Rhydycar West

April 2022

Foreword

The Rhydycar West development proposals seek to create the flagship indoor leisure resort in Wales – for “all year round”. It will be an exemplary and internationally recognised, sports, leisure and tourism destination able to offer a unique experience to both the people of South Wales and the UK as a whole.

Indoor snow sports are one of the anchor attractions at Rhydycar West. It will host the Welsh & UK National Centre of Excellence for snow sport and be the training headquarters for the Welsh and UK national and Olympic teams as well as offering world class recreational facilities. The resort will be home to a wide variety of indoor and outdoor pursuits including an indoor water park and indoor & outdoor activity centres. These facilities will be supported by a wide range of associated accommodation from the spa hotel to the sport & value hotel and woodland lodges – all able to cater for the long and short stay visitor.

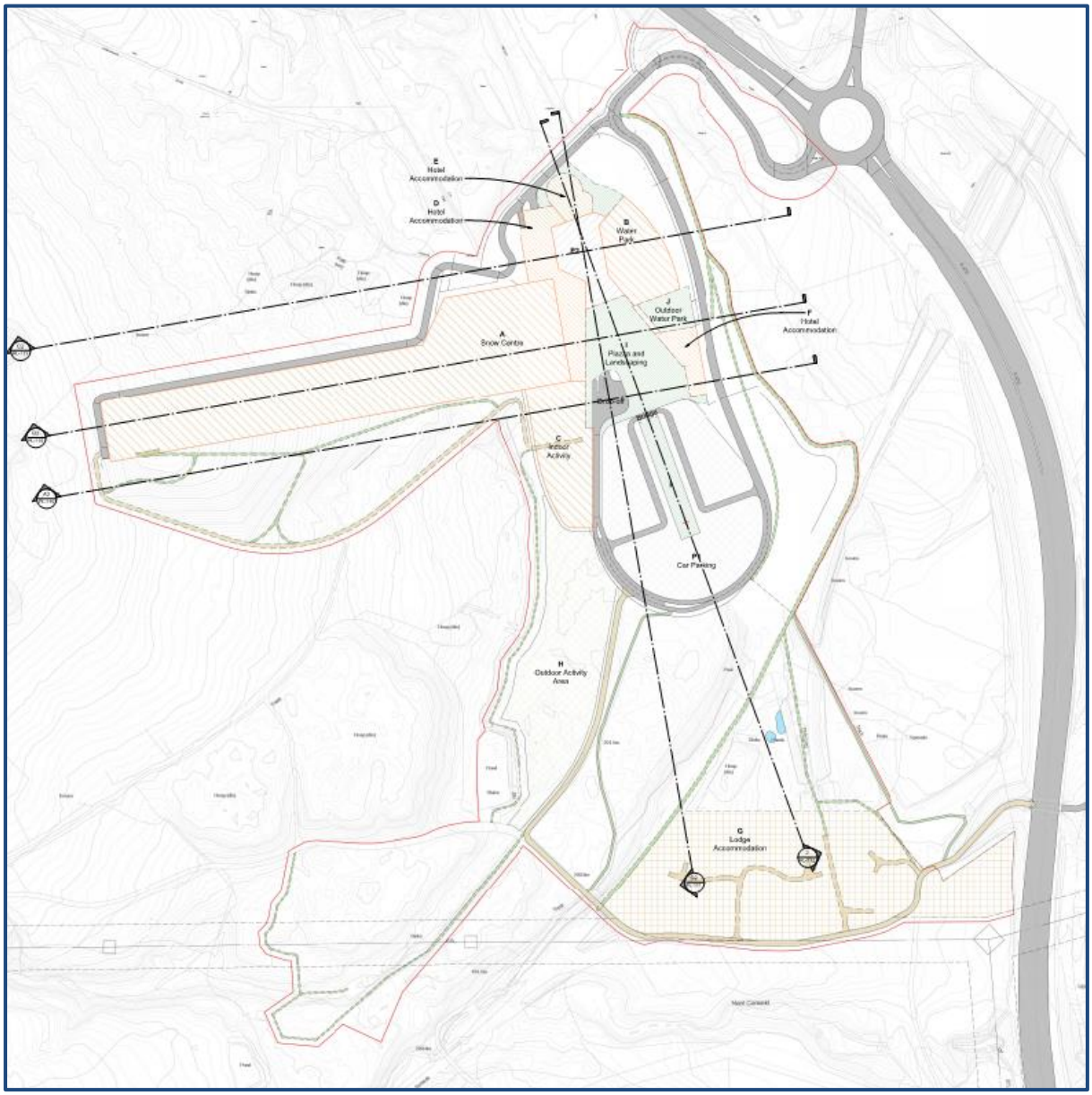
The resort will also complement and enhance the existing sport, leisure and tourism offer currently thriving in the South Wales Valleys and Brecon Beacons such as Bike Park Wales and Zip World. Ideally situated and extremely well connected the development will strengthen Merthyr Tydfil’s regeneration and position as both a destination of choice in its own right and the gateway to the Brecon Beacons.

The proposal is the carefully considered outcome of a period of several years of engagement and understanding of the local and regional economy, ecology, history and heritage. Further details regarding the formulation of the scheme and the design process are set out in full in the Design & Access Statement and other reports and documents which are all available at: www.rhydycarwest.com/planning.

Rhydycar West, Merthyr Tydfil

Noise Assessment

784-B023905



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CONTENTS

1.0 INTRODUCTION

1.1 PURPOSE OF THIS REPORT

This report presents the findings of a noise assessment undertaken for a proposed mixed-use leisure development on land at Rhydycar West, Merthyr Tydfil, South Wales.

A description of the existing noise environment in and around the site is provided. Noise surveys have been undertaken and the results used to verify predictions of the short-term and long-term effects of noise. The existing noise levels surrounding the proposed development have been predicted, based on noise measurements at local representative receptors, using CADNA noise modelling software which incorporates ISO 9613 and CRTN methodologies and calculations. A list of acoustic terminology and abbreviations used in this report is provided in Appendix A.

1.2 LEGISLATIVE CONTEXT

This report is intended to provide information relevant to the local planning authority and their consultees in support of a planning application for the above proposed development. Future Wales: The National Plan 2040 and Planning Policy Wales (PPW) sets out the land use planning policies of the Welsh Government. They are supplemented by a series of Technical Advice Notes (TANs), Technical Advice Note 11 which relates to Noise, Welsh Government Circulars, and policy clarification letters, which together provide the national planning policy framework for Wales. The primary objective of PPW is to ensure that the planning system contributes towards the delivery of sustainable development and improves the social, economic, environmental and cultural well-being of Wales, as required by the Planning (Wales) Act 2015, the Well-being of Future Generations (Wales) Act 2015 and other key legislation. A well-functioning planning system is fundamental for sustainable development and achieving sustainable places.

Paragraph 6.7.5 of PPW says *"In taking forward these broad objectives the key planning policy principle is to consider the effects which proposed developments may have on air or soundscape quality and the effects which existing air or soundscape quality may have on proposed developments. Air quality and soundscape influence choice of location and distribution of development and it will be important to consider the relationship of proposed development to existing development and its surrounding area and its potential to exacerbate or create poor air quality or inappropriate soundscapes. The agent of change principle says that a business or person responsible for introducing a change is responsible for managing that change. In practice, for example, this means a developer would have to ensure that solutions to address air quality or noise from nearby pre-existing infrastructure, businesses or venues can be found and implemented as part of ensuring development is acceptable."*

Paragraphs 6.7.6 and 6.7.7 say *"In proposing new development, planning authorities and developers must, therefore:*

address any implication arising as a result of its association with, or location within, air quality, noise action planning priority areas or areas where there are sensitive receptors;

• *not create areas of poor air quality or inappropriate soundscape; and*

• *seek to incorporate measures which reduce overall exposure to air and noise pollution and create appropriate soundscapes.*

To assist decision making it will be important that the most appropriate level of information is provided and it may be necessary for a technical air quality and noise assessment to be undertaken by a suitably qualified and competent person on behalf of the developer."

Paragraph. 6.7.24 says *"The potential impacts of noise pollution arising from existing development, be this commercial, industrial, transport-related or cultural venues (such as music venues, theatres or arts centres), must be fully considered to ensure the effects on new development can be adequately controlled to safeguard amenity and any necessary measures and controls should be incorporated as part of the proposed new development. This will help to prevent the risk of restrictions or possible closure of existing premises or adverse impacts on transport infrastructure due to noise and other complaints from occupiers of new developments. It will be important that the most appropriate level of information is provided, and assessment undertaken."*

TAN 11 provides advice on how the planning system can be used to minimise the adverse impact of noise without placing unreasonable restrictions on development or adding unduly to the costs and administrative burdens of business.

1.3 ACOUSTIC CONSULTANTS' QUALIFICATIONS, PROFESSIONAL MEMBERSHIPS

Name	Role	Education	Institute of Acoustics Post Graduate Diploma in Acoustic and Noise Control (Pass Date)	Experience in Undertaking Noise Assessments (Start date of working in noise & acoustics)	Attained Associate Membership of the Institute of Acoustics (date)	Attained Membership of the Institute of Acoustics (date)
Joe Rutt	Assistant Environmental Scientist	BSc (2021)	-	Jul 2021	Nov 2021	-
Graham Davis	Principal Consultant	BA (2008) PGd (2013)	Nov 2013	Sep 2011	Jan 2014	-
Nigel Mann	Director	BSc, (1997) MSc (1999)	Nov 2001	Nov 1998	Nov 2001	Jul 2005

2.0 ASSESSMENT CRITERIA

2.1 CONSTRUCTION-PHASE NOISE ASSESSMENT CRITERIA

The qualitative assessment of noise effects contained within the report will consider appropriate levels of noise emissions at nearby Noise Sensitive Receptors using guidance in 'example method 1 – the ABC method' as defined in BS 5228-1:2009+A1:2014. Table 2.1 (reproduced from BS 5228) provides guidance in terms of appropriate threshold values for residential NSRs, based upon existing ambient noise levels.

Table 2.1 Construction Noise Thresholds at Residential Dwellings

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

For the appropriate period (day, evening, night, weekend etc.), the ambient noise level is determined and rounded to the nearest 5 dB and the appropriate "Threshold Value" is then derived. The predicted construction noise level is then compared with this Threshold Value. Based upon this BS 5228 ABC method, the criterion adopted for the determination of potentially significant effects is the exceedance of the $L_{Aeq,T}$ threshold level for the category appropriate to the ambient noise level at each residential receptor.

2.2 BACKGROUND COMPARISON ASSESSMENT

A comparison of building services plant noise from the proposed development with existing background noise levels has been undertaken with reference given to the guidance provided within BS 4142:2014+A1:2019, '*Methods for rating and assessing industrial and commercial sound'.* This standard sets down the following guidelines for assessing the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes, based upon difference between the measured background noise level and the rating level of the source under consideration. In particular, the standard states:

"a) Typically, the greater the difference, the greater the magnitude of the impact.

b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.

c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.

d) The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context."

In addition to noise levels the significance of the impact depends on the individuals affected and to the acoustic features present which may be assessed subjectively or objectively as appropriate. Section 9 of BS 4142:2014+A1:2019 recommends that correction factors be applied to the specific noise level if the noise contains certain acoustic features such as:

- tonality
- impulsivity
- other sound characteristics which are readily distinctive
- intermittency

It should be noted that the significance of an industrial sound source depends upon both the margin by which the rating level exceeds the background sound level and the overall context in which the sound occurs.

