Albion Land Ltd

Discharge of Condition 23

Link 9 – Skimmingdish Lane,

Plot 1, Bicester

Noise Assessment

May 2018

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1.0 Introduction

1.1 Purpose of this Report

This report presents the findings of a noise assessment undertaken in support of the discharge of Condition 23 of application no. 15/01012/OUT which states:

> *Condition 23*
>
> *'Prior to the occupation of the development hereby approved details of the acoustic screening to be provided between the development and the existing care home on the south-western edge of the development site shall be first submitted and approved in writing with the Local Planning Authority. The approved scheme shall be implemented prior to the occupation of the development.'*

At the time of writing, the condition is subject to a pending partial discharge application (LPA Ref: 18/00060/DISC) which relates to the agreement of temporary acoustic mitigation measures between Plot 3 and Plot 1 of the development. These measures have been signed off by the Council's Environmental Protection Team, albeit a decision is yet to be issued.

These temporary mitigation measures provide an interim solution ahead of development on Plot 1 coming forward. This report outlines the proposed permanent measures that will replace these temporary measures as and when development on Plot 1 commences. This report therefore seeks the full discharge of Condition 23.

Noise surveys have been undertaken and the results used to verify predictions of the short-term and long-term effects of noise. The noise levels from all proposed noise sources associated with site have been predicted 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. Location plans and noise contour plots are presented in Appendix B.

1.2 Legislative Context (England)

This report provides information relevant to the local planning authority and their consultees in support of a planning application for the above proposed development. Policy guidance with respect to noise is found in the National Planning Policy Framework. With regard to noise and planning, the NPPF contains the following short statements (section 123):

- Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
- Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;
- Recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established
- 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.

The National Planning Practice Guidance (PPG) web-based resource was launched by the Department for Communities and Local Government (DCLG) on 6 March 2014 to support the National Planning Policy Framework and make it more accessible. The overall aim of the guidance, tying in with the principles of the NPPF and the Explanatory Note of the Noise Policy Statement for England, is to *identify whether the overall effect of noise exposure is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation.* A summary of the effects of noise exposure associated with both noise generating developments and noise sensitive developments is presented within the PPG and repeated as follows:

Table 1.1 Noise Exposure Hierarchy

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not noticeable	No Effect	No Observed Effect	No Specific Measures Required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No Specific Measures Required
Lowest Observed Adverse Effect Level			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; closing windows for some of the time because of the noise. Potential for non-awakening sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			

Perception	Examples of Outcomes	Increasing Effect Level	Action
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. having to keep windows closed most of the time, avoiding certain activities during periods of intrusion. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Observed Adverse Effect	Prevent

1.3 Acoustic Consultants' Qualifications, Professional Memberships

The project Acoustic Consultant is Graham Davis. The report has been checked by Graham Davis and verified by Nigel Mann. Relevant qualifications, membership and experience are summarised below.

Table 1.2 Acoustic Consultants' Experience

Name	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)
Leon Bailey	BSc (2014)	-	July 2017	-	-
Graham Davis	BA (2008)	Nov 2013	Sept 2011	Jan 2014	
Nigel Mann	BSc, (1997) MSc (1999)	Nov 2001	Nov 1998	Nov 2001	Jul 2005

2.0 Assessment Criteria

2.1 Internal Noise Assessment Criteria

In order enable the assessment of the proposed development in terms of LOAEL and SOAEL, Table 2.1 presents equivalent noise levels and associated actions with the target noise level criteria identified. The noise level criteria detailed below have been derived from standards and design guidance:

BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings'
World Health Organisation *'Guidelines on Community Noise' (1999)*

Table 2.1 Noise Level Criteria and Actions (Noise Intrusion Assessment)

Effect Level	Assessment	Noise Level Criteria	Action / Justification
No Observed Adverse Effect Level	Goods Deliveries/Service Yard Activities/Car Parking	Noise levels below: Bedrooms – 30 $dBL_{Aeq,8hours}$ / 45 dBL_{Amax} Living Rooms – 35 $dBL_{Aeq,16hours}$ External Amenity Space – 50 $dBL_{Aeq,16hours}$	No Action Required Score of zero or lower is an indication of the sound source having a low impact Within BS8233 / WHO / BB93 / BB101
Lowest Observed Adverse Effect Level	Goods Deliveries/Service Yard Activities/Car Parking	Noise levels exceed: Bedrooms – 30 $dBL_{Aeq,8hours}$ / 45 dBL_{Amax} Living Rooms – 35 $dBL_{Aeq,16hours}$ External Amenity Space – 55 $dBL_{Aeq,16hours}$	Mitigate to achieve: BS4142 Score of plus 5 or lower *Bedrooms – 30 $dBL_{Aeq,8hours}$ / 45 dBL_{Amax}* *Living Rooms – 35 $dBL_{Aeq,16hours}$* *External Amenity Space – 55 $dBL_{Aeq,16hours}$* Within BS8233 / WHO / BB93 / BB101
Significant Observed Adverse Effect	Goods Deliveries/Service Yard Activities/Car Parking	Noise levels exceed: Bedrooms – 30 $dBL_{Aeq,8hours}$ Living Rooms – 35 $dBL_{Aeq,16hours}$ External Amenity Space – 55 $dBL_{Aeq,16hours}$	Mitigate to achieve: *Bedrooms – 30 $dBL_{Aeq,8hours}$ / 45 dBL_{Amax} Living Rooms – 35 $dBL_{Aeq,16hours}$* *External Amenity Space – 55 $dBL_{Aeq,16hours}$* Within BS8233 / WHO criteria
Unacceptable Observed Adverse Effect	Goods Deliveries/Service Yard Activities/Car Parking	Noise levels with mitigation exceed: Bedrooms – 35 $dBL_{Aeq,8hours}$ Living Rooms – 40 $dBL_{Aeq,16hours}$ External Amenity Space – 60 $dBL_{Aeq,16hours}$	Prevent

