

Acoustic Report

Environmental Noise Survey Land to the South of Westgate, Heckmondwike

Our Reference – J2704-R1
Survey Date – 25th to 26th January 2018
Survey and Report by – Paul Horsley MIOA

Date of Report – 13th February 2018

Revision 1 – 24th October 2018

Revision 2 – 17th December 2018

A handwritten signature in blue ink, appearing to read 'P. Horsley', with a long horizontal flourish extending to the right.

Contents

1.0	Agent
2.0	Subject
3.0	Aims
4.0	Location and Description of Existing Noise Sources
5.0	Guidance on the Assessment of Noise Levels
5.1	BS4142:2014 "Methods for rating and assessing industrial and commercial sound"
5.2	World Health Organization 1999 "Guidance for Community Noise"
5.3	BS8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings'
6.0	Survey Equipment
7.0	Survey Method
8.0	Prevailing Weather Conditions
9.0	Noise Survey Results
10.0	Noise Survey Results Tables
11.0	Results Analysis
12.0	Impact Assessment Analysis
12.1	Construction Phase Noise (Temporary)
12.1.1	Construction Noise Mitigation
12.1.2	Noise Action Plan
12.1.3	Site Training / Instruction
12.1.4	Plant Maintenance
12.2	Impact Assessment from Car Park Noise
12.3	Impact Assessment for Service Vehicle Noise
12.3.1	Prediction of Servicing Noise
12.3.2	Summary of noise levels for typical service yard activities (dB re: 20µPa)
12.3.3	Predicted delivery/servicing noise levels (dB re: 20µPa)
12.4	Fixed Plant Noise
13.0	Mitigation Measures
14.0	Report Summary
Appendix A-1	Locational Plan and Survey Positions
Appendix A-2	Proposed Site Development Plan
Appendix B	Noise Survey Frequency Results Tables

1.0 Agent

Martin Walsh Associates Ltd
Firth Buildings
99-101 Leeds Road
Dewsbury
WF12 7BU

2.0 Subject

Proposed Development of
Land to the South of Westgate
Heckmondwike
West Yorkshire

3.0 Aims

The aim of this report is to determine the existing baseline background noise environment levels, over a typical daytime, evening and nighttime period, affecting the proposed development location in accordance with the requirements of BS4142: 2014, in support of any future planning application for the site.

Provide an assessment of the results in accordance with the recommendations laid down in the BS4142:2014 and BS8233:2014 for the site with respect to noise.

Provide an impact assessment of the potential incumbent noise sources with respect to the closest existing noise sensitive residential dwellings due to the introduction of the proposed Retail Development on site, prior to development works commencing.

Provide mitigating noise control advice, if necessary, relating to the achievement of an acceptable internal environment for the residential development as recommended within World Health Organization's "Guidance for Community Noise, 1999" and BS8233:2014.

4.0 Location and Description of Existing Noise Sources

The site under consideration is located to the south of the A638, Westgate, a main thoroughfare between Heckmondwike town centre; approximately 300m to the east, and Cleckheaton 3 km to the west.

The site is best described as triangular in shape occupying a maximum area of 200m x 100m and is located to the south of Westgate. The site is relatively flat and was formerly used for industrial purposes, having a stone / brick construction factory to the south with car parking to the north and west of the site. The former factory building has since been demolished and removed from the site, leaving only a footprint of the building outline and an overgrown tarmac car park area. There are several mature and sapling trees on the grounds.

The northern site boundary is formed by Westgate itself, with predominantly industrial building and factories located beyond on the opposite side of the road to the site. The boundary has a 1.5m high stone wall. The eastern site boundary is formed by recreational facilities serving the area, Algernon Park, which includes a bowling club and outdoor green, tennis courts and a cycle track. A mesh fence demarks this boundary. There is also Heckmondwike Health Centre located beyond the park backing onto Union Road and industrial units and a supermarket on the opposite side of the road. The southern site boundary is formed by a public footpath, beyond which is a strip of flat land, sloping up to existing industrial factories overlooking the site. The site boundary is marked with a wire mesh fence. The western site boundary is formed by the rear of detached residential bungalows positioned along Boundary Street which runs the full length of the boundary. On the opposite side of the street are 3 storey residential terraces premises. The boundary along this elevation is formed by a 1.5m high stone wall, however, the residential premises beyond are at a lower ground level, with the wall level with the eaves of the bungalows. There is also a builder's yard along the western elevation with shops to the northwest corner of the site, having residential dwellings on the 1st floor above the shops.