2.3 TRAFFIC NOISE ASSESSMENT CRITERIA

Tables 2.2 and 2.3 below has been produced with reference to Tables 3.54a and 3.54b of LA 111 published in May 2020, which present an example classification of the magnitude of noise impacts suitable for the assessment of changes in traffic noise levels.

Table 2.2 Assessment of Change in Traffic Noise Levels (Short-term)

Change in Noise Levels $L_{A10,18hr}$ (dB)	Category
0.0	No Change
0.1 – 0.9	Negligible
1.0 – 2.9	Minor
3.0 – 4.9	Moderate
> 5.0	Major

Table 2.3 Assessment of Change in Traffic Noise Levels (Long-term)

Change in Noise Levels $L_{A10,18hr}$ (dB)	Category
0.0	No Change
0.1 – 2.9	Negligible
3.0 – 4.9	Minor
5.0 – 9.9	Moderate
> 10.0	Major

2.4 SITE SUITABILITY ASSESSMENT CRITERIA

TAN 11 provides advice on how the planning system can be used to minimise the adverse impact of noise without placing unreasonable restrictions on development or adding unduly to the costs and administrative burdens of business. The Note gives recommended noise exposure categories for new permanent dwellings; reference is given to using standard BS 8233 where appropriate.

Table 2.4 Noise Exposure Categories

Noise Source	Period	Noise Exposure Category			
		A	B	C	D
Road Traffic	07:00 – 23:00	<55	55 – 63	63 – 72	>72
	23:00 – 07:00	<45	45 – 57	57 – 66	>66
Air Traffic	07:00 – 23:00	<57	57 – 66	66 – 72	>72
	23:00 – 07:00	<48	48 – 57	57 – 66	>66
Rail Traffic	07:00 – 23:00	<55	55 – 66	66 – 74	>74
	23:00 – 07:00	<45	45 – 59	59 – 66	>66
Mixed Sources	07:00 – 23:00	<55	55 – 63	63 – 72	>72
	23:00 – 07:00	<45	45 – 57	57 – 66	>66

The noise exposure categories A - D are defined as follows:

i. Noise Exposure Category A

For proposals in this category, 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 a desirable level.

ii. Noise Exposure Category B

For proposals in this category, authorities should increasingly take noise into account when determining planning applications and where appropriate, conditions should be imposed to ensure an adequate level of protection against noise.

iii. Noise Exposure Category C

For proposals in this category, 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, conditions should be imposed to ensure a commensurate level of protection against noise.

iv. Noise Exposure Category D

For proposals in this category, planning permission should normally be refused.

2.5 CHANGE IN NOISE LEVEL FOR SENSITIVE RECEPTORS

In order to assess the effects of the overall change in noise levels as a result of the scheme, the following effect level descriptors, derived from the Institute of Environmental Management & Assessment (IEMA) 'Guidelines for Environmental Noise Impact and Assessment', October 2014.

Table 2.5 IEMA Noise Effect Level Descriptors

Effect Level	Noise Level Criteria	Justification
None/not Significant	Change in Noise Levels $L_{A10\ 18hr}$ (dB) 0.0 – 2.9>	No Action Negligible change in noise level
Moderate	Change in Noise Levels $L_{A10\ 18hr}$ 3.0 – 4.9 (dB)	Change <3.0 dB, minor change in noise level no action required Change > 3.0dB <4.9 dB, moderate change in noise level. Mitigate to achieve: Change in Noise Levels $L_{A10\ 18hr}$ < 3.0
Substantial	Change in Noise Levels $L_{A10\ 18hr}$ 5.0 – 9.9 (dB)	Change > 5.0dB, major change in noise level. Mitigate to achieve: Change in Noise Levels $L_{A10\ 18hr}$ <3.0
Very Substantial	Change in Noise Levels > $L_{A10\ 18hr}$ 10.0 (dB)	Change > 5.0dB, major change in noise level. Mitigate to achieve: Change in Noise Levels $L_{A10\ 18hr}$ < 3.0

3.0 ASSESSMENT METHODOLOGY

3.1 NOISE MODELLING METHODOLOGY

Three-dimensional noise modelling has been undertaken based on the monitoring data to predict L_{Aeq} noise levels at a large number of locations both horizontally and vertically. CADNA noise modelling software has been used. The model is based on ISO 9613 noise propagation methodology and allows for detailed prediction of noise levels to be undertaken for several receptor points and different noise emission scenarios both horizontally and vertically.

The modelling software calculates noise levels based on the emission parameters and spatial settings that are entered. Input data, assumptions and model settings as given in Table 3.1 below have been used.

Table 3.1 Modelling Parameters Sources and Input Data

Parameter	Source	Details
Horizontal distances – around site	Ordnance Survey	Ordnance Survey
Ground levels – around site	Ordnance Survey	Ordnance Survey
Ground levels – other areas	Site observations & Ordnance Survey	Ordnance Survey Contours 10m
Building heights – around site	Tetra Tech Observations	8 m height for two storey residential properties. Additional 4m per story, 4m for bungalows.
Receptor positions	Tetra Tech	1 m from façade, height of 1.5 m for ground floor, 4m for first floor properties with a 2.5m increase for each subsequent storey.
Proposed Plans	Holder Mathias Architects	RHDR-HMA-LE-ZZ-DR-A-PL-010-Outline Masterplan-S0-P4

It is acknowledged that a number of the values of parameters chosen will affect the overall noise levels presented in this report. However, it should be noted that the values used, as identified above, are considered to represent a worst-case scenario.

3.2 MODEL INPUT DATA

3.2.1 Traffic Data

Information on the road traffic volumes (the number of vehicles per 18-hour day AAWT) have been provided by Tetra Tech Transport for the 2021 (baseline), 2026 and 2031 scenarios. A ‘link’ is a segment of road, which possesses unique traffic volumes and is normally taken to be between junctions. Modelled road links are dependent upon available traffic information; baseline and predicted traffic volumes are presented in Table 3.2 below; although the changes in road traffic volumes are typically less than 25%, the maximum change in road traffic volumes is expected to occur between the 2021 Baseline and 2031 ‘Do Something’ scenarios which has been considered within this assessment.

Table 3.2 Traffic Data

Link	Speed (km/h)	2021		2026		2026		2031		2031	
		Baseline		Do Minimum		Do Something		Do Minimum		Do Something	
		AAWT	HGV %	AAWT	%HGV	AAWT	%HGV	AAWT	%HGV	AAWT	%HGV
Rhydycar West Site Access	48	0	0	0	0	3885	7	0	0	3885	7
A470 (north of roundabout)	112	27403	3	28832	3	30330	3	30158	3	31656	3
A4120	48	13964	1	14687	2	14847	2	15363	2	15522	2
A470 (south of roundabout)	112	26256	3	27660	3	29888	4	28931	3	31158	4
Bike Park Wales Access	48	491	4	760	4	760	4	783	4	783	4
A470 (Bike Park Wales Roundabout northern arm)	112	26729	3	28124	4	30352	4	29417	4	31645	4
A4060	96	21144	5	22265	5	22683	5	23288	5	23706	5
A470 (Bike Park Wales Roundabout southern arm)	112	41815	4	43983	4	45793	4	46007	4	47816	4
A4054	48	12432	2	13437	2	13491	2	14037	2	14091	2
High Street	48	11105	2	12002	2	12056	2	12538	2	12592	2
Court Street	48	11250	2	12159	2	12213	2	12703	2	12756	2
Court Terrace	48	9146	1	9885	1	9912	1	10327	1	10354	1

3.2.2 Model Verification (Existing Ambient Noise Climate)

The model was verified by modelling the monitoring locations for the 'existing' scenario. Daytime and night-time L_{Aeq} scenarios have been verified. The comparison between the monitoring and modelling results are shown in the tables below.

Table 3.3 Modelled vs. Monitored Results $L_{Aeq;\ daytime\ 07:00 – 23:00}$

Location	Monitored L_{Aeq}	Modelled L_{Aeq}	Difference between Monitored and Modelled Results
LT1	79.0	78.0	-1.0
LT2	51.8	52.5	0.7
LT3	63.7	64.5	0.8
LT4	55.7	54.9	-0.8
LT5	53.6	51.4	-2.2

Location	Monitored L_{Aeq}	Modelled L_{Aeq}	Difference between Monitored and Modelled Results
LT6	64.1	66.0	1.9

All values are sound pressure levels in dB re: 2x 10^{-5} Pa

Table 3.4 Modelled vs. Monitored Results $L_{Aeq;\ night\text{-}time\ 23:00–\ 07:00}$

Location	Monitored L_{Aeq}	Modelled L_{Aeq}	Difference between Monitored and Modelled Results
LT1	70.0	70.0	0.0
LT2	43.7	46.1	2.4
LT3	57.4	60.3	2.9
LT4	51.4	49.1	-2.3
LT5	42.7	45.8	3.1
LT6	57.0	60.3	3.3

All values are sound pressure levels in dB re: 2x 10^{-5} Pa

The verification points show a divergence between monitored and modelled results of no more than +/- 2.9 dB at all long-term monitoring locations during the daytime and night-time L_{Aeq} scenarios. As such, the models are considered to be suitably verified.

3.2.3 Construction Phase Input Data

Information regarding noise emissions from equipment used during the construction phase has been obtained from Annex C of BS 5228-1:A1 - 2014 *Code of practice for noise and vibration control on construction and open sites – Part 1: Noise*. This annex presents a range of current sound level data on typical site equipment and common site activities.

This data is obtained by field measurements for items of plant in actual use on construction and open sites in the UK. Levels quoted in the database are based on an average (logarithmic) of measured sound levels, and where appropriate have been derived from more than one model of similarly sized plant. The results are presented as un-weighted octave band activity L_{eq} levels, and overall A-weighted activity L_{eq} levels in dB. All sound pressure levels are standardized to 10 metres from the plant.

The items of plant and associated noise levels shown in the tables below have been used for the purposes of this assessment and consider the range of typical activities likely to be employed during the construction phase of the proposed development. Items of mobile plant have been positioned in the areas on the development site that are close to existing residential dwellings.

Table 3.5 Mobile Plant Construction Phase

Mobile Plant	BS 5228-1:2009 Annex C Ref.	Octave Band Sound Pressure Levels (Hz)								Model Input $L_{Aeq,1hour}$ at 10 m
		63	125	250	500	1K	2K	4K	8K	
Pneumatic Breaker	Table C.1 No.6	83	83	81	74	73	76	78	77	83 dB
Tracked Excavator Loading	Table C.1 No.10	82	78	82	81	81	78	72	64	85 dB
Tracked Excavator	Table C.2 No.19	95	84	79	73	70	68	64	57	77 dB
Articulated Dump Truck	Table C.2 No.33	85	87	77	75	76	73	69	62	81 dB

Mobile Plant	BS 5228-1:2009 Annex C Ref.	Octave Band Sound Pressure Levels (Hz)								Model Input $L_{Aeq,1hour}$ at 10 m
		63	125	250	500	1K	2K	4K	8K	
Delivery Lorry	Table C.2 No.34	73	78	78	78	74	73	68	66	80 dB
Piling Rigs	Table C3 No.1	82	82	82	89	83	78	75	70	89 dB
Concrete Mixer	Table C4 No.20	83	74	66	69	70	78	60	55	80 dB
Concrete Pumps	Table C4 No.27	84	74	74	73	73	75	65	59	79 dB
Tracked Crane	Table C4 No.50	68	71	68	62	66	66	55	46	71 dB
Lifting Platform	Table C4 No.57	78	86	62	63	60	59	58	49	67 dB
Road Sweeper	Table C4 No.90	80	75	69	75	71	67	61	58	76 dB
Angle Grinder	Table C4 No.93	57	51	52	60	70	77	73	73	80 dB
Handheld Circular Saw	Table C5 No.3	82	75	73	68	63	67	80	69	82 dB
Road Planer	Table C5 No.7	81	87	79	77	77	74	70	67	82 dB
Dozer	Table C5 No.15	83	81	76	77	82	70	65	58	83 dB
Road Roller	Table C5 No.19	87	85	75	73	75	73	69	63	80 dB
Asphalt Paver	Table C5 No.32	87	84	81	80	79	76	74	65	84 dB

3.3 EXTERNAL LEISURE ACTIVITIES

Although specific details of the proposed activities associated with the outdoor activity are unknown and the finalised layouts are yet to be confirmed, the following noise level data have been included within the noise model and are considered to be representative of the future outdoor facilities. Measurements of an existing zip wire course and outdoor water park have been included within the noise model.