3.0 Assessment Methodology

3.1 Noise Modelling Methodology

The details of the scheme have been assessed using three-dimensional noise modelling of source noise levels at a large number of locations both horizontally and vertically. CADNA noise modelling software has been used. This model is based on the Department of Transport Calculation of Road Traffic Noise (CRTN) and ISO 9613 noise propagation methodology and allows for detailed prediction of noise levels to be undertaken for large numbers of 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 the table below have been used.

Table 3.1 Modelling Parameters Sources and Assumptions

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 and Ordnance Survey	OS 1:25,000 contours and OS 1:10,000 spot heights.
Building heights – around site	WYG Observations	8 m height for two storey residential properties, and 4 m for Bungalows
Barrier heights	WYG Observations	All existing barriers at 1.8 m with the exception of hedges and trees which are assumed to offer no noise protection.
Receptor positions	WYG	1 m from façade, height of 1.5 m for ground floor, 4 m for first floor properties with ground floor or bungalow dormer windows. 1.5 m height for model grid and monitoring locations for validation.
Reflections	WYG	First order reflections have been applied based on mirror image sources
Absorbent Ground	CADNA	Frequency dependant ground absorption has been applied based on values specified in VDI 2714/16 clause 6.3.
Façade Correction	CADNA	Façade corrections have been incorporated into the modelling
Proposed Plans	Cornish Architects	Drawing Number: 17007/SK/045 Dated: 14/03/2018

It is acknowledged that a number of these assumptions will affect the overall noise levels presented in this report. However, it should be noted that certain assumptions made, as identified above, are worst case.

3.2 Model Input Data - Operational Phase

3.2.1 Summary of Noise Levels

A summary of the operational phase noise levels, used within the model, for daytime and night-time L_{Aeq} and night-time L_{Amax}, are presented in Table 3.2 below; for the purposes of this worst-case assessment, all proposed units are considered to be operational. Further explanation on how these noise levels were calculated are presented in the following sub-sections.

Table 3.2 Summary of Noise Source, Noise levels during Daytime & Night-time

Noise Source	Noise Level (dB)		
	Daytime L_{Aeq}	Night-time L_{Aeq}	Night-time L_{Amax}
HGV Docking	71.3 dB @ 3m	76.2 dB @ 3m	89.4 dB @ 3m
HGV Parking	72.2 dB @ 3m	75.2 dB @ 3m	89.4 dB @ 3m
HGV Movements	59.7 dB @ 3m	62.7 dB @ 3m	72.0 dB @ 3m
Car Parking	53.0 dB @ 1.5m Height	53.0 dB @ 1.5m Height	71.9 dB @ 3m

3.2.2 HGV Docking Event; Noise Data

Noise of a docking delivery event has been known to vary from site to site by as much as 22 dB L_{Aeq} at 5 m distance even with the same vehicle type. Similarly, individual events using the same vehicle and at the same store have been recorded to vary by as much as 14 dB.

As such, the following worst-case calculations have been based on measurements of refrigerated lorries delivering consumables. All measurements were undertaken in free-field conditions. In addition to noise from the unloading process, the levels used in the assessment include noise from the vehicle pulling up to the unloading bay, manoeuvring into position and then pulling away once unloading/loading is complete, together with other sources such as trolleys and reversing bleepers. During the Daytime, the assessment is based on 100% of the docking bays having a HGV arrive, unload and depart in any 1-hour period, during the night-time the assessment is based on, in any 15–minute period, one event occurs at 50% of the available docking spaces. Events are modelled as a point source.

Refrigerated Articulated Vehicles

- *Specific Noise Level*

  1 x 120 seconds at L_p 84 dB at 3 m distance (vehicle arriving and manoeuvring)
  1 x 1800 seconds at L_p 70 dB at 3 m distance (vehicle unloading)
  1 x 60 seconds at L_p 75 dB at 3 m distance (vehicle leaving)

Daytime $L_{Aeq(60\ mins)} = 10\log(1/3600)(120 \times 10^{0.1 \times 84dB} + 1800 \times 10^{0.1 \times 70dB}) + 60 \times 10^{0.1 \times 75dB})$

$= 71.3$ dB at 3 m distance

Night-time $L_{Aeq(15\ mins)}$= 10log(1/900)(120 x $10^{0.1x84dB}$+ 780 x $10^{0.1x70dB}$)

= 76.2 dB at 3 m distance

- *Maximum Noise Level*

Night-time L_{Amax} = 89.4 dB at 3 m distance

3.2.3 HGV Parking Event; Noise Data

The following worst-case calculations have been based on measurements of refrigerated lorries. All measurements were undertaken in free-field conditions. The levels used in the assessment include noise from the vehicle pulling up to a parking bay, manoeuvring into position (2 minutes) and then turning both the engine and any refrigeration equipment off, maintaining a period of quiet ('no noise' emanating from the particular vehicle) for 56 minutes and then the vehicle will start its engine, idle and pull away (2 minutes). The calculations are based on a maximum of one event per hour. During the Daytime, the assessment is based on 100% of the parking bays having an HGV arrive and manoeuvring in any 1-hour period, during the night-time the assessment is based on, in any 15-minute period, one event occurs at 50% of the available parking spaces. Events are modelled as a point source.

