
Queens Market, Rhyl

DRAFT
Environmental Noise Assessment Report

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Prepared for: ION Developments
2 Queen Square
Liverpool
L1 1RH

Prepared by: BDP Acoustics
11 Ducie Street
PO Box 85
Piccadilly Basin
Manchester
M60 3JA

BDP.

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1. Introduction

1.1 Proposed development

BDP Acoustics have been commissioned by ION Developments to undertake an environmental noise assessment report to support a hybrid planning application for the proposed Queens Market development in Rhyl. Detailed planning permission is sought for the market hall elements, with outline planning for the other elements.

The proposed development will include the following spaces:

- Two mixed-use residential blocks located to the north of the site incorporating retail units on the ground floor.
- A Food Market Hall containing multiple food and beverage/retail units on two floors
- An Event Hall which will host events incorporating live amplified music. This space is separate to the food court but still linked via large doors in the centre of the building.
- Office and Library accommodation along Queen Street.

Our design commentary provided in this report assumes that the following operational times for the Food Hall and event hall developments

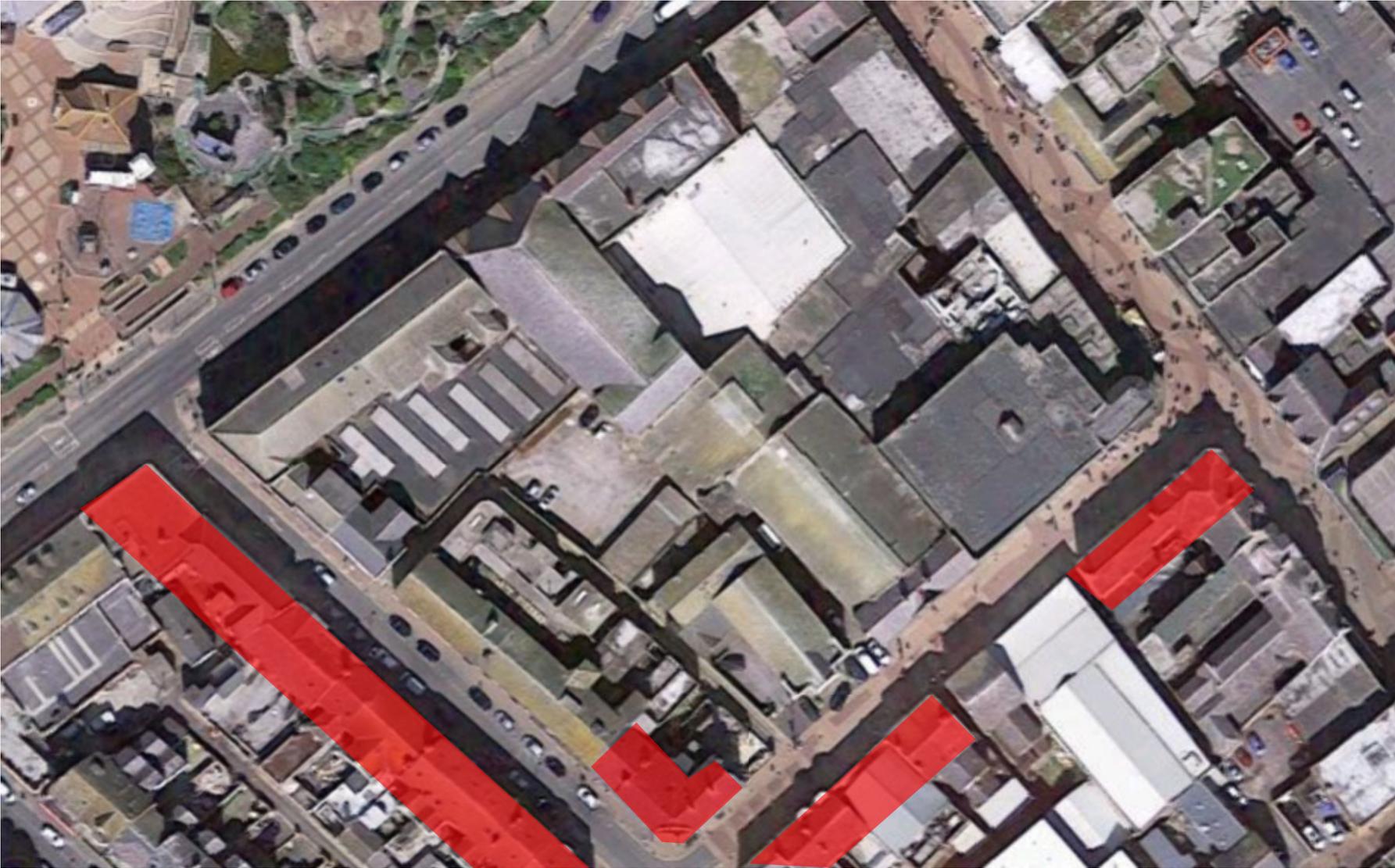
- Food Hall will operate 7 days a week from 07:00 to 22:00 hours;
- Event Hall will operate between 07:00 to 23:00 hours.