3.3.1 Zip Wire Input Data

Noise of zip wire usage has been observed and measured at a similar installation at Cannock Chase, including noise from patrons setting off and passing along the zip wire. All measurements were undertaken in free-field conditions. The following worst-case calculations are based on an average of one event per crossing per minute (60 patrons per hour/480 per eight hour day). Events are modelled as line sources at 12m high between 10 indicative zip-line stations.

$L_{Aeq,1hr}$ Noise Level

1 x 23 seconds at L_p 63.6 dB at 14 m distance (participant set-off and pass by)

$$L_{Aeq(60\ mins)} = 10\log(60/3600)(23\ secs \times 10^{0.1 \times 63.6dB})$$

$$= 59.4\ dB\ at\ 14\ m\ distance$$

3.3.2 Outdoor Water Park Input Data

A 17-minute measurement of worst-case noise from a similar wet, outdoor play area was undertaken at Markeaton Park, Derby. This worst-case source noise was undertaken on a busy summer Saturday, where noise from a play area consisted of children playing on equipment, associated talking, shouting and laughing. Noise from water fountains and running water from a weir were audible in the vicinity of the play area and contributed to the noise measurement. A noise level of 56.4 dB $L_{Aeq(4\ min)}$ was measured at a 5 metre distance from fountains in the absence of any significant noise from the activity area. During general use of the activity area along with contributions from the water fountain and weir, a noise level of 63.1 dB $L_{Aeq(13min)}$ was measured at a 10 metre distance from the perimeter of the activity area, which has been represented as an area source across the entire outdoor waterpark.

$L_{Aeq,1hr}$ *Noise Level* = 63.1 dB at 10 m distance

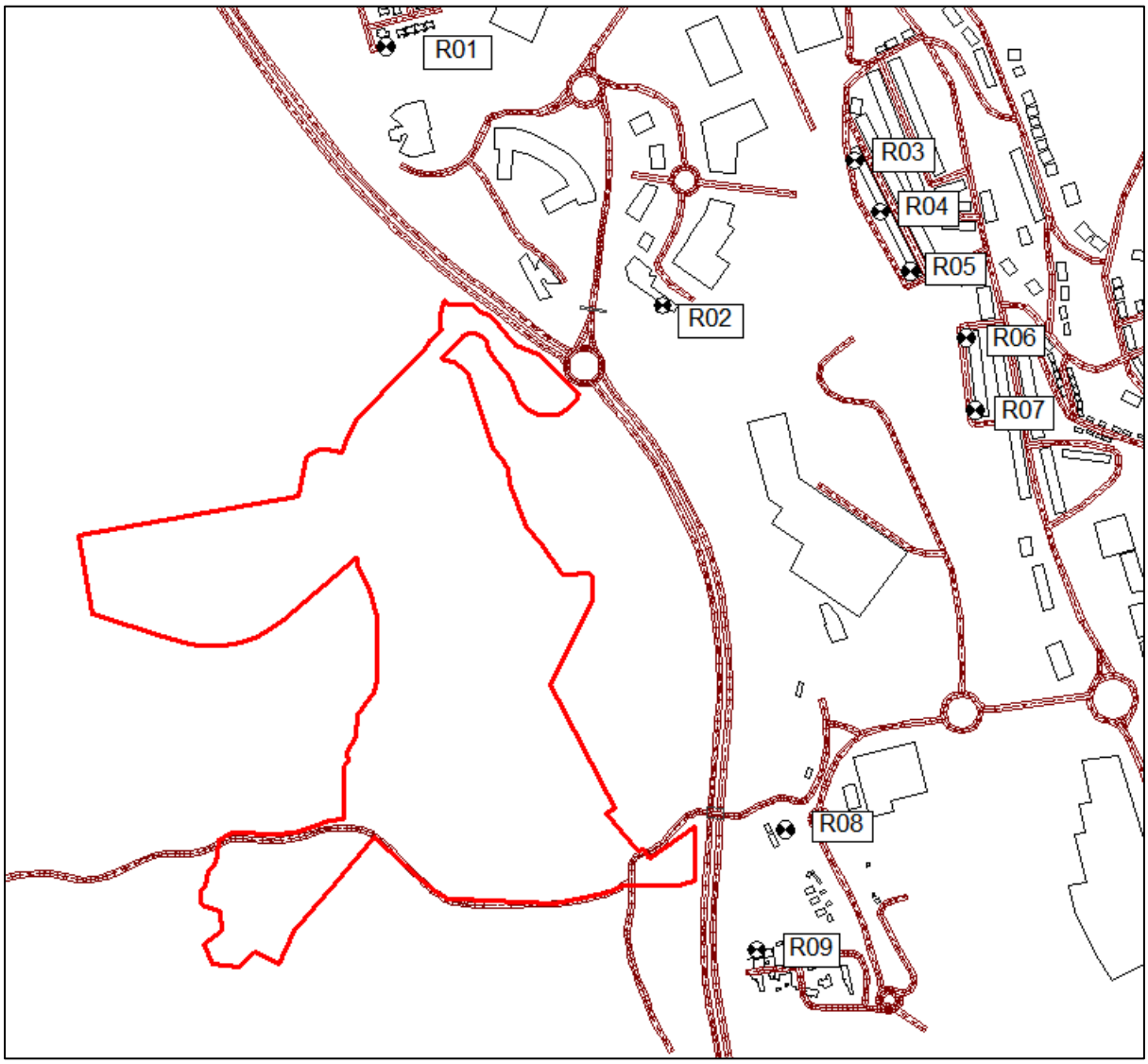
3.4 SENSITIVE RECEPTORS

Table 3.6 below summarises the existing receptor locations assessed as part of the construction, operational and road traffic noise assessments, the locations of which are shown illustratively within Figure 3.1. For the proposed sensitive receptors associated with the scheme (including proposed hotel and lodges), receptors have been located in a selection of areas around the development. The locations of the proposed receptors are summarised in Tables 3.7 and 3.8 and shown in Figure 3.2.

Table 3.6 Sensitive Receptor Locations (Construction, Operation and Road Traffic Assessments)

Ref.	Description	Height (m)
R01	Bunkhouse Ty Wern – Cae'r Wern	1.5 / 4.0
R02	Travelodge Merthyr Tydfil – A1402	1.5 / 4.0
R03	74 Clare Street	1.5 / 4.0
R04	62 Clare Street	1.5 / 4.0
R05	42 Clare Street	1.5 / 4.0
R06	2 Railway Terrace	1.5 / 4.0
R07	22 Railway Terrace	1.5 / 4.0
R08	The Cabin Park Home – Glyndyrus Close	1.5 / 4.0
R09	9 Lewis Square	1.5 / 4.0

Figure 3.1 Existing Sensitive Receptors



Not to scale
OS Licence No. AL553611

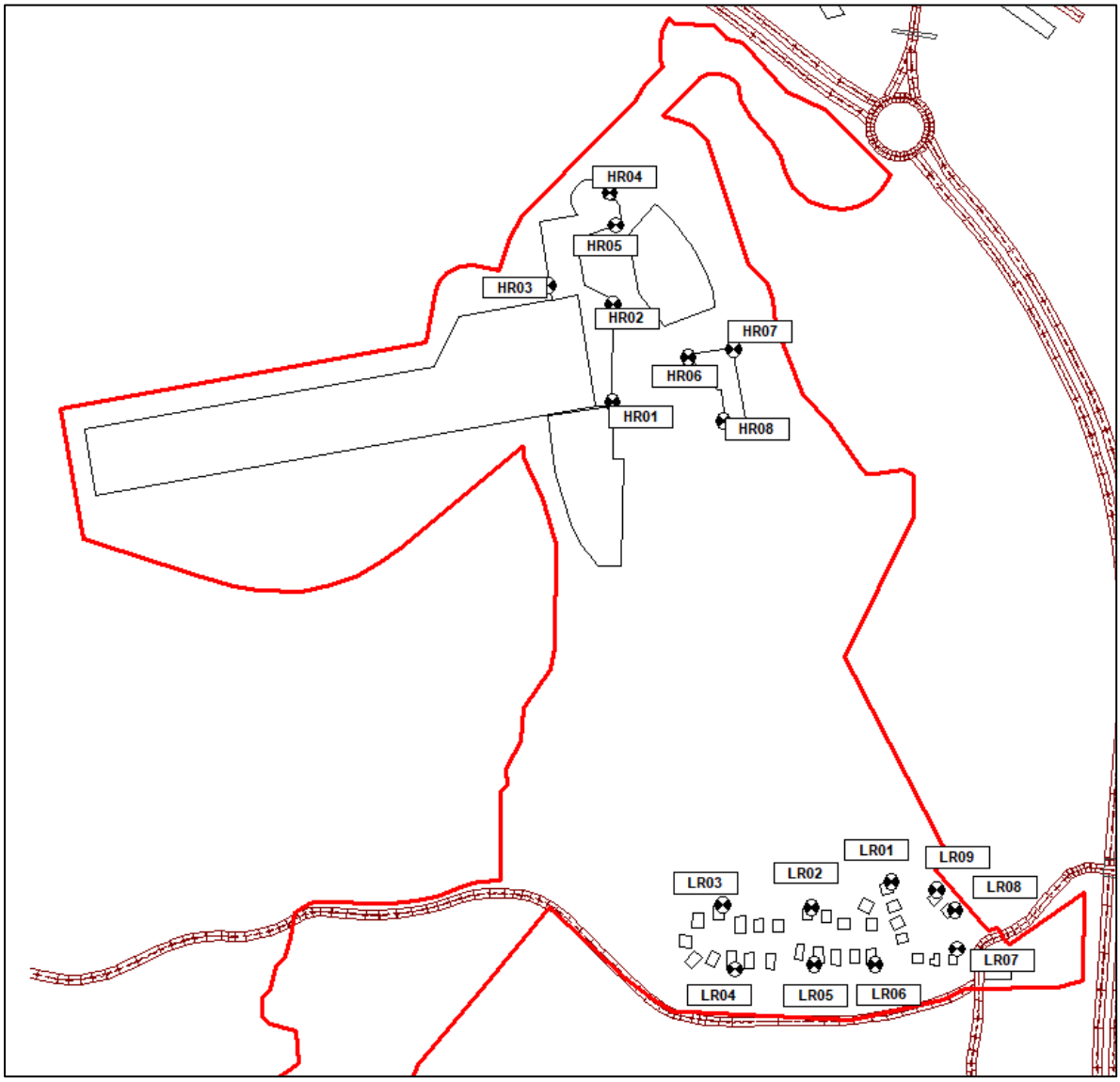
It is understood that the proposed hotel heights vary between 16.8m to 39.4m. The assessment utilises receptor locations at 4m and 14m above local ground levels to calculate noise levels at the facades of the proposed facility in order to minimising any localised screening from the terrain and other nearby structures. Similarly, the proposed lodge heights are between 3.5 to 4.5m tall and the receptors summarised in Table 3.7 have been modelled at 1.5 and 4.0m above local ground level.