Refrigerated Articulated Vehicles

- *Specific Noise Level*

  1 x 120 seconds at L_p 84 dB at 3 m distance (vehicle arriving and manoeuvring)

  Daytime $L_{Aeq(60\ mins)}$ = 10log(1/3600)(240 x $10^{0.1x84dB`}$))

  = 72.2 dB at 3 m distance

  Night-time $L_{Aeq(15\ mins)}$ = 10log(1/900)(120 x $10^{0.1x84dB}$))

  = 75.2 dB at 3 m distance

  Maximum Noise Level

  Night-time L_{Amax} = 89.4 dB at 3 m distance

3.2.4 HGV Movements; Noise Data

The following calculations have been used to represent HGV's arriving/existing along the access road. A worst-case scenario, has been calculated predicting 40 HGV's arriving/leaving in a 1-hour period during the daytime (07:00 – 23:00) period. During night-time (23:00-07:00) the assessment has used 50% of the predicted HGV's arriving/leaving, in any 15-minute period. The HGV movements have been included as a line source in the model.

- *Daytime $L_{Aeq,1hr}$ Noise Level*

  40 x 10 seconds at Lp = 69.3 dB at 3 m distance (vehicle arriving/leaving)
  $L_{Aeq(60\ mins)}$ = $10\log(1/3600)(400\ sec \times 10^{0.1 \times 69.3\ dB})$
  Daytime $L_{Aeq(60\ mins)}$ = 59.8 dB at 3 m distance

- *Night-time $L_{Aeq,15\ mins}$ Noise Level*

  20 x 10 seconds at L_p = 69.3 dB at 3 m distance (vehicle arriving/leaving)
  $L_{Aeq(15\ mins)}$ = $10\log(1/900)(200\ sec \times 10^{0.1 \times 69.3\ dB})$
  Night-time $L_{Aeq(15\ mins)}$ = 62.8 dB at 3 m distance

- *Night-time L_{Amax}*

  Night-time L_{Amax} = 72.0 dB at 3 m distance

3.2.5 Car Park; Noise Data

Worst case noise levels from car parking at the distribution centre have been based upon observations and measurements taken at a similar sized distribution centre car park during a shift change and have been included in the model as an area source at 1.5m height. L_{Amax} noise levels accounting for impulsive events such as car-door slams are modelled as point sources. the noise levels used can be found in Table 3.2 above.

3.3 Sensitive Receptors

The Tables below summarise receptor locations that have been selected to represent worst-case residential receptors, at the care home with respect to direct noise from the site. The closest receptors of the Care Home located to the south-east of the development have been assessed. The locations of the receptors are illustrated in SK02 in Appendix B.

Table 3.3 Receptor Locations – Operational Noise Assessment

Ref.	Description	Closest Source	Approximate distance to closest source (m)	Height (m)
R1	North-west façade of Care Home	Staff Car Parking	43.0	4.0
R2	North-west façade of Care Home	Staff Car Parking	36.0	4.0
R3	North-west façade of Care Home	Staff Car Parking	32.0	4.0
R4	North-east façade of Care Home	Staff Car Parking	32.0	4.0
R5	North-east façade of Care Home	Staff Car Parking	43.0	4.0
R6	North-east façade of Care Home	Staff Car Parking	54.0	4.0
R7	South-east façade of Care Home	HGV Movement	82.0	4.0

4.0 Noise Monitoring Data

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:

Rion NL-32	Environmental Noise Analyser (WYG12)	s/n	213442
Rion NL-52	Environmental Noise Analyser (WYG17)	s/n	1043466
Rion NL-52+X	Environmental Noise Analyser (WYG5)	s/n	342866

The measurement equipment was checked against the appropriate calibrator at the beginning and end of the measurements, in accordance with recommended practice, and no 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 six locations (as specified in the following table and shown in SK01 of Appendix B) from Wednesday 14th March 2018 to Thursday 15th March 2018. Attended short term measurements were undertaken at five locations during day, evening and night-time periods with two additional locations being measured unattended over a 119-hour period. The raw data collected from the long-term monitoring is 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 south-easterly wind direction, during the survey.

Table 4.1 Noise Monitoring Locations

Ref	Description
LT1	Along the North-western boundary of the site approximately 200m northeast of Skimmingdish Lane.
LT2	On the Northern boundary behind Wyndham Hall Care Home facing the footpath.
ST1	On the North-western corner of Wyndham Hall Care Home where the footpath veers off.
ST2	Along the footpath on the western side of Wyndham Hall Care Home.
ST3	Along the edge of Skimmingdish Lane, 30m north, up the footpath that links to the roundabout.
ST4	At the northern end of Benson Close.
ST5	At the southwestern corner of the site, adjacent to Skimmingdish Lane.

4.2 Noise Survey Results

The dominant noise source is road traffic noise along Skimmingdish Lane, other noticeabele noise sources include other surrounding roads (Launton Road and Boston Road [Site ST4 only]), HGV passes, occasional helicopter and plane passes, pedestrians (dog walkers, cyclists) using the footpath behind the care centre and surrounding wildlife (birds, sheep).