1.2 Noise assessment scope

The purpose of this report is to assess the site suitability with respect to the development operational noise break-out to the external environment and environmental noise ingress to the proposed residential units, office and library.

Based on discussions with the local planning authority, our assessment has considered the nearest existing noise sensitive premises to the site to be the existing residential properties that surround the site; these are identified in Figure 1.

Figure 1 – Assumed location of existing noise sensitive residential properties



2. Relevant guidance

The following documents have been considered in respect of the noise impact of the proposed development.

2.1 National Planning Policy Framework

The National Planning Policy Framework (NPPF) specifies the Government's planning policies for England and how these are expected to be applied. It replaces a number of previous planning policy documents, including Planning Policy Guidance 24: Planning and Noise (PPG24). Unlike PPG24 which it replaced, NPPF does not contain any methodology for objective assessment. It provides a framework within which local people and their accountable councils can produce their own distinctive local and neighbourhood plans, which reflect the needs and priorities of their communities.

Section 123 of the NPPF states the following:

"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 restriction 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."*

2.2 The Noise Council: 'Code of Practice on Environmental Noise Control at Concerts'

This document provides guidance on noise limits for large music events in various venue types, including open air sites and events within lightweight buildings. It gives guidance on how disturbance or annoyance from such events can be minimised.

The Code is designed to assist those planning a music event, those responsible for licensing such events and those responsible for enforcing the nuisance provisions of the Environmental Protection Act 1990 (England and Wales) and the Control of Pollution Act 1974 (Scotland).

The Code of Practice relates to music events '*...held in sporting stadia, arena, open air sites and within lightweight buildings.*'

2.3 IOA Pubs and Clubs Guidelines

In March 2003 the Institute of Acoustics (IOA) published its '*Good Practice Guide on the Control of Noise from Pubs and Clubs*'. The document provides guidance for the assessment and control of noise affecting noise-sensitive properties, from the public and private use of public houses, clubs, hotels, discotheques, restaurants, cafes, community or village halls and other similar premises.

The working group responsible for the Good Practice Guide also produced the '*Working Draft Annex on Criteria, Measurements Guidelines and other Relevant Information*' (November 2003), which provides suggested criteria and associated measurement techniques in relation to the advice in the Good Practice Guide.

2.4 Planning Guidance (Wales) Technical Advice Note 11, Noise

Planning Guidance (Wales) Technical Advice Note 11, Noise – October 1997 (TAN 11) states that:

'When assessing a proposal for residential development near a source of noise, local planning authorities should determine into which of the four noise exposure categories (NECs)...the proposed site falls, taking account of both day and night-time noise levels. Local planning authorities should then have regard to the advice in the appropriate NEC, as below'

The following table summarises the TAN 11 recommended noise levels for 'mixed sources' along with the corresponding TAN 11 advice for each of the four NECs. Mixed sources refers to any combination of road, rail, air and industrial noise sources. The "mixed source" values are based on the lowest numerical values of the single source limits in the table. The "mixed source" NECs should only be used where no individual noise source is dominant.

With regard to the range of noise levels referenced in TAN 11, the guidance states that:

'A recommended range of noise levels is given...for each of the NECs for dwellings exposed to noise from road, rail, air and mixed sources. However, in some cases it may be appropriate for local planning authorities to determine the range of noise levels they wish to attribute to the various NECs. Where there is a clear need for new residential development in an already noisy area some or all NECs might be increased by up to 3 dB(A) above the recommended levels. In other cases, a reduction of up to 3 dB(A) may be justified.'

Table 1: TAN 11 NECs and corresponding noise levels for mixed sources

NEC	Noise Levels $L_{Aeq,T}$ (dB)	TAN 11 Advice
A	Daytime < 55 dB Night-time* < 45 dB	Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as desirable.
B	Daytime 55 - 63 dB Night-time* 45 – 57 dB	Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection.
C	Daytime 63 - 72 dB Night-time* 57 - 66 dB	Planning permission should not normally be granted. Where it is considered that permission should be given, for example, because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.
D	Daytime > 72 dB Night-time* > 66 dB	Planning permission should normally be refused.

* Night-time noise levels (2300-0700): sites where individual noise events regularly exceed 82dB L_{Amax} (S time weighting) several times in any hour should be treated as being in NEC C, regardless of the $L_{Aeq,8H}$ (except where the $L_{Aeq,8H}$ already puts the site in NEC D).

2.5 BS4142:2014+A1:2019 'Methods for Rating and Assessing Industrial and Commercial Sound'

This edition of BS4142 was prepared under the direction of the Health and Environment Sector Board. The general basis for the standard is derived from the application of previous editions, together with accumulated experience. Some aspects, including guidance on character corrections, are based upon research which has been reported since publication of the previous edition of this standard.

2.6 Local Planning Authority

Denbighshire County Council have been consulted in regards to suitable noise level criteria and assessment methodology for the proposed development. The noise level criteria outlined in section 3 of this report has been discussed and agreed with Denbighshire County Council's Senior Technical Officer (Environmental Health), Philip Caldwell.