Table 3.7 Proposed Receptor Locations (Hotels & Lodges)

Ref.	Description	Height (m)
HR01	4* Hotel – South-east Facing	4.0 / 14.0
HR02	4* Hotel – East Facing	4.0 / 14.0
HR03	4* Hotel – West Facing	4.0 / 14.0
HR04	4* Hotel – North Facing	4.0 / 14.0
HR05	4* Hotel – South Facing	4.0 / 14.0

Ref.	Description	Height (m)
HR06	3* Hotel – North-west Facing	4.0 / 14.0
HR07	3* Hotel – East Facing	4.0 / 14.0
HR08	3* Hotel – South-west Facing	4.0 / 14.0
LR01	Located at North-west of proposed lodging site	1.5 / 4.0
LR02	Located at North-west of proposed lodging site	1.5 / 4.0
LR03	Located at West of proposed lodging site	1.5 / 4.0
LR04	Located at South-west of proposed lodging site	1.5 / 4.0
LR05	Located at South of proposed lodging site	1.5 / 4.0
LR06	Located at South of proposed lodging site	1.5 / 4.0
LR07	Located at South-east of proposed lodging site	1.5 / 4.0
LR08	Located at South-east of proposed lodging site	1.5 / 4.0
LR09	Located at East of proposed lodging site	1.5 / 4.0

Figure 3.2 Proposed Sensitive Receptors



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4.0 NOISE SURVEY

4.1 NOISE SURVEY METHODOLOGY

A monitoring survey was undertaken to characterise baseline ambient noise levels currently experienced on the site and to establish the relative local background and traffic noise levels. Equipment used during the survey included:

B&K 2238	Environmental Noise Analyser	s/n	2684499
Rion NL-32	Environmental Noise Analyser	s/n	123729
Rion NL-32	Environmental Noise Analyser	s/n	213442
Rion NL-52	Environmental Noise Analyser	s/n	620858
Rion NL-52	Environmental Noise Analyser	s/n	1043466
Rion NL-52	Environmental Noise Analyser	s/n	253702
Rion NL-52	Environmental Noise Analyser	s/n	1021257
Rion NL-52	Environmental Noise Analyser	s/n	264490

The measurement equipment was checked against the appropriate calibrator at the beginning and end of the measurements, in accordance with recommended practice and no significant drift was observed. The accuracy of the calibrators can be traced to National Physical Laboratory Standards, calibration certificates for which are available on request.

A baseline monitoring survey was undertaken at twenty-one locations (as specified in the following table and shown in Figure 4.1) from Thursday 23rd March 2017 to Wednesday 29th March 2017. Attended short term measurements were undertaken at ten locations during the day, evening and night-time periods with an additional location attended during only the evening and night-time periods. Three attended traffic measurements were undertaken for 15 mins per hour in three consecutive hours, with an additional location monitored unattended for three hours. Six additional locations were measured, unattended, over a 144-hour period. The raw data collected from the long-term monitoring are available upon request.

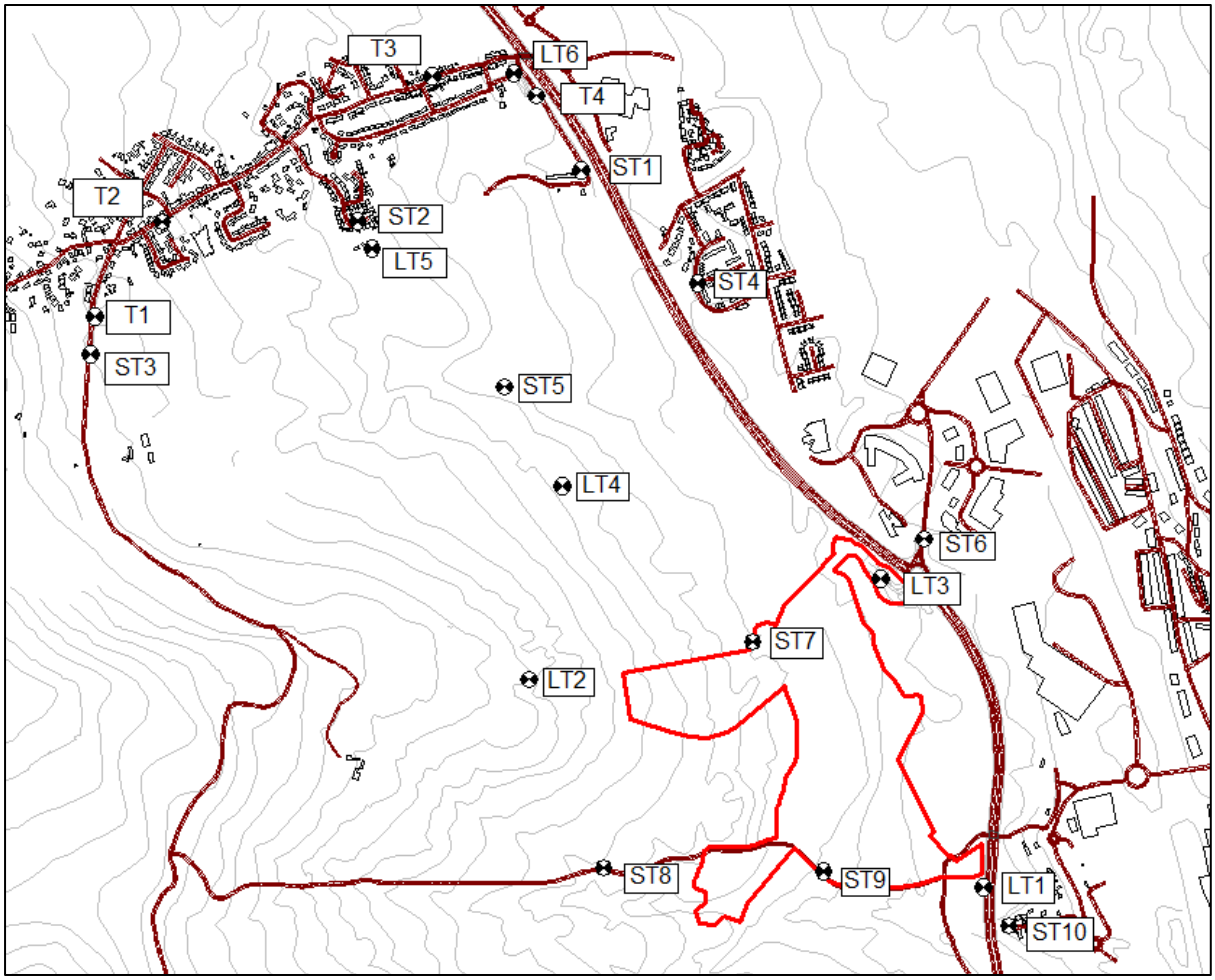
Measurements were taken in general accordance with BS 7445-1:2003 *The Description and Measurement of Environmental Noise: Guide to quantities and procedures*. Weather conditions during the survey period were observed as being dry with scattered showers. Anemometer readings confirmed that wind speeds were less than 5 ms^{-1} at all times during the survey with a predominant north-easterly wind direction.

Table 4.1 Noise Monitoring Locations

Ref	Description
LT1	South eastern corner of the site, adjacent to A470
LT2	to West of development site, 970m west of A470
LT3	Eastern boundary of the site, adjacent to A470/A4102 roundabout
LT4	To north of development site, approx. 470m west of A470
LT5	To north of development site, approx. 470m south oh Heolgerrig
LT6	Adjacent to A470/Upper Colliers' Row

Ref	Description
ST1	At southern end of Upper Colliers' Row
ST2	North of the site at southern end of Parc Cwm Pant Bach
ST3	North-west of the site at Germant Lane at junction with off road track
ST4	North of the site at junction between branches of Penlan View
ST5	North of the site, approx. 380m west of A470
ST5a	Approx. 200mm north of ST5
ST6	North-East of the site, approx. 180m north of A470/A4102 junction
ST7	Northern boundary of the site, approx. 470m west of A470/A4102 junction
ST8	West of the site, approx. 400m of A470
ST9	Southern boundary of the site, approx. 950m west of A470
ST10	End of Lewis Square adjacent to A470
T1	Germant Lane approx. 140m south of Hoelgerrig
T2	Hoelgerrig adjacent to Calfaria Capel Y Bedyddwyr
T3	Hoelgerrig, approx. 200m west of A470
T4	Upper Colliers' Row adjacent to ST1

Figure 4.1 Baseline Noise Monitoring Locations



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4.2 NOISE SURVEY RESULTS

Existing ambient noise levels around the site are characterised by road traffic noise from the A470 with localised contributions from minor roads and sources including the railway and existing industrial and commercial facilities to the east of the site.

Ambient and background noise levels are usually described using the L_{Aeq} index (a form of energy average) and the L_{A90} index (i.e. the level exceeded for 90% of the measurement period) respectively. Road traffic noise is generally described using the L_{A10} index (i.e. the level exceeded for 10% of the measurement period).

Table 4.2 Meteorological Conditions during the Survey

Survey Location	Date & Time	Temperature	Wind Speed (m/s)	Wind Direction	Cloud Cover (Oktas)	Dominant Noise Source
Day ST1	23/03/2017 11:39	7°C	1-2ms^{-1}	NE	4	Road traffic on A470
Day ST2	23/03/2017 15:36	10°C	2-3ms^{-1}	NE	4	Distant road traffic on A470
Day ST3	23/03/2017 15:14	10°C	4-5ms^{-1}	NE	4	Distant road traffic on A470
Day ST4	23/03/2017 14:16	10 °C	4-5ms^{-1}	NE	5	Distant road traffic on A470, occasional car pass on Penlan View, wind in trees
Day ST5	23/03/2017 12:58	10 °C	4-5ms^{-1}	NE	6	Distant road traffic on A470
Day ST6	23/03/2017 14:45	10 °C	1-2ms^{-1}	NE	6	Road traffic on A4102
Day ST7	23/03/2017 16:30	10 °C	3-4ms^{-1}	NE	2	Traffic on A470, wind in trees
Day ST8	23/03/2017 15:46	10 °C	1-2ms^{-1}	NE	3	Distant road traffic on A470, wind in trees, faint sound of stream
Day ST9	23/03/2017 15:20	10 °C	1-2ms^{-1}	NE	4	Distant road traffic on A470, birdsong, wind in the trees
Day ST10	23/03/2017 16:05	10°C	1-2ms^{-1}	NE	3-4	Road traffic on A470
Evening ST1	23/03/2017 22:00	6 °C	1-2ms^{-1}	NE	1	Road traffic on A470
Evening ST2	23/02/2017 22:45	6 °C	2-3ms^{-1}	NE	1	Distant road traffic on A470
Evening ST3	23/03/2017 22:42	5°C	3-4ms^{-1}	NE	2-3	Distant road traffic on A470
Evening ST4	23/03/2017 22:21	7°C	3-4ms^{-1}	NE	2-3	Distant road traffic
Evening ST5a	23/03/2017 22:21	6 °C	2-4ms^{-1}	NE	2	Road traffic on A470
Evening ST6	23/03/2017 21:57	7°C	3-4ms^{-1}	NE	2-3	Road traffic on A4102
Evening ST7	23/03/2017 21:32	6 °C	2-4ms^{-1}	NE	1	Distant road traffic on A470, wind gusting in trees
Evening ST8	23/03/2017 20:52	6 °C	1-3ms^{-1}	NE	1	Distant road traffic on A470, wind gusting in trees
Evening ST9	23/03/2017 20:47	7°C	2-3ms^{-1}	NE	1-2	Road traffic on A470
Evening ST10	23/03/2017 21:29	7°C	2-3ms^{-1}	NE	2-3	Road traffic on A470
Night ST1	23/03/2017 23:07	5°C	2-3ms^{-1}	NE	2-3	Road traffic on A470
Night ST2	23/03/2017 23:44	6°C	1-3ms^{-1}	NE	2	Distant road traffic on A470
Night ST3	23/03/2017 23:29	5°C	2-3ms^{-1}	NE	2-3	Distant road traffic on A470
Night ST4	24/03/2017 00:08	5°C	3-4ms^{-1}	NE	3-4	Distant road traffic on A470
Night ST5a	23/03/2017 23:17	6°C	4-5ms^{-1}	NE	1	Distant road traffic on A470, wind gusting in trees