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	Temp. (°C)	Wind Speed (m/s)	Wind Direction	Cloud Cover (Oktas)	Dominant Noise Source
Day ST1	14/03/2018 15:13	11.0	3-4	SSE	6/8	Road traffic noise along Skimmingdish Lane and occasional bangs from construction site among other construction noises. Also, short period of distant hunting gun shots heard.
Day ST2	14/03/2018 15:31	11.0	2-3	SSE	6/8	Road traffic noise along Skimmingdish Lane, some construction noise, regular HGVs on road close to roundabout/junction – constant traffic flow and distant noise from surrounding connecting roads (Launton Road, A4421 [Charbridge Lane] and Bicester Road).
Day ST3	14/03/2018 15:48	11.0	2-3	SE	7/8	Road traffic noise along Skimmingdish Lane, roundabout and Launton Road. Noise from passing cyclists and bird song in nearby bushes and trees as well as dog walkers passing along footpath (around Care Centre).
Day ST4	14/03/2018 14:23	12.0	2-3	SE	5/8	Distant traffic noise (low-level) as well as occasional construction noise (banging and reversing construction vehicles). Some occasional passing cars on residential roads (Launton) and some bird song.
Day ST5	14/03/2018 14:51	11.0	2-3	SE	5/8	Road traffic noise along Skimmingdish Lane, some construction noise and regular passing of HGVs.
Evening ST1	14/03/2018 21:43	9.0	2-3	SE	4/8	Road traffic noise – Skimmingdish Lane. No noise coming from care home or construction site.
Evening ST2	14/03/2018 22:02	9.0	1-2	ESE	5/8	Road traffic noise along Skimmingdish Lane, roundabout and Launton road – traffic becoming less regular.
Evening ST3	14/03/2018 22:20	9.0	2-3	ESE	5/8	Road traffic noise – Skimmingdish Lane, Roundabout, Launton Road.
Evening ST4	14/03/2018 20:54	9.0	1-2	ESE	3/8	Distant road traffic noise from surrounding roads – Skimmingdish Lane, Roundabout, Launton Road and Boston Road and infrequent pedestrian passes on footpath.
Evening ST5	14/03/2018 21:20	9.0	2-3	SE	3/8	Road traffic noise along Skimmingdish Lane with regular passing traffic.
Night ST1	14/03/2018 23:52	9.0	2-3	ESE	6/8	Very occasional car passing along surrounding roads. Sheep in nearby field occasionally making

Survey Location	Date & Time	Temp. (°C)	Wind Speed (m/s)	Wind Direction	Cloud Cover (Oktas)	Dominant Noise Source
						noise. Distant, low hum coming from trading centre to the Southeast. Can see 2 lights from the trading centre.
Night ST2	15/03/2018 00:11	9.0	1-2	ESE	4/8	Road traffic noise on surrounding roads (Skimmingdish, Launton, roundabout) all occasional vehicles passing. Wind rattling sign on fence nearby and can hear distant plant noise (hum) from trading estate to the Southeast.
Night ST3	15/03/2018 00:29	9.0	1-2	ESE	4/8	[Begun to rain at 00:36]. Occasional cars passing along surrounding roads (Skimmingdish, Launton, roundabout). Occasional vehicle reversing. Can still hear constant, low-level, distant plant noise from trading centre to the Southeast in traffic lull.
Night ST4	14/03/2018 23:02	9.0	1-2	ESE	5/8	Occasional cars/HGVs passing on distant surrounding roads. Some activity on nearby trading estate (albeit quiet) – unloading vehicles.
Night ST5	14/03/2018 23:30	9.0	2-3	ESE	5/8	Occasional car passing along Skimmingdish lane (occasional car and HGV).

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).

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 Daytime 07:00 - 23:00	46 Hours	14/03/2018 – 19/03/2018 13:48 – 12:18	LT1	49.6	86.7	33.1	50.6	48.0
Weekday Night-time 23:00 – 07:00	24 Hours	14/03/2018 – 19/03/2018 23:00 - 07:00		44.4	72.1	30.5	45.2	34.0
Weekend Daytime 07:00 - 23:00	32 Hours	17/03/2018 – 18/03/2018 07:00 - 23:00		48.8	82.1	31.7	50.0	41.0
Weekend Night-time 23:00 – 07:00	16 hours	17/03/2018 – 18/03/2018 23:00 - 07:00		45.8	66.9	31.8	47.6	37.0
Weekday Daytime 07:00 - 23:00	46 Hours	14/03/2018 – 19/03/2018 13:15 – 12:40	LT2	48.2	76.9	33.8	50.4	37.0
Weekday Night-time 23:00 – 07:00	24 Hours	14/03/2018 – 19/03/2018 23:00 - 07:00		49.1	83.1	28.2	45.8	38.0
Weekend Daytime 07:00 - 23:00	32 Hours	17/03/2018 – 18/03/2018 07:00 - 23:00		47.8	74.7	30.9	48.8	39.0
Weekend Night-time 23:00 – 07:00	16 hours	17/03/2018 – 18/03/2018 23:00 - 07:00		45.7	76.9	29.6	46.7	38.0
Daytime 07:00 - 19:00	15 Mins	14/03/2018 15:13	ST1	52.6	74.3	46.2	54.3	49.0
	15 Mins	14/03/2018 15:31	ST2	63.3	71.3	52.6	65.7	58.3
	15 Mins	14/03/2018 15:48	ST3	64.3	79.2	54.4	66.6	59.8