3. Proposed Design Criteria

The following subsections detail appropriate design criteria for both internal ambient noise levels within the development and noise from the entertainment events and fixed plant items associated with the development at the nearest noise sensitive receptors.

3.1 Proposed new residential internal ambient noise levels

For the outline planning application for the residential development we propose to assess the site with reference to guidance from Planning Guidance (Wales), Technical Advice Note 11, Noise - October 1997 (TAN 11).

Given that the current COVID-19 lockdown measures are expected to result in artificially low noise levels around the site, we have utilised historical third party noise survey data to estimate the TAN 11 Noise Exposure Category (NEC) of the site. Specifically, we have referenced noise levels measured along West Parade in the following planning noise assessment:

- Planning Stage Environmental Noise Assessment Rhyl Aquatic Centre issued by HRS Services Ltd in March 2017

In addition to estimating the TAN 11 Noise Exposure Category using historical third party noise survey data, we propose the following internal noise limits for the residential development based on guidance from BS 8233: 2014 'Guidance on Sound Insulation and Noise Reduction for Buildings' (BS8233).

Table 2: Proposed internal ambient noise levels for proposed new residential units

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 dB $L_{Aeq,16hour}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

To reduce the potential for sleep disturbance, we propose that individual noise events should not normally exceed 45 dB $L_{Amax,F}$ in bedrooms between 23:00 and 07:00 hours.

The above criteria is proposed to be complied with whilst providing minimum Part F background ventilation requirements.

For the outline planning application, we have provided high level commentary on typical mitigation measures that may be required for the residential units (e.g. glazing and ventilation sound insulation requirements). For the detailed planning application, where possible we would intend to undertake a site specific noise survey at a later date when the local noise climate is deemed to be more representative of typical conditions, which will be used to finalise the glazing and ventilator sound insulation performance to achieve the proposed BS8233 internal noise criteria.

3.2 External plant noise emissions

Based on guidance from BS 4142:2014+A1:2019 'Methods for Rating and Assessing Industrial and Commercial Sound' (BS4142), we propose the following noise limits for external plant noise at existing identified noise sensitive receptors:

The free-field equivalent plant noise rating level, $L_{Ar,Tr}$ (i.e. the specific sound level plus any adjustment for the characteristic features of the sound in accordance with BS 4142) when measured at the nearest residential noise sensitive receptor shall not exceed the existing background sound level, $L_{A90,T}$ when all plant/equipment (or any part of it) is in operation.

3.3 Event and Market Halls entertainment noise break-out

For occasional entertainment events associated with the Event and Market Halls, we propose to adopt the noise criteria presented in The Noise Council: 'Code of Practice on Environmental Noise Control at Concerts'.

The proposed noise criteria for the event frequencies of up to 30 events per year with a music end time of 23:00 hrs than is presented in the table below.

Table 3: Proposed external noise criteria for less than 30 events per year

Event frequency	Time Period	External Noise Criteria at Existing Noise Sensitive Receptors (refer to Figure 1)
Up to 3 days a year	09:00 – 23:00 hrs	The Music Noise Level* should not exceed 75dB(A) over a 15 minute period.
Up to 12 days a year, not more than 3 consecutive days.	09:00 – 23:00 hrs	The Music Noise Level* should not exceed the background noise level** by more than 15 dB(A) over a 15 minute period.
Up to 30 days a year, not more than once in a single week	09:00 – 23:00 hrs	The Music Noise Level* should not exceed the background noise level** by more than 5dB(A) over a fifteen minute period.

* In this instance, the Music Noise Level is defined as the measured L_{Aeq} at 1 metre from the façade of any existing or known future residential premises resulting from music and vocals during a concert or sound checks and not affected by other local noise sources.

** In this instance, the background noise is defined as the arithmetic average of the hourly L_{A90} measured between 19:00 and 23:00 hours.

For frequent events incorporating entertainment noise, we propose to adopt the criteria presented in the 'Working Draft Annex on Criteria, Measurement Guidelines and other relevant information' published in 2002 by the Institute of Acoustics working group responsible for producing the 2003 'Good Practice Guide on the Control of Noise from Pubs and Clubs'.

The proposed noise criteria for the event frequencies of more than 30 events per year with a music end time that may extend beyond 23:00 hrs than is presented in the table below.

Table 4: Proposed external noise criteria for frequent events continuing beyond 23:00 hrs

Event frequency	Time Period	External Noise Criteria at Existing Noise Sensitive Receptors (refer to Figure 1)
More than 30 days per year, not more than once in a single week and ends by 23:00 hrs	09:00 – 23:00 hrs	The $L_{Aeq,1minute}$ of the entertainment noise should not exceed the representative background noise level L_{A90} (without entertainment noise) by more than 5 dB; and The $L_{10,1minute}$ of the entertainment noise should not exceed the representative background noise level L_{90} (without entertainment noise) by more than 5 dB in each third octave band between 40Hz and 160Hz

More than once per week or continues beyond 23:00 hrs*	At any time	The $L_{Aeq,1minute}$ of the entertainment noise should not exceed the representative background noise level L_{A90} (without entertainment noise); and
		The $L_{10,1minute}$ of the entertainment noise should not exceed the representative background noise level L_{90} (without entertainment noise) in each third octave band between 40Hz and 160Hz

* Note that the Institute of Acoustics working group guidance states that if the criteria relating to an event frequency of more than once per week or continuing beyond 23:00 hrs are met, entertainment noise will be '...virtually inaudible inside noise sensitive property'.