Survey Location	Date & Time	Temperature	Wind Speed (m/s)	Wind Direction	Cloud Cover (Oktas)	Dominant Noise Source
Night ST6	24/03/2017 00:14	6°C	1-3ms^{-1}	NE	2	Road traffic on A4102 and in distance
Night ST7	24/03/2017 00:43	6°C	3-4ms^{-1}	NE	1	Road traffic on A470, wind in the trees
Night ST8	24/03/2017 01:35	6°C	1-2ms^{-1}	NE	1	Distant traffic, distant streams, distant wind in trees
Night ST9	24/03/2017 01:32	4°C	3-4ms^{-1}	NE	2	Distant traffic, wind in trees
Night ST10	24/03/2017 00:35	7°C	4ms^{-1}	NE	3-4	Road traffic on A470

The results of the statistical measurements and frequency measurements conducted during the survey are summarised in the following table. All values are sound pressure levels in dB (re: 2 x 10^{-5} Pa). For the long-term (LT) locations, the presented $L_{Aeq,T}$ and $L_{A10,T}$ are average noise levels whilst the L_{A90} is the modal noise level of each 5 minute measurement over the stated survey period.

Table 4.3 Results of Baseline Noise Monitoring Survey (Average Levels)

Period	Duration (T)	Monitoring Date and Times	Location	$L_{Aeq,T}$ (dB)	$L_{Amax,T}$ (dB)	$L_{Amin,T}$ (dB)	$L_{A10,T}$ (dB)	$L_{A90,T}$ (dB)
Weekday 07:00 - 23:00	64 hours	23/03/2017 – 29/03/2017 07:00 - 23:00	LT1	78.0	100.6	37.2	81.4	70.0
Weeknight 23:00 – 07:00	32 hours	23/03/2017 – 29/03/2017 23:00 - 07:00		70.0	103.1	30.3	67.3	41.0
Weekend Day 07:00 - 23:00	32 hours	25/03/2017 – 26/03/2017 07:00 – 23:00		76.9	99.6	39.0	80.4	70.0
Weekend Night 23:00 – 07:00	16 hours	25/03/2017 – 26/03/2017 23:00 – 07:00		68.0	95.6	30.3	98.1	36.0
Weekday 07:00 - 23:00	64 hours	23/03/2017 – 29/03/2017 07:00 - 23:00	LT2	51.8	96.0	33.0	50.6	51.0
Weeknight 23:00 – 07:00	32 hours	23/03/2017 – 29/03/2017 23:00 - 07:00		43.7	71.1	25.7	43.4	36.0
Weekend Day 07:00 - 23:00	32 hours	25/03/2017 – 26/03/2017 07:00 – 23:00		50.5	80.9	35.6	51.3	49.0
Weekend Night 23:00 – 07:00	16 hours	25/03/2017 – 26/03/2017 23:00 – 07:00		42.7	73.3	28.4	42.5	36.0
Weekday 07:00 - 23:00	64 hours	23/03/2017 – 29/03/2017 07:00 - 23:00	LT3	63.7	95.8	38.8	62.4	61.0
Weeknight 23:00 – 07:00	32 hours	23/03/2017 – 29/03/2017 23:00 - 07:00		57.4	87.0	28.8	49.4	34.0
Weekend Day 07:00 - 23:00	32 hours	25/03/2017 – 26/03/2017 07:00 – 23:00		63.6	92.8	38.9	61.7	61.0
Weekend Night 23:00 – 07:00	16 hours	25/03/2017 – 26/03/2017 23:00 – 07:00		55.9	89.3	30.5	49.4	40.0
Weekday 07:00 - 23:00	64 hours	23/03/2017 – 29/03/2017 07:00 - 23:00	LT4	55.5	92.4	40.7	55.5	55.0
Weeknight 23:00 – 07:00	32 hours	23/03/2017 – 29/03/2017 23:00 - 07:00		51.4	86.0	37.5	52.9	45.0
Weekend Day 07:00 - 23:00	32 hours	25/03/2017 – 26/03/2017 07:00 – 23:00		55.7	92.4	43.1	56.1	54.0
Weekend Night 23:00 – 07:00	16 hours	25/03/2017 – 26/03/2017 23:00 – 07:00		51.1	77.5	38.4	52.5	46.0

Period	Duration (T)	Monitoring Date and Times	Location	$L_{Aeq,T}$ (dB)	$L_{Amax,T}$ (dB)	$L_{Amin,T}$ (dB)	$L_{A10,T}$ (dB)	$L_{A90,T}$ (dB)
Weekday 07:00 - 23:00	62 hours	23/03/2017 – 29/03/2017 07:00 - 23:00	LT5	53.6	89.5	35.6	53.9	51.0
Weeknight 23:00 – 07:00	32 hours	23/03/2017 – 29/03/2017 23:00 - 07:00		50.6	83.6	29.2	46.2	38.0
Weekend Day 07:00 - 23:00	32 hours	25/03/2017 – 26/03/2017 07:00 – 23:00		53.1	80.9	34.5	53.7	50.0
Weekend Night 23:00 – 07:00	16 hours	25/03/2017 – 26/03/2017 23:00 – 07:00		50.5	83.1	30.0	44.6	33.0
Weekday 07:00 - 23:00	64 hours	23/03/2017 – 29/03/2017 07:00 - 23:00	LT6	64.1	90.7	35.6	66.0	59.0
Weeknight 23:00 – 07:00	32 hours	23/03/2017 – 29/03/2017 23:00 - 07:00		57.0	86.1	24.1	56.7	34.0
Weekend Day 07:00 - 23:00	32 hours	25/03/2017 – 26/03/2017 07:00 – 23:00		64	90.7	34.8	66.0	62.0
Weekend Night 23:00 – 07:00	16 hours	25/03/2017 – 26/03/2017 23:00 – 07:00		54.8	86.6	27.3	57.2	34.0
Day 07:00 - 19:00	15 Mins	23/03/2017 11:39	ST1	65.7	79.8	53.6	68.0	61.9
	15 Mins	23/03/2017 15:36	ST2	52.1	74.9	46.8	53.7	50.0
	15 Mins	23/03/2017 15:14	ST3	54.6	72.6	45.0	57.8	47.0
	15 Mins	23/03/2017 14:16	ST4	54.0	82.1	46.9	54.9	50.4
	15 Mins	23/03/2017 12:58	ST5	55.3	78.3	47.6	56.6	52.0
	15 Mins	23/03/2017 14:45	ST6	69.6	86.4	52.7	73.3	58.3
	15 Mins	23/03/2017 16:28	ST7	55.1	65.5	50.5	56.5	53.3
	15 Mins	23/03/2017 15:46	ST8	49.7	60.4	46.2	51.1	48.2
	15 Mins	23/03/2017 15:20	ST9	55.1	61.0	50.6	56.6	53.1
	15 Mins	23/03/2017 16:05	ST10	59.2	68.3	53.9	61.0	56.9
Evening 19:00 - 23:00	15 Mins	23/03/2017 22:00	ST1	60.8	77.9	44.4	63.3	51.9
	15 Mins	23/03/2017 22:45	ST2	43.6	64.8	36.9	45.1	40.3
	15 Mins	23/03/2017 22:43	ST3	45.7	73.0	38.3	47.9	40.3
	15 Mins	23/03/2017 22:21	ST4	49.8	71.2	42.0	51.7	46.5
	15 Mins	23/03/2017 22:21	ST5a	53.3	67.7	42.7	55.9	48.5
	15 Mins	23/03/2017 21:57	ST6	68.0	93.5	47.5	72.3	51.6
	15 Mins	23/03/2017 21:32	ST7	52.4	62.7	46.2	54.5	49.4
	15 Mins	23/03/2017 20:47	ST9	52.9	64.5	47.4	54.6	51.4
	15 Mins	23/03/2017 21:29	ST10	54.0	66.0	48.2	56.6	50.5
Night 23:00 - 07:00	15 Mins	23/03/2017 23:07	ST1	56.6	69.7	40.1	60.8	44.3
	15 Mins	23/03/2017 23:44	ST2	43.9	66.1	35.6	45.7	38.3
	15 Mins	23/03/2017 23:29	ST3	46.0	70.8	36.3	48.3	38.9
	15 Mins	24/03/2017 00:08	ST4	48.8	67.7	39.3	51.2	41.8
	15 Mins	23/03/2017 23:17	ST5a	51.5	65.6	41.3	54.8	45.6
	15 Mins	24/03/2017 00:14	ST6	61.2	81.3	38.5	60.8	42.0
	15 Mins	24/03/2017 00:43	ST7	44.9	58.9	35.5	48.2	38.8
	15 Mins	24/03/2017 01:35	ST8	40.4	63.2	35.5	42.3	37.1
	15 Mins	24/03/2017 01:32	ST9	44.7	61.7	37.2	47.6	39.7
	15 Mins	24/03/2017 00:35	ST10	46.2	56.0	44.1	47.4	45.0

All values are sound pressure levels in dB re: $2x\ 10^{-5}$ Pa

5.0 ASSESSMENT OF KEY EFFECTS

5.1 CONSTRUCTION PHASE – NOISE ASSESSMENT

Based upon the results of the existing free-field baseline ambient noise surveys, Table 5.1 sets out an appropriate BS 5228 'ABC' noise threshold categories at each residential receptor for the daytime period when works are expected to take place. The ABC criteria at all existing receptors have been based upon the verified noise models of baseline 2017 ambient noise levels. An additional comparison against measured baseline noise levels monitoring at location LT4 (that is a comparable distance from the A470 as the majority of residential receptors for this assessment) similarly identifies that ambient noise levels were around 57 dB L_{Aeq} and therefore the applicable ABC category value would be 'Category A'.