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)
	15 Mins	14/03/2018 14:23	ST4	53.0	72.6	47.0	53.7	49.5
	15 Mins	14/03/2018 14:51	ST5	76.7	87.5	54.9	80.6	62.7
Evening 19:00 - 23:00	15 Mins	14/03/2018 21:43	ST1	46.7	62.6	38.4	49.3	41.2
	15 Mins	14/03/2018 22:02	ST2	57.8	73.3	40.1	62.0	44.4
	15 Mins	14/03/2018 22:20	ST3	57.4	71.0	44.1	60.7	49.2
	15 Mins	14/03/2018 20:54	ST4	79.6	71.8	39.9	50.8	44.6
	15 Mins	14/03/2018 21:20	ST5	72.1	92.3	43.7	77.1	47.4
Night-time 23:00 - 07:00	15 Mins	14/03/2018 23:52	ST1	43.0	60.3	33.9	46.2	36.3
	15 Mins	15/03/2018 00:11	ST2	52.4	70.9	35.9	54.7	38.5
	15 Mins	15/03/2018 00:29	ST3	51.5	72.6	35.9	53.9	39.8
	15 Mins	14/03/2018 23:02	ST4	46.7	61.9	40.9	48.9	43.4
	15 Mins	14/03/2018 23:30	ST5	67.9	87.3	42.3	69.0	45.3

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

5.0 Assessment of Key Effects

5.1 Care Home - Noise Intrusion Assessment

This assessment has been undertaken in order to establish the internal noise levels, at the care home, from the proposed operations (including HGV movements along the access road, HGV parking and unloading, staff car parking) at the distribution centre (Plot 1) with and without the proposed permanent acoustic screening. Noise levels have been assessed both with windows open, where a reduction from a partially open window of 15 dB has been used, and with windows closed where an assumption of single glazing with a sound reduction of 30 dB has been used.

In accordance with the requirements of Condition 23, this assessment compares two scenarios (with and without mitigation) to determine the reduction in noise levels provided by the proposed permanent acoustic screening to the south-east corner of the site, that will replace the temporary screening measures as and when the development on Plot 1 commences. The proposed permanent acoustic screening includes a 4m high acoustic barrier to the south of the distribution centre 1B and a 2m high bund with a 2m high acoustic barrier on top of the bund, to the east of the staff parking area south of Unit 1B. The location and details of the acoustic screening are shown illustratively in Appendix B.

Tables 5.1-5.3 below present noise intrusion levels during day time and night-time, with and without the proposed permanent acoustic screening, in addition to the change in external façade noise levels, to show the benefits of the proposed permanent acoustic screening to the Care Home, located to the south-west of the development.

Table 5.1 Care Home Noise Intrusion Levels L_{Aeq} (Daytime)

Location	Without Mitigation				With Mitigation				Reduction in Noise Levels (dB)
	External Façade Levels $L_{Aeq(1\ hr)}$	Internal $L_{Aeq(1\ hr)}$ with windows open	Internal $L_{Aeq(1\ hr)}$ with windows closed	BS 8233 / WHO Criteria – Internal L_{Aeq}	External Façade Levels $L_{Aeq(1\ hr)}$	Internal $L_{Aeq(1\ hr)}$ with windows open	Internal $L_{Aeq(1\ hr)}$ with windows closed	BS 8233 / WHO Criteria – Internal L_{Aeq}	
R1	49.9	34.9	14.9	35	45.5	30.5	10.5	35	**-4.4**
R2	51.4	36.4	16.4	35	46.3	31.3	11.3	35	**-5.1**
R3	53.0	38.0	18.0	35	46.5	31.5	11.5	35	**-6.5**
R4	53.7	38.7	18.7	35	44.9	29.9	9.9	35	**-8.8**
R5	53.5	38.5	18.5	35	44.9	29.9	9.9	35	**-8.6**
R6	53.3	38.3	18.3	35	45.1	30.1	10.1	35	**-8.2**
R7	49.2	34.2	14.2	35	43.8	28.8	8.8	35	**-5.4**

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

Table 5.2 Care Home Noise Intrusion Levels L_{Aeq} (Night-time)

Location	Without Mitigation				With Mitigation				Reduction in Noise Levels (dB)
	External Façade Levels $L_{Aeq(15\ min)}$	Internal $L_{Aeq(15\ min)}$ with windows open	Internal $L_{Aeq(15\ min)}$ with windows closed	BS 8233 / WHO Criteria – Internal L_{Aeq}	External Façade Levels $L_{Aeq(15\ min)}$	Internal $L_{Aeq(15\ min)}$ with windows open	Internal $L_{Aeq(15\ min)}$ with windows closed	BS 8233 / WHO Criteria – Internal L_{Aeq}	
R1	47.6	32.6	12.6	30	43.4	28.4	8.4	30	**-4.2**
R2	48.8	33.8	13.8	30	43.9	28.9	8.9	30	**-4.9**
R3	50.5	35.5	15.5	30	44.1	29.1	9.1	30	**-6.4**
R4	51.2	36.2	16.2	30	42.5	27.5	7.5	30	**-8.7**
R5	51.0	36.0	16.0	30	42.4	27.4	7.4	30	**-8.6**
R6	50.9	35.9	15.9	30	42.7	27.7	7.7	30	**-8.2**
R7	46.8	31.8	11.8	30	41.6	26.6	6.6	30	**-5.2**

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

Table 5.3 Care Home Noise Intrusion Levels L_{AMax} (Night-time)