4. Environmental noise survey

4.1 Survey Details

A noise survey was undertaken by Gavin Stevenson MIOA of BDP Acoustics to determine the existing ambient (L_{eq}) and background (L_{90}) noise levels representative of the immediate surrounding area. The noise survey was conducted between 21:00 hours on Tuesday 21st July to 10:22 hours on Wednesday 22nd July.

The instrumentation used for the survey was B&K 2260 Class 1 Sound Level Meter (SLM). The SLM was calibrated before and after the survey and no drifts in level were observed.

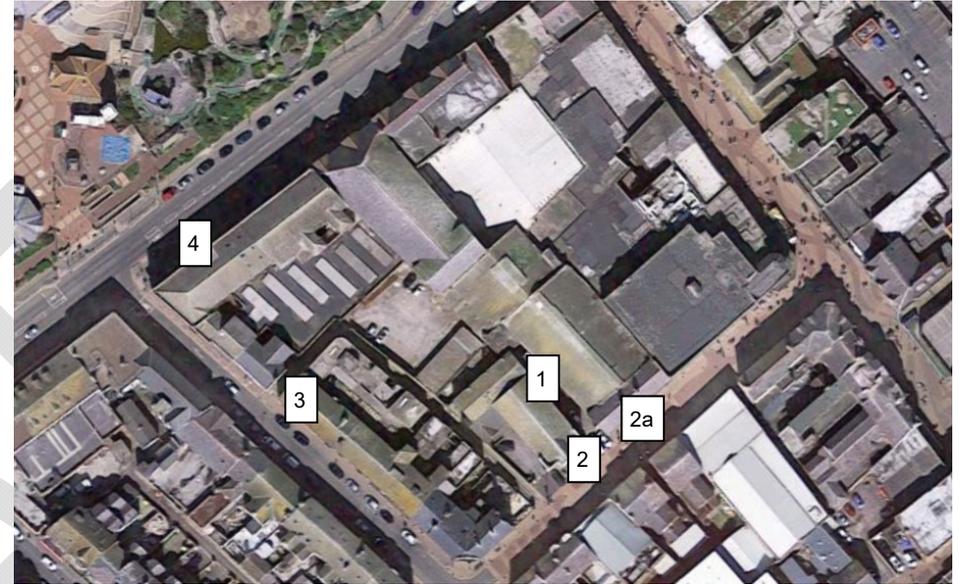
The SLM monitoring locations were free-field, approximately 1.3 metres above local ground level. The approximate locations of the measurements are presented in Figure 2.

Existing ambient (L_{eq}) and background (L_{90}) noise levels prevailing at these monitoring locations were representative of the immediate surrounding area, particularly in relation to existing and future noise sensitive premises that will overlook the proposed development.

At each position octave band and A-weighted fast response levels were recorded for a comprehensive suite of noise level metrics.

Weather conditions during the 21st July measurements were dry with low wind speeds (<2m/s), temperatures varying around 15°C and cloud cover of approximately 10%. Weather conditions during the 22nd July measurements were generally dry with low wind speeds (<2m/s), temperatures of around 13°C and 100% cloud cover.

Figure 2 – Site plan indicating noise monitoring location



4.2 Description of Noise Climate

A subjective description of the noise climate observed at the site is provided in the table below.

Table 5: Subjective description of noise climate during the survey

Position	Location and ambient noise climate description
1	<p>Alley between the existing Queens Market building and the adjacent Christian Centre off Sussex Street.</p> <p>The ambient noise levels (L_{eq}) were generally controlled by Seagull activity.</p> <p>The background noise levels (L_{90}) were generally controlled by Seagull activity and local road traffic, with some distant plant during the late evening / night.</p>
2	<p>Outside Christian Centre entrance, directly opposite residential accommodation above ground floor retail units on Sussex Street.</p> <p>The ambient noise levels (L_{eq}) were generally controlled by Seagull activity and some traffic passing.</p> <p>The background noise levels (L_{90}) were generally controlled by Seagull activity and local road traffic, with some distant plant during the late evening / night.</p>
2A	<p>Outside Market Hall entrance on Sussex Street, representative of position 2 but moved due to nearby intermittent construction works.</p> <p>The ambient noise levels (L_{eq}) were generally controlled by Seagull activity and some traffic passing.</p> <p>The background noise levels (L_{90}) were generally controlled by Seagull activity and local road traffic, with some distant plant during the late evening / night.</p>
3	<p>Open carpark opposite residential terraced houses on Queen Street.</p>

Position	Location and ambient noise climate description
	<p>The ambient noise levels (L_{eq}) were generally controlled by Seagull activity and passing traffic.</p> <p>The background noise levels (L_{90}) were generally controlled by Seagull activity and local road traffic, with some distant plant during the late evening / night.</p>
4	<p>Spot measurements on West Parade, approximately 2.5m from carriageway.</p> <p>The ambient noise levels (L_{eq}) were generally controlled by passing road traffic.</p> <p>The background noise levels (L_{90}) were generally controlled by Seagull activity and local road traffic.</p>

4.3 Survey Results Summary

The following tables show a summary of the measured ambient and background noise levels.