Table 5.1 Construction Noise Emission Category based upon the ABC Method

Ref	Receptor	Daytime 07:00 – 19:00 and Saturdays 07:00 – 13:00			Predicted Sound pressure level at Receptor (dB)	Comparison Against Criteria
		Baseline $L_{Aeq,T}$ dB	ABC Category	Criteria Daytime 07:00 – 19:00 and Saturdays 07:00 – 13:00 (dBA)		
R01	Bunkhouse Ty Wern – Cae'r Wern	57.6	A	65	52.2	-12.8
R02	Travelodge Merthyr Tydfil – A1402	50.1	A	65	53.4	-11.6
R03	74 Clare Street	51.6	A	65	50.9	-14.1
R04	62 Clare Street	52.5	A	65	54.6	-10.4
R05	42 Clare Street	53.3	A	65	54.7	-10.3
R06	2 Railway Terrace	53.9	A	65	56.2	-8.8
R07	22 Railway Terrace	54.2	A	65	52.4	-12.6
R08	The Cabin Park Home – Glyndyrus Close	57.3	A	65	53.9	-11.1
R09	9 Lewis Square	62.8	A	65	53.5	-11.5

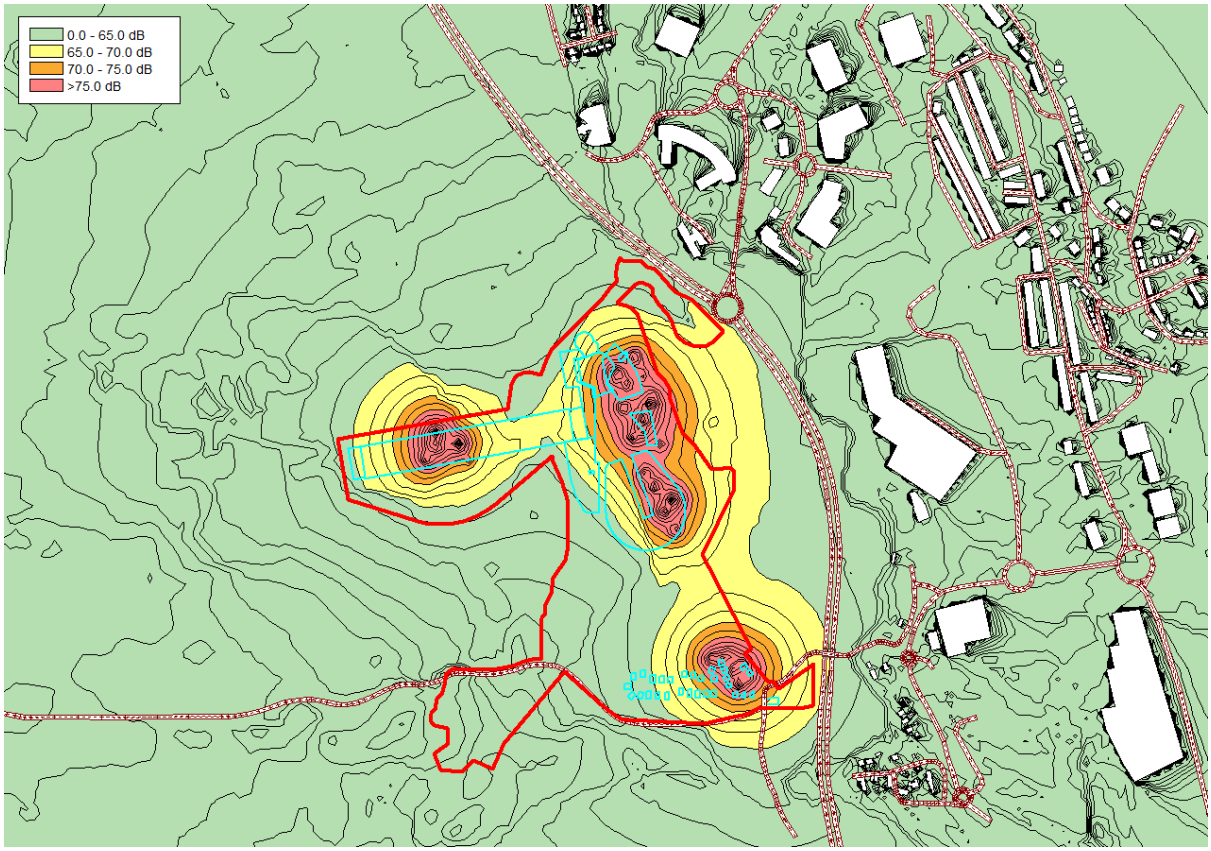
The 'Threshold Values' have been derived for each receptor using the BS5228 ABC methodology (presented in Table 2.1). Residential receptors in the area surrounding the Proposed Development would be classified at 'Category A' during the daytime period. It is assumed that no construction works will be required outside of the daytime period as defined above. However, should the need for works arise outside of this time period, appropriate noise limits can be derived using the baseline data. Any

works required outside of the daytime period will most likely need to be agreed prior to commencement with the Local Authority.

The summary of the outline results shown in Table 5.1 indicate that noise associated with the construction phase of the development is expected to be at least 8 dB below the BS 5288 threshold value at nearby sensitive receptor locations and therefore not expected to result in significant adverse impacts at existing residential receptors within the area.

Construction activities across the development site have been assessed simultaneously across the site. This results in evaluating a worst case scenario as the number of simultaneous activities is expected to be significantly lower than those presented in the assessment above.

Figure 5.1 Indicative Construction Noise Contour Plot $L_{Aeq,10hour}$



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Despite the favourable assessment presented above, a number of additional mitigation measures have been recommended for inclusion within a Construction and Environmental Management Plan (CEMP) to reduce construction site noise to a minimum, these measures are presented in Appendix B.

5.2 BUILDING SERVICES PLANT NOISE LIMITS

At this early stage, the finalised locations and specification of building services plant are yet to be confirmed. However, for the purposes of this worst-case assessment, the maximum permissible external noise levels from the proposed building services plant have been established from indicative locations on the roof of snow dome, indoor activity centre and the indoor waterpark. The assessment compares the predicted worst-case noise levels from the plant against the existing measured average background noise L_{A90} (measured at location LT2) at the closest proposed residential receptors associated with the scheme (plant noise contributions at existing properties located at least 400m away are expected to be significantly lower).

As no data is available for the proposed plant, a series of predictions were made by defining different sound power levels at point sources. When the sound pressure levels are set as shown in Table 5.2 (which are considered to be achievable) at the Proposed Building Services Plant location, the noise Rating Levels at all the existing receptors are predicted to be at least 5 dB below existing background L_{A90} levels during the daytime and night-time therefore expected to a low impact. The suggested noise emission limits are considered to be readily achievable and a consented condition could also be considered for the fixed plant at site. An example condition that could be used with regards to fixed plant limits is presented below:

> *"The cumulative noise rating levels ($L_{Ar'Tr}$) of any fixed plant serving the development shall not be greater than 5 dB below the typical background noise level $L_{A90,T}$ when measured or predicted at 1m from the façade of the nearest noise sensitive residential premises. The measurement and/or prediction of the noise should be carried out in accordance with the methodology contained within BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound*."

For the purposes of this indicative assessment, in accordance with Section 9.2 of BS4142:2014 an overall +2 dB character correction has been applied to account for any mild tonal characteristics (which are sometimes associated with fixed plant) of noise from the proposed plant which may be just perceptible at the closest sensitive receptors. The assessment presented below has been undertaken with the plant associated with the scheme operating simultaneously.

Table 5.2 Proposed Limits (Rating Level) for BSP as Modelled

BSP Location	Noise Emission Limit (Rating Level) – Sound Pressure Level	
	Daytime	Night-time
Roof of Snowdome, Indoor Waterpark & Activity Centre	75 dB(A) at 1m OR 66 dB(A) at 3m	64 dB(A) at 1m OR 55 dB(A) at 3m

*Different plant configurations could apply depending on a number of variables, including operating periods and location of plant, which would be established during the detailed M&E design

Table 5.3 BS4142 Assessment for Proposed Plant

Ref	Description	Measured Background L_{A90}		Rating level from plant		BS 4142 Score	
		Daytime	Night-time	Daytime	Night-time	Daytime	Night-time
HR01	4* Hotel Receptor Location 1	49	36	35	27	-14	-9
HR02	4* Hotel Receptor Location 2			36	28	-13	-8
HR03	4* Hotel Receptor Location 3			36	28	-13	-8
HR04	4* Hotel Receptor Location 4			36	28	-13	-8
HR05	4* Hotel Receptor Location 5			39	31	-10	-5
HR06	3* Hotel Receptor Location 1			38	30	-11	-6
HR07	3* Hotel Receptor Location 2			36	28	-13	-8
HR08	3* Hotel Receptor Location 3			33	25	-16	-11

5.3 TRAFFIC NOISE ASSESSMENT

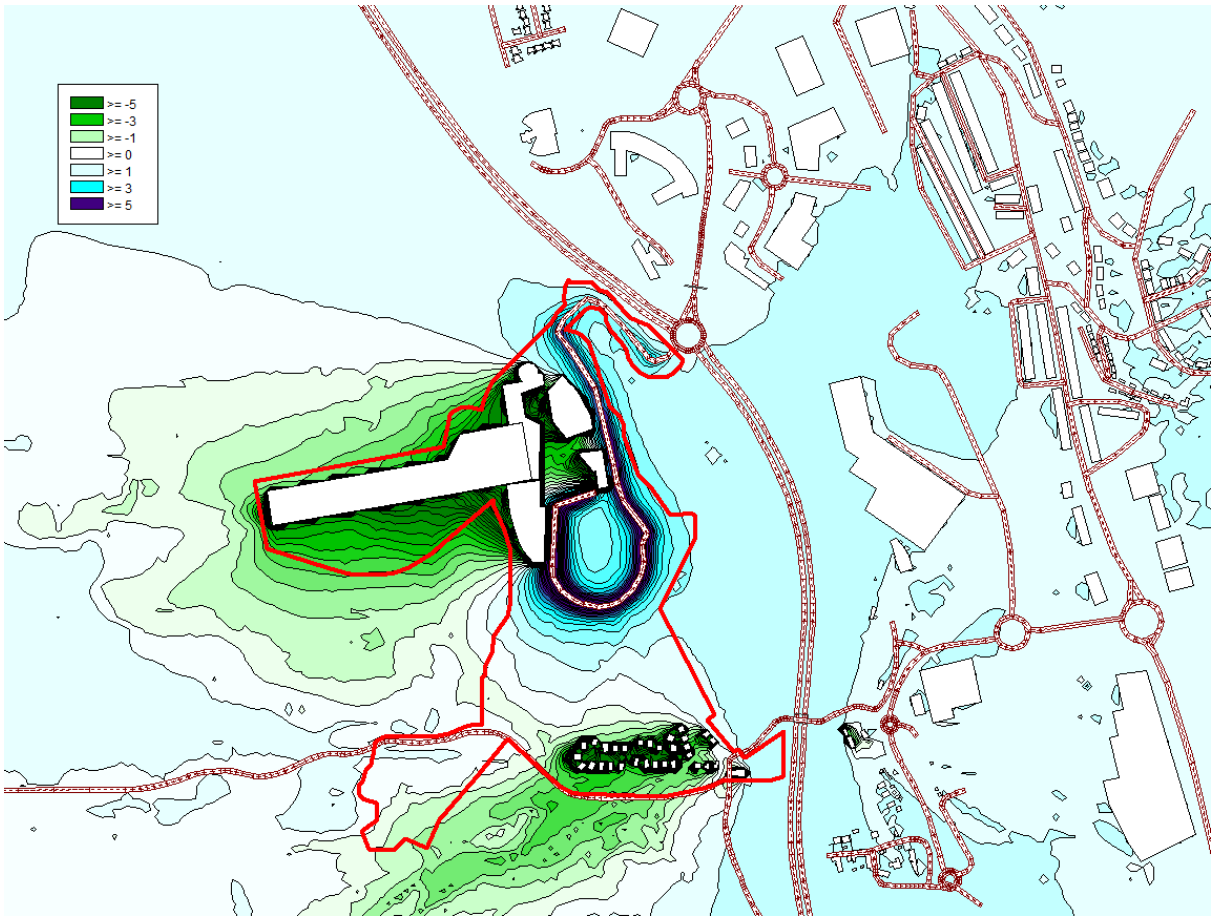
Based on the traffic data provided by Tetra Tech transport consultants, the assessment below compares different scenarios to determine the change in road traffic noise levels resulting from the proposed development. The traffic data used within this assessment are presented in Table 3.2. The 'without development' flows are presented as the 2021 Baseline and the 'with development' flows are presented as the 2031 'do-something.'