Location	Without Mitigation				With Mitigation				Reduction in Noise Levels (dB)
	External Façade Levels L_{AMax}	Internal L_{AMax} with windows open	Internal L_{AMax} with windows closed	WHO Criterion – Internal L_{AMax}	External Façade Levels L_{AMax}	Internal L_{AMax} with windows open	Internal L_{AMax} with windows closed	WHO Criterion – Internal L_{AMax}	
R1	58.3	43.3	23.3	45	54.4	39.4	19.4	45	**-3.9**
R2	59.1	44.1	24.1	45	54.5	39.5	19.5	45	**-4.6**
R3	60.0	45.0	25.0	45	54.6	39.6	19.6	45	**-5.4**
R4	60.9	45.9	25.9	45	50.5	35.5	15.5	45	**-10.4**
R5	60.8	45.8	25.8	45	50.0	35.0	15.0	45	**-10.8**
R6	60.5	45.5	25.5	45	51.5	36.5	16.5	45	**-9.0**
R7	55.3	40.3	20.3	45	52.3	37.3	17.3	45	**-3.0**

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

The assessment presented in the Tables above shows that, in the absence of acoustic screening, internal daytime L_{Aeq}, night-time L_{Aeq} and night-time L_{Amax} noise levels from operational noise at the proposed site have the potential to exceed the WHO/BS 8233 criteria at the majority of receptors with windows open. However, with the proposed permanent acoustic screening in place, noise levels are predicted to reduce by up to 10.8 dB and all sensitive receptors are predicted to be within the BS 8233/WHO criteria with windows open and closed.

Therefore, the proposed permanent mitigation, that will replace the agreed temporary screening measures, is expected to reduce potentially noticeable and intrusive noise levels within the adjacent care home and is not expected to have significant adverse effects. The requirements of Condition 23 are considered to be fully met and can be discharged.

6.0 Conclusions of Noise Assessment

This report presents the findings of a noise assessment undertaken in accordance with the requirements of Condition 23 of application no. 15/01012/OUT.

A noise intrusion assessment, including staff car parking and HGV activities, has shown the proposed permanent acoustic screening that will be provided in place of the agreed temporary screening measures, is expected to reduce noise levels from the site by up to 10.8 dB. Noise intrusion levels at the adjacent care home are predicted to be within the WHO/BS 8233 criteria with windows open or close at the closest sensitive receptor locations. As such the requirements of Condition 23 are considered to be met and can be fully discharged.

Appendices

Appendix A – Acoustic Terminology and Abbreviations

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 12 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.

An explanation of abbreviations used within this report is provided below.

