.3	40.2	36.6	34.7	30.6	25.8
LE	69.4	78.7	75.9	69.8	66.2	64.3	60.2	55.4
Lmax	54.2	69.6	59.0	54.6	54.4	47.9	40.1	41.4
Lmin	29.3	40.5	34.6	28.7	25.9	24.9	17.7	15.3
L90	32.2	42.2	35.8	30.8	29.1	27.4	20.6	16.0
Address	8							
Start Time	15/03/2015 12:48							
Measurement Time	00d 00:15:00.0							
	Main	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
Leq	44.3	50.4	50.2	42.7	39.7	40.7	35.0	30.8
LE	73.9	80.0	79.8	72.3	69.3	70.3	64.6	60.4
Lmax	70.7	68.8	69.0	69.1	65.3	68.9	57.2	53.7
Lmin	32	42.9	36.4	30.9	28.9	27.9	21.0	15.5
L90	34.4	43.3	37.6	32.1	31.1	29.3	22.6	17.8

APPENDIX B – Measurement Equipment

Equipment	Manufacturer	Type	Serial Number

Sound Level Meter	Rion	NL-52	1043459
Preamplifier	Rion	NH-25	43488
Microphone	Rion	UC-59	7235
Calibrator	Rion	NC-74	35246905

MEASUREMENT SYSTEMS

CERTIFICATE OF CONFORMANCE

Date of Issue	**03 March 2015**
Customer	**Cahill Design Consultants**
Certificate Number	**CONF031502**

	Manufacturer	**Type**	**Serial Number**
Sound Level Meter	Rion	NL-52	01043459
Preamplifier	Rion	NH-25	43488
Microphone	Rion	UC-59	07235

This is to certify that the instrument was tested and calibrated at the Manufacturer's factory according to their specification and that the product satisfied all the relevant requirements of the following Standards:

IEC 61672-1:2002 Class 1.

The instrument also received a functional check by ANV Measurement Systems prior to despatch in the UK, in accordance with our standard procedures.

Signed Amrat C Patel Position Laboratory Manager Date.03 March 2015

Amrat C Patel

BEAUFORT COURT, 17 ROEBUCK WAY, MILTON KEYNES, MK5 8HL
☎ 01908 642846 🖷 01908 642814
✉ info@noise-and-vibration.co.uk 💻 www.noise-and-vibration.co.uk

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