Table 6: Summary of manned survey noise levels

Position	Start Time	L _{A90,5mins} Range (dB)	L _{A90,15min} Avg*	L _{A90,5mins} 63 Hz	L _{A90,5mins} 125 Hz	L _{AFmax,5min} Range (dB)	L _{Aeq,5mins} Range (dB)
1	21:00	42 - 45	43	43	46	76 - 79	57 - 61
1	22:02	42 - 43	46	43	46	67 - 76	47 - 57
1	09:47	46 - 47	46	47	47	74 - 78	57 - 62
2	21:18	44 - 44	44	50	46	75 - 85	59 - 61
2	22:19	40 - 43	41	48	45	77 - 87	57 - 61
2	23:15	39 - 39	39	47	45	64 - 74	47 - 56
2	00:15	36 - 42	39	45	42	69 - 72	49 - 56
2	01:09	38 - 41	39	44	42	68 - 72	52 - 59
2A	09:31	50 - 52	51	50	48	69 - 83	56 - 65
3	21:36	46 - 49	47	49	46	76 - 79	60 - 64
3	22:37	41 - 42	42	47	46	73 - 77	52 - 56
3	23:38	40 - 41	40	49	47	65 - 73	50 - 54
3	00:33	37 - 42	39	42	43	66 - 72	49 - 57
3	01:27	36 - 38	37	42	41	63 - 75	47 - 52
3	10:07	49 - 53	51	55	49	73 - 78	60 - 62
4	09:07	55 - 58	-	-	-	82 - 85	67 - 69

* Arithmetic average of 3 x 5 min measurements

5. Food & Event Halls entertainment noise break-out assessment

5.1 Proposed entertainment noise break-out limits

In order to enable compliance with the criteria presented in section 3.3, we recommend the absolute noise limits presented in Table 7 are adopted for everyday events containing entertainment noise which end before 23:00 hours.

Table 7: Indicative absolute entertainment noise limits based on the criteria presented in section 3.3

Event Frequency (Time period)	Music noise limit (MNL) at the façade of the existing noise sensitive premises (refer to Figure 1)	
	Queen Street	Sussex Street
Up to 3 days a year (09:00 – 23:00 hrs)	The MNL should not exceed 75dB(A) over a 15 minute period.	
Up to 12 days a year, not more than 3 consecutive days. (09:00 – 23:00 hrs)	The MNL should not exceed 57 dB(A) over a 15 minute period.	The MNL should not exceed 56 dB(A) over a 15 minute period.
Up to 30 days a year, not more than once in a single week (09:00 – 23:00 hrs)	The MNL should not exceed 47 dB(A) over a 15 minute period.	The MNL should not exceed 46 dB(A) over a 15 minute period.
More than 30 days per year, not more than once in a single week and ends by 23:00 hrs	The $L_{Aeq,1minute}$ of the entertainment noise should not exceed 47 dB; and	The $L_{Aeq,1minute}$ of the entertainment noise should not exceed 46 dB; and

Event Frequency (Time period)	Music noise limit (MNL) at the façade of the existing noise sensitive premises (refer to Figure 1)	
	Queen Street	Sussex Street
(09:00 – 23:00 hrs)	The $L_{10,1minute}$ of the entertainment noise should not exceed the representative background noise level L_{90} (without entertainment noise) by more than 5 dB in each third octave band between 40Hz and 160Hz	The $L_{10,1minute}$ of the entertainment noise should not exceed the representative background noise level L_{90} (without entertainment noise) by more than 5 dB in each third octave band between 40Hz and 160Hz
More than once per week (09:00 – 23:00 hrs)	The $L_{Aeq,1minute}$ of the entertainment noise should not exceed 42 dB; and The $L_{10,1minute}$ of the entertainment noise should not exceed the representative background noise level L_{90} (without entertainment noise) by more than 5 dB in each third octave band between 40Hz and 160Hz	The $L_{Aeq,1minute}$ of the entertainment noise should not exceed 41 dB; and The $L_{10,1minute}$ of the entertainment noise should not exceed the representative background noise level L_{90} (without entertainment noise) by more than 5 dB in each third octave band between 40Hz and 160Hz
Any night-time event (23:00 – 00:00 hrs)	The $L_{Aeq,1minute}$ of the entertainment noise should not exceed 40 dB; and	The $L_{Aeq,1minute}$ of the entertainment noise should not exceed 39 dB; and