Table 5.4 Difference in Traffic Noise (Long-term)

Location	Baseline 2021 Noise Levels $L_{A10,18hour}$	Do Something (DS) 2031 Noise Levels $L_{A10,18hour}$	Difference in Noise Levels
R01	61.8	62.5	0.7
R02	57.8	58.8	1.0
R03	53.1	54.2	1.1
R04	53.8	55.0	1.2
R05	54.6	55.7	1.1
R06	55.4	56.5	1.1
R07	55.8	56.8	1.0
R08	60.1	60.2	0.1
R09	66.1	67.2	1.1

When the differences of the above scenarios are compared with the noise change criteria presented in Table 2.2 of this report, the long-term change in road traffic noise levels between 2021 and 2031 (inclusive of development-related traffic and cumulative increases in road traffic) at all representative receptors would be considered to be of 'negligible' significance.

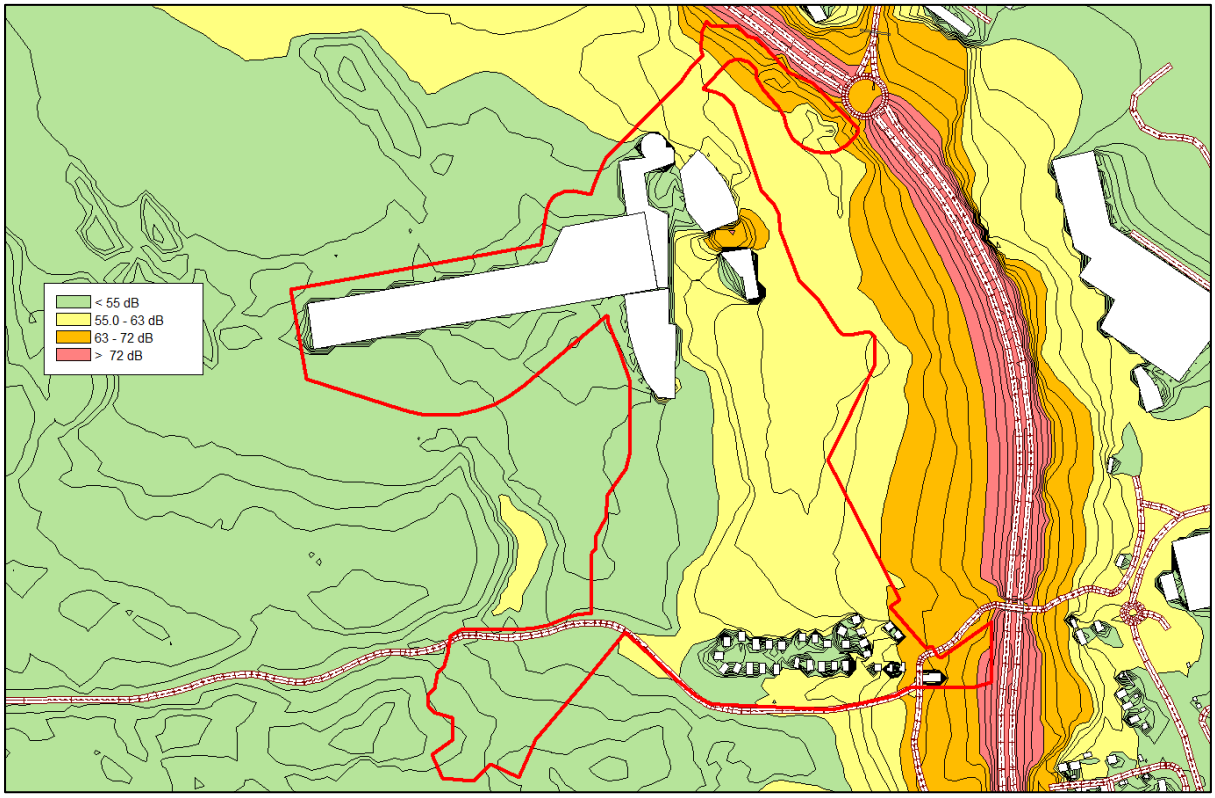
Figure 5.2 Predicted Change in Road Traffic Noise ($L_{A10,18hour}$ 2031 DS – 2021 Baseline)



5.4 NOISE EXPOSURE ASSESSMENT (PROPOSED LODGES & HOTEL)

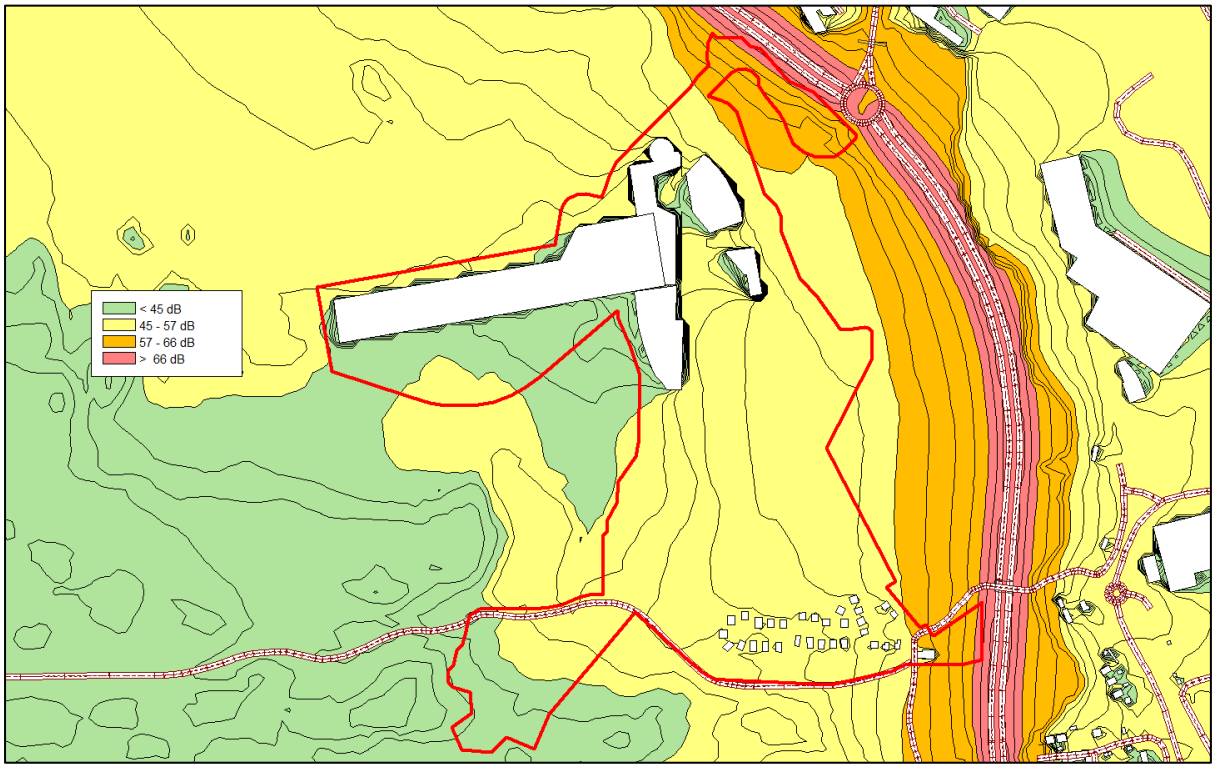
In accordance with TAN 11 the results of the modelling presented in Figures 5.3 and 5.4 below show that areas of the proposed development site are within Noise Exposure Categories A – C during the daytime and Noise Exposure Categories A-B during the night-time (D= Pink, C = Orange, B = Yellow, A = Green).

Figure 5.3 Daytime $L_{Aeq,\ 16hour}$ Noise Contour



Not to scale OS Licence No. AL553611 Noise Contours at 1.5m above ground

Figure 5.4 Night-time $L_{Aeq,8hour}$ Noise Contour



Not to scale OS Licence No. AL553611 Noise Contours at 4m above ground

In accordance with TAN 11, the results of the modelling presented in Table 5.5 below and illustrated in Figures 5.3 and 5.4 show that areas of the proposed development site are within Noise Exposure Categories A – C. As such, although the proposed hotel and lodges do not represent permanent residential dwellings, mitigation measures will be required in order to demonstrate that the target BS 8233 internal noise level criteria can be achieved, which are outlined in Section 5.5.

Table 5.5 Noise Exposure Category

Ref.	Daytime Noise Level (L_{Aeq}) dB	Night-time Noise Level (L_{Aeq}) dB	Daytime Noise Exposure Category	Night-time Noise Exposure Category
HR01	59.3	50.7	B	B
HR02	57.9	50.0	B	B
HR03	55.2	48.7	B	B
HR04	61.8	56.3	B	B
HR05	55.2	47.0	B	B
HR06	60.8	51.6	B	B
HR07	64.3	56.5	C	B
HR08	60.5	52.9	B	B

Ref.	Daytime Noise Level (L_{Aeq}) dB	Night-time Noise Level (L_{Aeq}) dB	Daytime Noise Exposure Category	Night-time Noise Exposure Category
LR01	62.9	55.2	B	B
LR02	60.6	52.9	B	B
LR03	59.6	52.0	B	B
LR04	58.0	50.2	B	B
LR05	59.4	51.8	B	B
LR06	61.4	53.7	B	B
LR07	65.2	57.5	C	C
LR08	65.3	57.7	C	C
LR09	64.7	57.1	C	C

5.5 NOISE INTRUSION ASSESSMENT (HOTEL & LODGES)

Noise from the existing ambient noise climate have been assessed with respect to the proposed hotel and lodges; internal noise levels within the proposed hotel and lodges have been assessed both with windows open, where a reduction from a partially open window of 10 dB has been used, and with windows-closed where an assumption of glazing with specification $R_w + C_{tr}$ 30 dB (e.g. 6/12/6mm double glazing or equivalent) has been used.

The results presented in Table 5.6 below show the predicted noise intrusion levels at properties across the site. The recommended WHO/BS 8233 internal noise levels are generally met across the site during the daytime and night-time, assuming a windows-closed scenario, however certain façades at the proposed lodge receptors to the south-eastern boundary facing the A470 are predicted to exceed the relevant criteria with windows open and closed. In order to achieve the recommended internal noise criteria, the minimum composite sound reduction for hotel and lodges across the development site have been identified.