The primary noise source within the vicinity of the site is predominantly due to traffic noise from vehicles passing along Westgate to the north and the local road network. Aircraft noise is also audible during daytime and evening periods. Industrial noise is dominant and audible from the southern half of the site at all times of the day and night due to 24 hour operation of the facility.

It is the noise from these sources that are under consideration within this report.

5.0 Guidance on the Assessment of Noise Levels

The purpose of any criterion or standard for environmental noise should be to safeguard against unacceptable levels of community response, deemed as a feeling of annoyance during daytime or disturbance at night. WHO defines annoyance as "...a feeling of displeasure evoked by noise."

The main source of information relating to noise and the community response are field studies including noise measurements and social surveys. These studies then attempt to establish a correlation between the two sets of results.

In the absence of any definitive guidance and in order to establish suitable noise criteria, it is necessary to rely on general guidance and assessment methods used for community noise sources. Discussions on the current methods are given below.

5.1 BS4142:2014 'Method for Rating and Assessing Industrial and Commercial Sound'

This recently revised standard provides a method for rating and assessing sound of an industrial and/or commercial nature. The method uses outdoor sound levels to assess the likely effect of sound on people who might be inside or outside a dwelling or premises used for residential purposes. It is limited to applicable sounds and is not intended for noise amounting to nuisance or rating noise outside the scope of the Standard.

Unlike the previous version of the Standard, rating levels are not prescriptive, but more context based, with the following applicable to rating values:

- Typically, the greater this difference (variance between impact of background and rating level), the greater the magnitude of impact.
- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending upon the context.
- A difference of around +5 dB is an indication of an adverse impact, depending upon the context.
- The lower the rating level is relative to the measured sound level, the less it is that the specific sound source will have an adverse impact or a significant impact. Where the rating does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending upon context.

The Standard introduces additional rating elements, these being subject assessments of tonality, and impulsivity of a sound source, with weighted rating values accordingly applied at the judgment of the assessor.

The introduction of Uncertainty has been applied to the measured values; again, consideration of this is left to the professional executing the survey and assessment. However, steps are provided within the Standard for the reduction of uncertainty in both measurement and calculations of the sound source and rating value.

Actual meteorological conditions are now required to be recorded and reported upon for the survey and report.

5.2 World Health Organization 1999 “Guidance for Community Noise”

This document provides a review of the effects of noise and a description of the principles of the WHO health criteria and guidelines for Community Noise.

The effects of noise in dwellings are identified as sleep disturbance, annoyance and speech interference. For bedrooms, the critical effect is sleep disturbance. Indoor guideline values for bedrooms are 30 dB LAeq for continuous noise and 45 dB L_{Amax} for sound events. At night time, outside sound levels about 1 metre from facades of living spaces should not exceed 45 dB LAeq, so that people may sleep with bedroom windows open. This value is equivalent to that specifies in the Criteria 12 document; however it is now assumed that the noise reduction from outside to inside with the window open is 15 dB.

To enable casual conversation indoors during the daytime, the sound level of the interfering noise should not exceed 35 dB LAeq.

To protect the majority of people from being **seriously** annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed 55dB LAeq on balconies, terraces and in outdoor living areas. To protect the majority of people from being **moderately** annoyed during the daytime, the outdoor sound level should not exceed 50 dB LAeq.

Table 1 of the document summarises the guideline values for community noise in specific environments and includes the noise indices to be adopted. Significantly, the corresponding time base to be used for the assessment is also included.

The relevant extracts of Table 1 are reproduced thus:

Specific Environment	Critical health effect (s)	LAeq dB	Time Base hours	LAMax dB
Outdoor living area	Serious annoyance, daytime and evening	55	16	-
	Moderate Annoyance, Daytime and evening	50	16	-
Dwelling, Indoors	Speech intelligibility & moderate annoyance daytime & evening.	35	16	-
	Sleep Disturbance, night-time	30	8	45
Outside Bedroom	Sleep disturbance, window open (Outdoor Values)	45	8	60

5.3 BS 8233:2014, 'Guidance on sound insulation and noise reduction for buildings'

This revised British Standard relates to the requirements necessary to allow for design of new building or refurbished buildings undergoing a change of use. It provides guidance on acoustic criteria appropriate for various types of internal spaces. The criteria as noted within 7.7.2, internal ambient noise levels for dwellings; are reproduced below:

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	35 LAeq, 16 hour dB	-
Dining	Dining Room / Area	40 LAeq, 16 hour dB	-
Sleeping (daytime resting)	Bedroom	35 LAeq, 16 hour dB	30 LAeq, 8 hour dB

These criteria are based upon average data and exclude occasional event noise.