Event Frequency (Time period)	Music noise limit (MNL) at the façade of the existing noise sensitive premises (refer to Figure 1)	
	Queen Street	Sussex Street
	The $L_{10,1\text{minute}}$ of the entertainment noise should not exceed the representative background noise level L_{90} (without entertainment noise) in each third octave band between 40Hz and 160Hz	The $L_{10,1\text{minute}}$ of the entertainment noise should not exceed the representative background noise level L_{90} (without entertainment noise) in each third octave band between 40Hz and 160Hz
Any night-time event (00:00 – 02:00 hrs)	The $L_{Aeq,1\text{minute}}$ of the entertainment noise should not exceed 37 dB; and The $L_{10,1\text{minute}}$ of the entertainment noise should not exceed the representative background noise level L_{90} (without entertainment noise) in each third octave band between 40Hz and 160Hz	The $L_{Aeq,1\text{minute}}$ of the entertainment noise should not exceed 39 dB; and The $L_{10,1\text{minute}}$ of the entertainment noise should not exceed the representative background noise level L_{90} (without entertainment noise) in each third octave band between 40Hz and 160Hz

5.2 Event Hall entertainment noise break-out assessment

Noise break-out calculations and modelling have been undertaken to evaluate the sound insulation performance required from the Event Hall building envelope to achieve the proposed entertainment noise limits.

It is expected that the recommended external noise limits for the following event frequency and operating hours are achievable with the building envelope elements outlined in the following sections.

- *Event frequency up to 30 days a year, not more than once in a single week (09:00 – 23:00 hrs)*

Note that further acoustic enhancements will be required for the building envelope elements, particularly with respect to improving the low frequency sound insulation performance, if the event hall is proposed to operate for more than 30 days a year or after 23:00 hrs.

5.2.1 Assumed entertainment noise levels

The following octave band noise levels have been used in our calculations to represent typical reverberant indoor noise levels from amplified live entertainment events within the Event Hall.

Table 8: Assumed Event Hall indoor entertainment octave band noise levels, L_{eq} (dB)

Octave Band Centre Frequency	63	125	250	500	1k	2k	4k	A
Live amplified music, L_{eq} (dB)	105	100	95	93	87	85	82	95

The noise levels presented in Table 8 are at the lower end of the range of noise levels present at professional concerts. In order to operate at higher noise levels, further enhancements to the building envelope would be required.

5.2.2 Event Hall building envelope sound insulation performance requirements

The following assessment of the Event Hall building envelope is based on achieving the external noise limit criteria for the following event frequency and operating hours:

- Event frequency up to 30 days a year, not more than once in a single week (09:00 – 23:00 hrs)

Based on the sample background noise level measurements undertaken in July 2020, the external noise limit targets associated with the event frequencies and operating hours noted above would be as follows:

- The Music Noise Level should not exceed 47 dB(A) over a 15 minute period at the façade of the residential noise sensitive receivers on Queen Street (09:00 – 23:00 hrs);*
- The Music Noise Level should not exceed 46 dB(A) over a 15 minute period at the façade of the residential noise sensitive receivers on Sussex Street (09:00 – 23:00 hrs);*

Outline octave band sound insulation requirements have been calculated for each of the Event Hall building envelope elements which will be used to inform the building envelope specifications during the detailed design stages.

The table below summarises the calculated sound insulation performance required for each of the building envelope elements, expressed using the single figure weighted sound reduction index ($R_w + C_{tr}$), along with example constructions that achieve the sound insulation performance requirement.

Table 9: Summary of Event Hall building envelope sound insulation requirements, $R_w + C_{tr}$ (dB)

Building Element	Minimum sound insulation performance	Example build-up to achieve minimum sound insulation performance
Roof	$R_w + C_{tr}$ 47 dB	45mm Kingspan Insulated Panel / 60mm Acoustic Insulation (45kg/m ²) in 140mm void / 0.7mm Steel Profiled Liner / 2 x 12.5mm Layers of Plasterboard
Glazed Rooflights	$R_w + C_{tr}$ 29 dB	Saint Gobain 6mm glass / 12mm airspace / 4mm glass
Lower External Walls	$R_w + C_{tr}$ 49 dB	Minimum 100mm Blockwork (density >1700kg/m ³) / 25mm Acoustic Insulation in minimum 80 mm void / 12.5mm SoundBloc Plasterboard
Upper External Walls	$R_w + C_{tr}$ 47 dB	45mm Kingspan Insulated Panel / 60mm Acoustic Insulation (45kg/m ²) in 140mm void / 0.7mm Steel Profiled Liner / 2 x 12.5mm Layers of Plasterboard
Façade Glazing	$R_w + C_{tr}$ 39 dB	Saint Gobain 14.8 mm laminated glass / 24 mm airspace / 12.8mm laminated glass
Doors - Fire Escapes	$R_w + C_{tr}$ 39 dB	Assumed Lobbied R_w 23 dB doorsets. Both doors remain closed during an event.
Doors – Main Entrance	See example build-up column	Lobbied doorsets to form sound lock entrance comprising of an internal doorset achieving minimum R_w 33 dB sound insulation performance and external doorset achieving minimum R_w 23 dB sound insulation performance. The lobby walls and ceiling are to be lined with finishes achieving a Class A acoustic absorbency rating. Refer also to Section 5.2.3.