Table 5.6 Noise Intrusion Levels (Daytime $L_{Aeq\ 16\ hour}$ & Night-time $L_{Aeq\ 8\ hour}$)

Location	Daytime (07:00-23:00)				Night-time (07:00-23:00)				Minimum Composite Sound Reduction Requirements to Achieve BS 8233 Criteria R_w+C_{tr} dB
	External L_{Aeq} at 1m from facade	Internal L_{Aeq} with windows open	Internal L_{Aeq} with windows closed	Criteria Internal L_{Aeq}	External L_{Aeq} at 1m from facade	Internal L_{Aeq} with windows open	Internal L_{Aeq} with windows closed	Criteria Internal L_{Aeq}	
HR01	59.3	49.3	29.3	35	50.7	40.7	20.7	30	**25**
HR02	57.9	47.9	27.9	35	50.0	40.0	20.0	30	**23**
HR03	55.2	45.2	25.2	35	48.7	38.7	18.7	30	**21**
HR04	61.8	51.8	31.8	35	56.3	46.3	26.3	30	**27**
HR05	55.2	45.2	25.2	35	47.0	37.0	17.0	30	**21**

Location	Daytime (07:00-23:00)				Night-time (07:00-23:00)				Minimum Composite Sound Reduction Requirements to Achieve BS 8233 Criteria R_w+C_{tr} dB
	External L_{Aeq} at 1m from facade	Internal L_{Aeq} with windows open	Internal L_{Aeq} with windows closed	Criteria Internal L_{Aeq}	External L_{Aeq} at 1m from facade	Internal L_{Aeq} with windows open	Internal L_{Aeq} with windows closed	Criteria Internal L_{Aeq}	
HR06	60.8	50.8	30.8	35	51.6	41.6	21.6	30	**26**
HR07	64.3	54.3	34.3	35	56.5	46.5	26.5	30	**30**
HR08	60.5	50.5	30.5	35	52.9	42.9	22.9	30	**26**
LR01	62.9	52.9	32.9	35	55.2	45.2	25.2	30	**28**
LR02	60.6	50.6	30.6	35	52.9	42.9	22.9	30	**26**
LR03	59.6	49.6	29.6	35	52.0	42.0	22.0	30	**25**
LR04	58.0	48.0	28.0	35	50.2	40.2	20.2	30	**23**
LR05	59.4	49.4	29.4	35	51.8	41.8	21.8	30	**25**
LR06	61.4	51.4	31.4	35	53.7	43.7	23.7	30	**27**
LR07	65.2	55.2	35.2	35	57.5	47.5	27.5	30	**31**
LR08	65.3	55.3	35.3	35	57.7	47.7	27.7	30	**31**
LR09	64.7	54.7	34.7	35	57.1	47.1	27.1	30	**30**

All values are sound pressure levels in dB re: 2x 10-5 Pa.

The composite sound reduction of the proposed lodges and hotel (inclusive of glazing and ventilation) of up to R_w + C_{tr} 31 dB is required for façades of proposed lodges facing the A470.

5.6 ASSESSMENT OF CHANGE IN NOISE LEVELS

This assessment compares worst case noise levels from the existing baseline ambient noise levels (L_{Aeq}) to the proposed scheme noise levels (L_{Aeq}) at the closest sensitive properties; the assessment includes contributions from the proposed outdoor activity area and waterpark, building services plant and access road. The difference between the 'existing' and the 'proposed' development scenarios are presented below in the table below.

Table 5.7 Difference Between the 'Existing Noise Levels' and 'Proposed' Scenarios

Ref.	Description	Existing $L_{Aeq\ 16\ Hour}$ (baseline ambient noise levels)	Combined L_{Aeq} (baseline ambient noise levels + proposed sources)	Contribution
R01	Bunkhouse Ty Wern – Cae'r Wern	59.5	59.5	0.0
R02	Travelodge Merthyr Tydfil – A1402	55.7	55.9	0.2
R03	74 Clare Street	52.1	52.4	0.3
R04	62 Clare Street	53.0	53.5	0.5
R05	42 Clare Street	53.8	54.3	0.5
R06	2 Railway Terrace	54.4	54.8	0.4
R07	22 Railway Terrace	54.9	55.2	0.3
R08	The Cabin Park Home – Glyndyrus Close	59.1	59.1	0.0
R09	9 Lewis Square	66.1	66.1	0.0

All values are sound pressure levels in dB re: 2x 10-5 Pa.

When compared with the criteria in Table 2.5 of this report, daytime noise levels are predicted to experience a worst-case change in noise level of up to 0.5 dB and therefore the overall change in

ambient noise level is expected to be negligible and is considered not to be significant (noise level changes of up to ± 3 dB are generally imperceptible to the human ear).

As such, the proposed development is not expected to result in a significant change in ambient noise levels at existing dwellings and is not expected to be readily distinguishable and is expected to have a negligible impact.

6.0 CONCLUSIONS

This report presents the findings of a noise assessment to support a proposed mixed-use leisure development on land at Rhydycar West, Merthyr Tydfil, South Wales.

Construction Noise

Noise levels from potential construction activities have been predicted and have shown that the relevant criteria is met at nearby sensitive receptors. Examples of typical construction activities have been presented. Based on typical equipment, the limits set out in BS 5228-1 for construction noise should be readily achievable. Furthermore, with careful management and appropriate mitigation, as presented in the Construction and Environmental Management Plan (CEMP) in Appendix B, it is considered that these noise levels could be reduced further still. Predicted noise levels at the nearest sensitive receptors are not considered to be significant in accordance with BS 5228-1:2009 +A1:2014.

Traffic Noise

The traffic noise assessment has concluded that cumulative off-site traffic noise contributions are expected to result in 'negligible' changes at existing properties.

Operational Noise

Assessments of contributions from building services plant have been undertaken to determine noise emission limits for plant, and an assessment of the change in ambient noise levels at existing dwellings has identified that the proposed facility is expected to have a negligible impact at existing dwellings.

Site Suitability Assessment

A glazing and ventilation strategy has been provided which achieves both ventilation and internal ambient noise level requirements of $L_{Aeq\ daytime}$ 35 dB and $L_{Aeq\ night\text{-}time}$ of 30 dB in all sensitive spaces of the proposed development. The composite sound reduction of the building envelope of the hotel and lodges (inclusive of glazing and ventilation) will be up to $R_w + C_{tr}$ 31 dB.

Therefore, it is considered that the proposed noise mitigation is sufficient to reduce the effects of any noticeable and disruptive noise being currently emitted from the surrounding environment by helping to prevent noise levels exceeding BS 8233 criteria for L_{Aeq} within all areas of the proposed development.

APPENDICES

APPENDIX A – ACOUSTIC TERMINOLOGY & ABBREVIATION

An explanation of the specific acoustic terminology referred to within this report is provided below.

dB — Sound levels from any source can be measured in frequency bands in order to provide detailed information about the spectral content of the noise, i.e. whether it is high-pitched, low-pitched, or with no distinct tonal character. These measurements are usually undertaken in octave or third octave frequency bands. If these values are summed logarithmically, a single dB figure is obtained. This is usually not very helpful as it simply describes the total amount of acoustic energy measured and does not take any account of the ear's ability to hear certain frequencies more readily than others.

dB(A) — Instead, the dBA figure is used, as this is found to relate better to the loudness of the sound heard. The dBA figure is obtained by subtracting an appropriate correction, which represents the variation in the ear's ability to hear different frequencies, from the individual octave or third octave band values, before summing them logarithmically. As a result the single dBA value provides a good representation of how loud a sound is.

L_{Aeq} — Since almost all sounds vary or fluctuate with time it is helpful, instead of having an instantaneous value to describe the noise event, to have an average of the total acoustic energy experienced over its duration. The $L_{Aeq,\ 07:00\ –\ 23:00}$ for example, describes the equivalent continuous noise level over the 16 hour period between 7 am and 11 pm. During this time period the L_{pA} at any particular time is likely to have been either greater or lower that the $L_{Aeq,\ 07:00\ –\ 23:00}$.

L_{Amin} — The L_{Amin} is the quietest instantaneous noise level. This is usually the quietest 125 milliseconds measured during any given period of time.

L_{Amax} — The L_{Amax} is the loudest instantaneous noise level. This is usually the loudest 125 milliseconds measured during any given period of time.

L_n — Another method of describing, with a single value, a noise level which varies over a given time period is, instead of considering the average amount of acoustic energy, to consider the length of time for which a particular noise level is exceeded. If a level of x dBA is exceeded for say. 6 minutes within one hour, then that level can be described as being exceeded for 10% of the total measurement period. This is denoted as the $L_{A10,\ 1\ hr}$ = x dB.

The L_{A10} index is often used in the description of road traffic noise, whilst the L_{A90}, the noise level exceeded for 90% of the measurement period, is the usual descriptor for underlying background noise. L_{A1} and L_{Amax} are common descriptors of construction noise.

R_w — The *weighted sound reduction index* determined using the above *measurement* procedure, but weighted in accordance with the procedures set down in BS EN ISO 717-1. Partitioning and building board manufacturers commonly use this index to describe the inherent sound insulation performance of their products.

APPENDIX B – CONSTRUCTION AND ENVIRONMENTAL MANAGEMENT PLAN (CEMP) – NOISE

A construction noise assessment has been undertaken in accordance with BS 5228:2009:A1+ 2014 which demonstrates that noise from daytime construction activity on the site is not considered to be significant. The full details of the assessment are presented in the noise technical report which supports the proposed scheme.

Despite the favourable assessment, a number of additional mitigation measures are recommended to keep construction site noise to a minimum. The following practices are derived from those detailed in BS 5228-1:2009:A1+ 2014 and those most appropriate to the site are outlined below.

Source Noise Control

Wherever possible noise will be controlled at source.

a) avoid unnecessary revving of engines and switch off equipment when not required;

b) keep internal haul routes well maintained and avoid steep gradients;

c) use rubber linings in, for example, chutes and dumpers to reduce impact noise;

d) minimize drop height of materials;

e) start up plant and vehicles sequentially rather than all together.

As far as reasonably practicable, sources of significant noise will be enclosed or screened. The extent to which this can be done depends on the nature of the machine or process to be enclosed and their ventilation requirements. For maximum benefit, screens will be close to the source of noise.

Plant Location

The plant and activities to be employed on that site will be reviewed to ensure that they are the quietest available for the required purpose; this is in accordance with best practicable means. For an existing operational site, where reasonably practicable, noisy plant or activities will be replaced by less noisy alternatives if noise problems are occurring. Noise from existing plant and equipment can often be reduced by modification or by the application of improved sound reduction methods, but this will only be carried out after consultation with the manufacturer. Suppliers of plant will often have ready-made kits available and will often have experience of reducing noise from their plant.

Working Methods

Where reasonably practicable, quiet working methods will be employed, including use of the most suitable plant, reasonable hours of working for noisy operations, and economy and speed of operations.

Scheduling of Works

It is proposed that the scheduling of any construction works at the site be within daytime hours. The following hours of construction working are proposed;

a) Monday to Friday: 07:00 – 19:00

b) Saturday: 07:00 – 13:00

c) Sundays and Bank Holidays: No Working

Maintenance

Regular and effective maintenance by trained personnel is essential and will do much to reduce noise from plant and machinery. Increases in plant noise are often indicative of future mechanical failure.

Training

Operatives will be trained to employ appropriate techniques to keep site noise to a minimum, and will be effectively supervised to ensure that best working practice in respect of noise reduction is followed. All employees will be advised regularly of the following, as part of their training:

a) the proper use and maintenance of tools and equipment;

b) the positioning of machinery on site to reduce the emission of noise to the neighbourhood and to site personnel;

c) the avoidance of unnecessary noise when carrying out manual operations and when operating plant and equipment;

d) the protection of persons against noise;

e) the operation of sound measuring equipment (selected personnel).

Special attention will be given to the use and maintenance of sound-reduction equipment fitted to power tools and machines.

Community Relations

Good relations with people living and working in the vicinity of site operations are of paramount importance. Early establishment and maintenance of these relations throughout the duration of site operations, will go some way towards allaying people's fears. It is suggested that good relations can be developed by keeping people informed of progress and by treating complaints fairly and expeditiously. The person, company or organization carrying out work on site will appoint a responsible person to liaise with the public.

In general, the longer the duration of activities on a site, the more likely it is that noise from the site will prove to be an issue. In this context, good public relations and communication are important. The hours of working will be planned in advance and disseminated. There will be a need to adhere strictly to the stated schedule and ensure that the community is informed of their likely durations.