CADNA – Computer Aided Noise Abatement

DMRB – Design Manual for Roads and Bridges

HGV – Heavy Goods Vehicle

PPG – Planning Practice Guidance

UDP – Unitary Development Plan

UKAS – United Kingdom Accreditation Service

Appendix B – Sketches

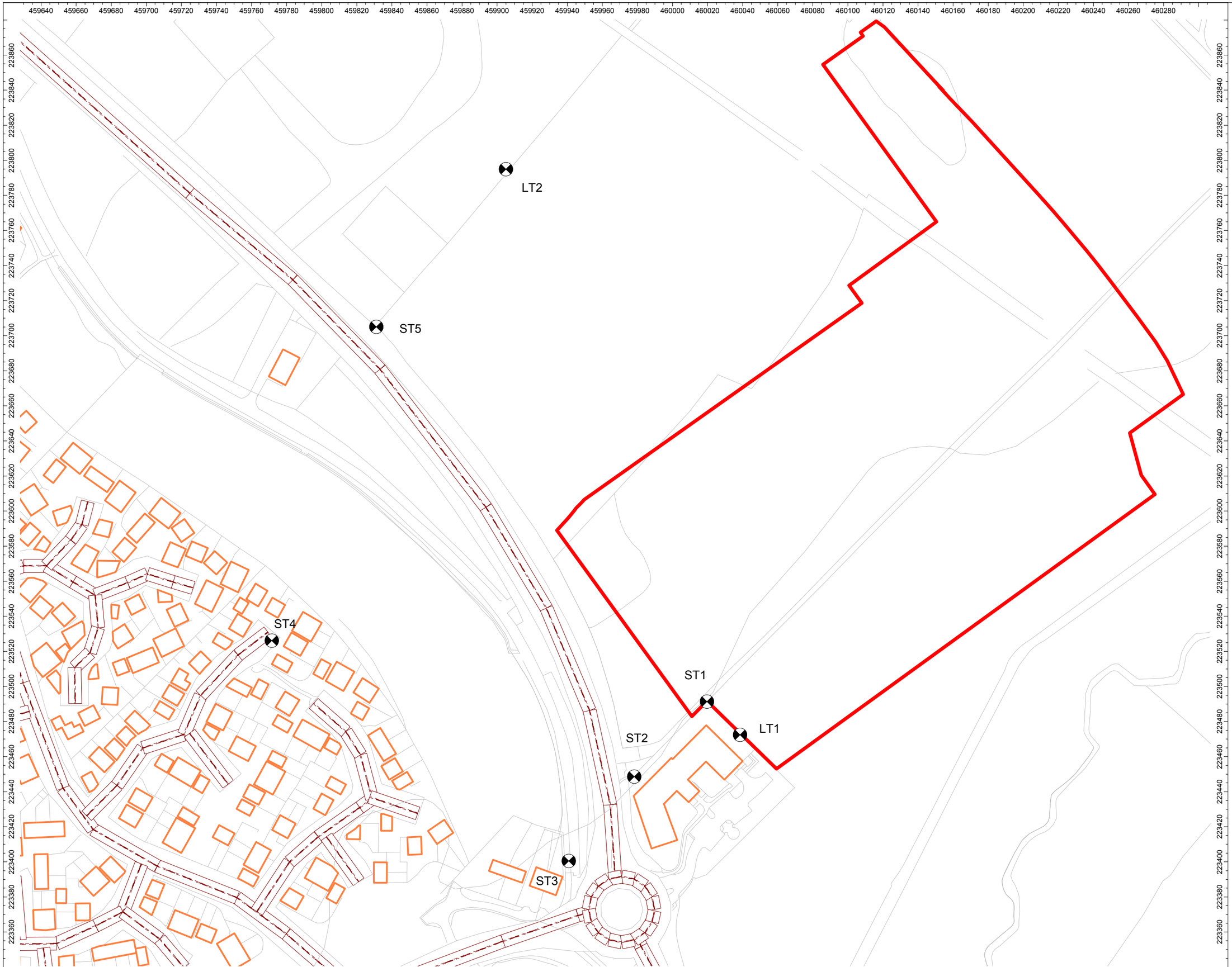
SK01 Noise Monitoring Locations

SK02 Operational Noise Assessment Receptor Locations

SK03 Worst-case Operational Noise Contour Plot (Without Mitigation) $L_{Aeq,1hour}$

SK04 Worst-case Operational Noise Contour Plot (With Mitigation) $L_{Aeq,1hour}$

SK05 Acoustic Fence Details



Client:
Albion Land Ltd

Project:
Link 9 - Skimmingdish Lane, Plot 1, Bicester

Project Number:
A108033

Drawing Title / Scenario:
Noise Monitoring Locations

Drawing Number:
SK01

Key:

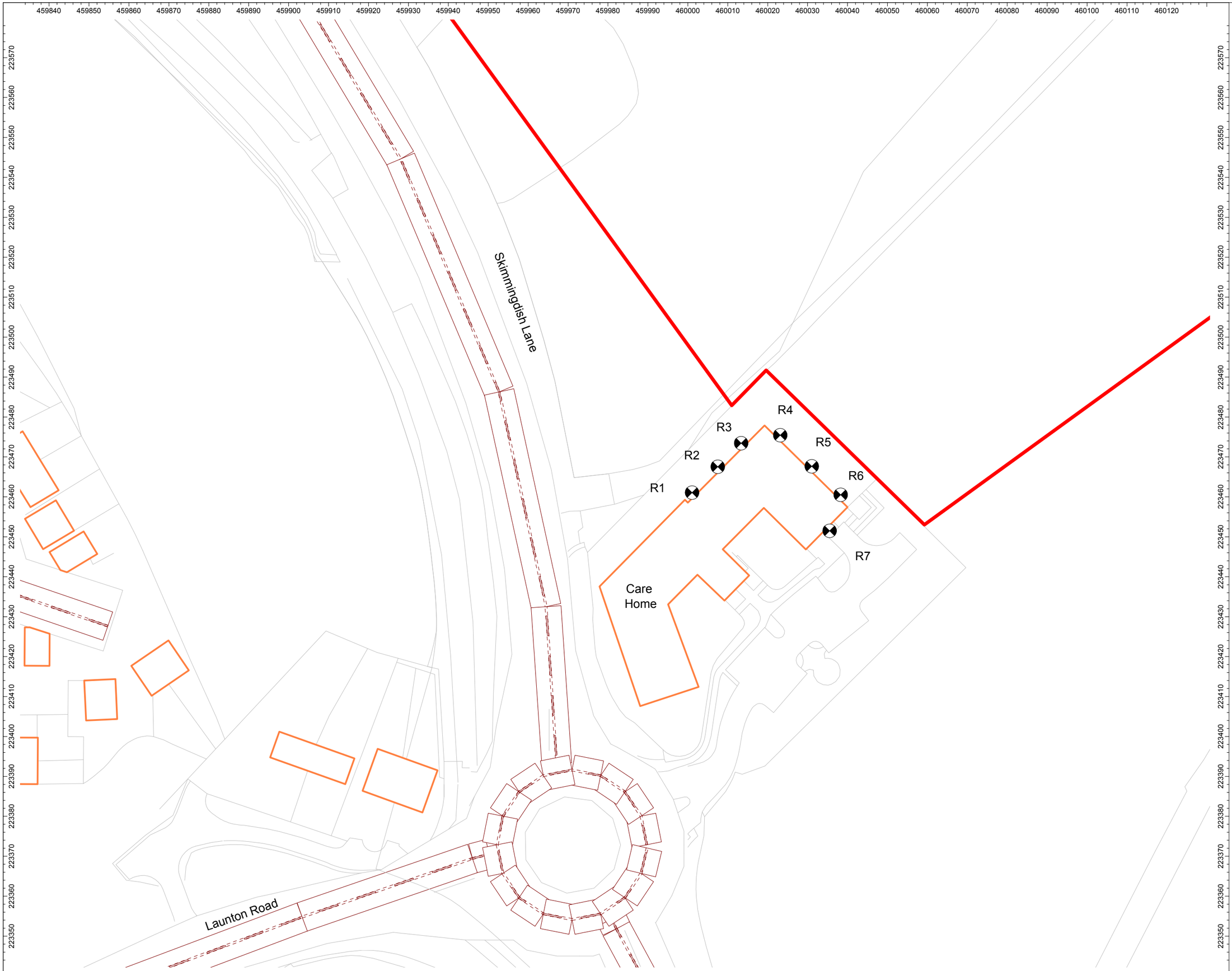
Site Boundary:

Scale : Not to scale

WYGE Leicester 11.04.18

Licence Number AL 553611

Executive Park
Avalon Way
Anstey
Leicestershire
LE7 7GR
Tel 0116 234 8000



Client:
Albion Land Ltd

Project:
Link 9 - Skimmingdish Lane, Plot 1, Bicester

Project Number:
A108033

Drawing Title / Scenario:
Existing Sensitive Receptor Locations

Drawing Number:
SK02

Key:

Site Boundary:

Scale : Not to scale

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Executive Park
Avalon Way
Anstey
Leicestershire
LE7 7GR
Tel 0116 234 8000

Client:
Albion Land Ltd

Project:
Link 9 -
Skimmingdish Lane,
Plot 1, Bicester

Project Number:
A108033

Drawing Title / Scenario:
Worst-case Operational
Noise Contour Plot
(Without Mitigation)
LAeq, 1-hour

Drawing Number:
SK03

Key:

Site Boundary:

- 0.0 - 50.0 dB
- 50.0 - 60.0 dB
- 60.0 - 70.0 dB
- >70.0 dB

Scale : Not to scale

WYGE Leicester 20.04.18

Executive Park
Avalon Way
Anstey
Leicestershire
LE7 7GR
Tel 0116 234 8000

Client:
Albion Land Ltd

Project:
Link 9 -
Skimmingdish Lane,
Plot 1, Bicester

Project Number:
A108033

Drawing Title / Scenario:
Worst-case Operational
Noise Contour Plot
(With Mitigation)
LAeq, 1-hour

Drawing Number:
SK04

Key:

Site Boundary:

4m Barrier:

2m Barrier:

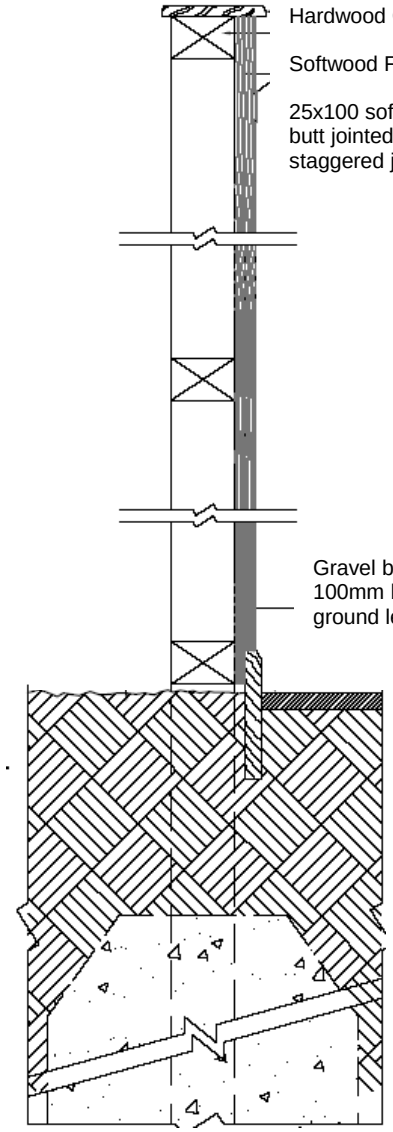
2m Bund:

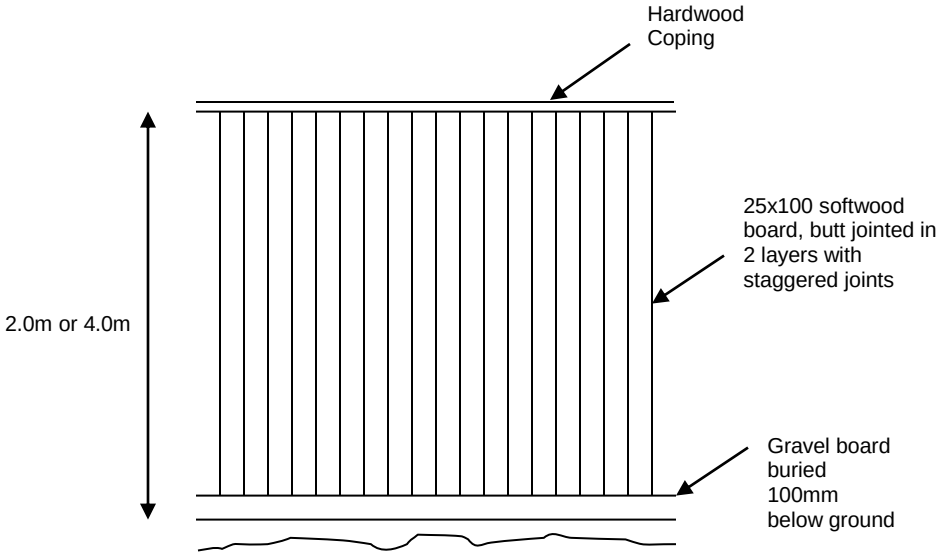
0.0 - 50.0 dB
50.0 - 60.0 dB
60.0 - 70.0 dB
>70.0 dB

Scale : Not to scale

WYGE Leicester 20.04.18

Executive Park
Avalon Way
Anstey
Leicestershire
LE7 7GR
Tel 0116 234 8000





Client:
Albion Land Ltd

Project:
Link 9 –
Skimmingdish Lane,
Plot 1, Bicester

Project Number:
A108033

Drawing Title / Scenario:
Acoustic Fence Detail

Drawing Number:
SK05

Scale: Not to Scale

Key:

Site Boundary:

4m Barrier:

2m Barrier:

2m Bund:

WYG Leicester

Appendix C – Report Conditions

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The whole of the report must be read as other sections of the report may contain information which puts into context the findings in any executive summary.

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