5.2.3 Entrance doors

It should be noted that the noise break-out assessment and modelling undertaken for the Event Hall has assumed that a lobbied doorset arrangement will be employed whereby two sets of doorsets will be in place between the event space and the outside.

The sound insulation performance of the entrance doors used in the noise break-out assessment is based on the assumption that at least 1 set of the pair of doorsets remains closed at any time during an event and that the second doorset will be closed except when providing access where one of the door leafs would be partially opened and then immediately closed.

We therefore recommend that the operational management policy (OMP) for the development should include a strategy to ensure all external doors and internal doors to the Event Hall remain closed other than for access (e.g through the use of door supervisors and / or automatic door closers).

5.2.4 Mechanical ventilation

The Event Hall is to be mechanically ventilated and as such it has been assumed that there will be no ventilation openings within the building envelope other than those which are ducted to external air handling plant.

5.2.5 Additional mitigation measures

In addition to the sound insulation performance requirements outlined above, we recommend that the development incorporate the following mitigating measures to assist in achieving the proposed noise limit criteria:

- Appropriate calibration of the installed sound system and mixer / EQ settings to ensure that the indoor entertainment noise levels do not cause an exceedance of the required external noise limits.
- Appropriate minimum sound insulation performance requirements assigned to internal building elements within the Event Hall e.g. walls, doors and structural elements.
- Appropriate minimum sound insulation performance requirements assigned to ventilation elements e.g. attenuators to ventilation openings within the building envelope, and acoustic lagging of internal and external ductwork where appropriate.
- Consideration of the sound system speaker layouts and internal finishes to allow noise levels at the extremities of the internal areas of the development to be lower than the main audience areas.
- The operational management policy (OMP) for the development to include a strategy to ensure all external doors and internal doors to the Event Hall remain closed other than for access (e.g through the use of door supervisors and / or automatic door closers).
- The OMP for the development to include a strategy, where necessary, to adequately limit the programme of events involving high levels of entertainment noise within the Event Space.

5.3 Food Hall noise break-out assessment

The potential for noise break-out from the Food Market Hall has been assessed for the assumed worst case daytime opening hours of 09:00 – 22:00 hrs.

The assessment has assumed that background music could be playing at a level of up to 69 dBA within the Food Hall during typical opening hours; this level of music would constitute low level background music within a restaurant or café premises.

Table 10: Assumed Food Hall background noise octave band noise levels, L_{eq} (dB)

Octave Band Centre Frequency	63	125	250	500	1k	2k	4k	A
Low level background music, L_{eq} (dB)	73	68	65	65	65	62	58	69

Conventional building constructions are expected to provide a suitable level of sound insulation for the Food Hall building envelope as the proposed Hot Food Stalls, with open counters to both indoor and outdoor areas, will represent the weakest element in the building envelope sound insulation, and will therefore dominate the noise break-out contribution from the building.

Based on the assumed daytime opening hours of 09:00 – 22:00 hrs, our modelling calculations confirm that an indoor background music limit of 69 dBA within the Food Hall would not be expected to exceed the required daily event external noise limit of $L_{Aeq,1minute}$ 42 dB at the existing residential receptors on Queen Street, $L_{Aeq,1minute}$ 41 dB at the existing residential receptors on Sussex Street and the related third-octave $L_{10,1minute}$ limits at these receptors.

5.4 External plant noise break-out limits

Noise limits for building services associated with the food hall and event space are provided in section 8.

6. Proposed Residential Development Assessment

6.1 Local Noise Climate

Given that the current COVID-19 lockdown measures are expected to result in artificially low noise levels around the site, we have utilised historical third party noise survey data to estimate the TAN 11 Noise Exposure Category (NEC) of the site. Specifically, we have referenced noise levels measured along West Parade in the following planning noise assessments:

- *Planning Stage Environmental Noise Assessment Rhyl Aquatic Centre issued by HRS Services Ltd in March 2017*

A summary of the noise levels measured along West Parade taken from the third party noise survey is presented in the table below. The result of a short-term indicative noise measurement undertaken by BDP Acoustics in July 2020 is included in the table for comparison.

Table 11: Results from third party noise survey on West parade

Survey	Date	Daytime	Night-time	Night-time
		L _{Aeq,15min} Range	L _{Aeq,15min} Range	L _{Amax,15min} Range
HRS Position 2	13/10/2016	66 – 66 dB	-	-
HRS Position 2	14/10/2016	67 dB	-	-
HRS Position 3	13/10/2016	64 – 68 dB	-	-
HRS Position 3	14/10/2016	66 – 68 dB	-	-
HRS Position 5	13/10/2016	-	54 - 61	78 – 84 dB
BDP	22/07/2020	67 – 69 dB*	-	-

* BDP indicative measurement period was 2 x 5 minutes

Whilst the recent indicative short-term daytime measurements undertaken by BDP Acoustic during July 2020 are limited to 2 no. 5 minute measurements, they are noted to be in a similar range to the longer period daytime noise levels measured previously along West Parade.

6.2 Noise Exposure Categories (NEC)

Based on the noise levels reported in the third party noise surveys, the proposed residential development would be expected to fall into NEC C as defined in TAN 11.