The external noise criterion is noted as 50 dB LAeq,T with the upper guidance value of 55 dB LAeq,T which would be acceptable for noisier environments. It is also noted that these criteria may not be achievable in noisier environments where developments are desirable, such as city centres or urban areas adjoining strategic transport networks. Where this is the case, the development should be designed to achieve the lowest practicable levels for external amenity spaces, but should not be prohibited.

6.0 Survey Equipment

Real-Time 1/3 Octave Integrating Sound Level Meter, RION NA-27, Type 1, Serial No 431986

RION UC-53A Microphone Serial No 35771

RION NC-74 Calibrator Serial No 530712

Windshield

Tripod

7.0 Survey Method

An attended environmental noise assessment survey was carried out over a typical daytime, evening and nighttime period. The noise monitoring was executed between 25th and 26th January 2018, by the author.

LA_{eq} , LA_{90} , LA_{10} and LA_{max} sound measurements were taken using the sound analyser. The sound level meter was calibrated before and after the measurements using the calibrator to ensure accuracy of the results. No variations were noted between calibrations and the results obtained can be deemed to be an accurate representation of the levels recorded.

The measurement indices noted above are defined as follows:

$LA_{eq, T}$	the "A" weighted equivalent continuous noise level of sample period T
$LA_{10, T}$	the "A" weighted level exceeded for 10% of sample period T
$LA_{90, T}$	the "A" weighted level exceeded for 90% of sample period T
LAF_{max}	The Fast response "A" weighted maximum level during the sample period T

In order to determine the existing baseline background noise climate, sound recordings were taken at the selected assessment position in accordance with BS4142:2014. Refer to Appendix A for a marked up locational plan of the site and survey point.

8.0 Prevailing Weather Conditions

25th January 2018 - Daytime - 7°C, 50% cloud cover, Wind 0-5 mph SSW, 1002 mb, 78% rh

25th January 2018 – Evening - 4°C, 40% cloud cover, Wind 0-3 mph SW, 1004 mb, 84% rh

26th January 2018 – Nighttime - 1°C, 10% cloud cover, Wind 0-1 mph W, 1006 mb, 92% rh

9.0 Noise Survey Results

During the monitoring period 24 separate noise samples were recorded using a 1/1 Octave Centre Band analysis. These monitoring samples were collected from the relevant site boundary positions.

The table of results on the following page indicate the noise levels recorded for the various locations selected during the monitoring period, with a brief description of the noise sources contributing to the individually monitored noise levels recorded.

An overview of monitoring positions is given below:-

1. Location 1 relates to the north western site boundary close to the residents of 127 Westgate.
2. Location 2 relates to a position at the south western site boundary close to the premises of 21 Boundary Street.

This was to establish the existing noise climate at the closest residential premises.

The table of results on the following pages indicates the noise levels recorded during the monitoring period.

The above monitoring location should be read in conjunction with the site plan appearing in Appendix A of this report.

Refer to Appendix B for the survey results frequency analysis table.