TAN 11 advises that for developments falling into NEC C:

'Planning permission should not normally be granted. Where it is considered that permission should be given, for example, because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise'

Whilst the historical third party noise measurements suggest that this area of the West Parade may result in a site falling into the lower range of NEC C, it is expected that the internal noise criteria agreed with Denbighshire County Council's Environmental Health department (Refer to section 3.1) will ensure a commensurate level of protection against noise for the proposed residential units.

6.3 External noise break-in calculations

Based on the results of historical third-party noise level measurements, indicative noise measurements undertaken by BDP Acoustics and assumed operational activity noise break-out, sample noise break-in calculations have been undertaken for the proposed residential blocks to provide an indication of the glazing and ventilation specifications that are likely to be required to enable the appropriate internal noise targets to be achieved.

6.4 Outline Mitigation Measures

Based on the external noise break-in calculations, it is anticipated that conventional double glazing, external walls, roofs and background ventilation methods would enable compliance with the proposed internal noise level criteria presented in section 3.1.

Note that the above mitigation measures are indicative at this stage in the design and will be subject to development as the scheme design progresses and accurate environmental noise levels and façade/room dimensions are made available.

6.5 External plant noise break-out limits

External plant noise break-out associated with the residential blocks should be suitably limited to enable compliance with the criteria presented in section 3.2.

7. Proposed Offices & Library Assessment

Suitable internal noise level criteria, commensurate with current best practice and relevant standards and guidance, will be incorporated into the scheme design. However, compliance with internal ambient noise criteria for this type of development is not considered to be a Local Authority requirement and therefore internal ambient noise criteria are not detailed in this report.

We anticipate that conventional glazing, external wall, roof and ventilation methods will enable compliance with appropriate internal noise level criteria.

7.1 External plant noise emission criteria

External plant noise break-out associated with the offices and library should be suitably limited to enable compliance with the criteria presented in section 3.2.

8. Noise from building service plant

8.1 External plant design proposals

The development is anticipated to contain, but not limited to the following external plant items:

- 2 no. AHUs
- Kitchen Extract fans
- Condenser units

8.2 Proposed Plant external noise emission limits

Based on the proposed plant noise external noise emission criteria presented in section 3.2, we recommend that the cumulative noise resulting from all external plant associated with the development under normal operating conditions is designed to achieve the indicative external noise emission limits presented in Table 11.

The project building service engineers will specify and size appropriate building services equipment at the appropriate design stage in order to ensure that this criteria is met.

Table 12: Indicative noise limits for external plant

Noise Receiver (refer to Figure 1)	Sensitive (refer to)	Applicable time period	Proposed Plant Noise BS4142:2014-A1:2019 rating level, dB *
Sussex Street		Daytime (07:00 to 23:00 hours)	40 dB
		Night time (23:00 to 07:00 hours)	36 dB
Queen Street		Daytime (07:00 to 23:00 hours)	40 dB
		Night time (23:00 to 07:00 hours)	36 dB

*1 metre from the nearest noise sensitive [habitable] window of any identified current and future residential premises (refer to Figure 1)

Appendix I – Glossary of Acoustic Terms

A-Weighting

Normal hearing covers the frequency range from about 20Hz to 20kHz but sensitivity is greatest between about 500Hz and 8kHz. The 'A-Weighting' is an electronic filters network incorporated in sound level meters which approximately corresponds to the frequency response of the ear. The unit of measurement of A-weighted sound level is dBA.

Decibel, dB

This is the unit to measure sound. The human ear has an approximately logarithmic response to acoustic pressure over a very large dynamic range (typically 20 micro-Pascals to 100 Pascals). We therefore use a logarithmic scale to describe sound pressure level, intensities and sound power levels. Subjectively, an increase of 10 dB corresponds to a doubling in the perceived loudness of sound.

Equivalent Continuous Sound Level L_{eq} or L_{Aeq}

The continuous equivalent sound level, L_{Aeq} is a notional sound level. It is the sound level, which, if maintained for a given length of time, would produce the same acoustic energy as a fluctuating noise over the same time period. The A-weighted L_{eq} is widely used to measure any environmental noise which varies considerably with time and is denoted as the L_{Aeq} .

Octave and Third Octave Bands

The human ear is sensitive to sound over a range of approximately 20Hz to 20kHz, and is generally more sensitive to medium and high frequencies than to low frequencies. In order to define the frequency content of a noise, the spectrum is divided into frequency bands, and the sound pressure level is measured in each band. The most commonly used frequency bands are octave bands, in which the mid frequency of each band is twice that of the band below it. (For instance the octave bands above and below the 500Hz octave band are 1kHz and 250Hz respectively). For finer analysis, each octave band may be split into three one-third octave bands or in some cases, fine frequency bands.

Statistical Level: L_{10}

Sound pressure level that is exceeded for 10% of the measurement time.

Statistical Level: L_{90}

Sound pressure level that is exceeded for 90% of the measurement time. Consequently it is indicative of the general background noise level in the absence of any higher level short duration events that occur during the period.