10.0 Noise Survey Results Table

LAND SOUTH of WESTGATE, HECKMONDWIKE - NOISE SURVEY RESULTS TABLE

Map Location	Description of Location	Survey Period	Data ID	L _{Amax} dB	L _{Aeq} dB	L _{A10} dB	L _{A90} dB	Survey Duration	Durvey Date	Start Time	Source Description
1	North West Site Boundary	Daytime	1	61.1	51.1	52.9	48.6	01:00:00.00	25-01-2018	13:11:01	Traffic flow along A638, Westgate dominant. Aircraft. Birdsong. Distant industrial activity noise audible.
			2	66.1	50.5	52.0	47.9	01:00:00.00	25-01-2018	14:11:01	
			3	63.4	51.6	53.6	48.3	01:00:00.00	25-01-2018	15:11:01	
		Evening	7	64.0	51.8	54.7	46.3	00:15:00.00	25-01-2018	21:15:07	Traffic flow along A638, Westgate dominant. Distant industrial activity noise audible.
			8	67.5	51.7	54.0	47.4	00:15:00.00	25-01-2018	21:30:07	
			9	66.5	50.8	53.8	44.3	00:15:00.00	25-01-2018	21:45:07	
		Nighttime	13	60.1	46.1	50.4	39.6	00:15:00.00	26-01-2018	00:06:53	Traffic flow along A638 dominant and intermittent. Low industrial activity noise audible from south.
			14	69.3	50.5	52.0	38.3	00:15:00.00	26-01-2018	00:21:53	
			15	62.7	45.7	49.0	39.7	00:15:00.00	26-01-2018	00:36:53	
			19	50.0	40.5	42.8	37.2	00:15:00.00	26-01-2018	02:07:14	
			20	62.4	45.4	48.7	38.9	00:15:00.00	26-01-2018	02:22:14	
			21	47.6	42.5	45.9	38.3	00:15:00.00	26-01-2018	02:37:14	
2	South West Site Boundary	Daytime	4	64.1	50.7	52.6	48.8	01:00:00.00	25-01-2018	16:45:51	Low traffic noise A638, Westgate audible. Aircraft. Birdsong. Industrial activity noise dominant from south.
			5	64.3	52.1	54.1	49.5	01:00:00.00	25-01-2018	17:45:51	
			6	68.7	51.6	53.2	49.0	01:00:00.00	25-01-2018	18:45:51	
		Evening	10	66.9	50.1	51.5	46.8	00:15:00.00	25-01-2018	22:05:14	Low traffic noise A638, Westgate audible. Industrial activity noise dominant from south.
			11	62.4	48.3	49.3	46.8	00:15:00.00	25-01-2018	22:20:14	
			12	58.1	48.6	49.8	47.0	00:15:00.00	25-01-2018	22:35:14	
		Nighttime	16	55.8	43.3	44.5	40.9	00:15:00.00	26-01-2018	01:02:44	Industrial activity and plant noise dominant from south. Low traffic noise audible along A638 Westgate to north.
			17	57.1	44.9	46.9	40.9	00:15:00.00	26-01-2018	01:17:44	
			18	59.1	44.9	47.4	41.1	00:15:00.00	26-01-2018	01:32:44	
			22	51.7	42.9	45.7	40.5	00:15:00.00	26-01-2018	03:12:30	
			23	50.3	42.5	45.1	39.9	00:15:00.00	26-01-2018	03:27:30	
			24	54.3	42.3	43.7	39.7	00:15:00.00	26-01-2018	03:42:30	

11.0 Results Analysis

The above attended noise survey, carried out between 25th and 26th January 2018, was chosen as a representative period to reflect the typical noise climate for the area surrounding the proposed redevelopment site.

The noise survey results obtained for the site can, therefore, be deemed to be representative of normal activities for the area and will be used as the base for analysis and assessment purposes below.

Assessments of the individual results indicate that the monitoring positions selected are affected primarily by road traffic movements when considered at the northern half of the site, however, industrial activity and plant noise is the dominant source at the southern half of the site. These are the pre-existing noise sources for the site. There are other sources present but the above at the main elements making up the noise climate.

From the data acquired during the various assessment periods the following exposure noise levels have been established for the noise sensitive western site boundary. All other boundary locations are not considered as noise sensitive and as such are not considered.

Table of Total Exposure Levels

Position 1 - North West Exposure Levels	Average Noise Level
Daytime (0700 – 2300 Hrs)	LAeq, 16 Hours – 51 dB
Night-time (2300 – 0700 Hrs)	LAeq, 8 Hours – 46 dB LAFmax - 69 dB LAFmax (Typical) – 62 dB
Position 2 – South West Exposure Levels	
Daytime (0700 – 2300 Hrs)	LAeq, 16 Hours – 51 dB
Night-time (2300 – 0700 Hrs)	LAeq, 8 Hours – 44 dB LAFmax - 59 dB LAFmax (Typical) – 54 dB

12.0 Site Development - Impact Assessment Analysis

There is a proposal to develop the vacant land to the south of Westgate, Heckmondwike, with the erection of commercial premises, including a retail store to the north east of the site and garden centre to the mid-east, as detailed on the MWA drawing No WFFL-MWA-01-GF-DR-A-0003-A (refer to Appendix A-2 for details).

Based upon this, it will be necessary to ensure that the development and operations thereafter do not produce undue loss of amenity to the existing nearby noise sensitive residential premises.

In order to ensure that the noise produced by the development are acceptable design target noise levels will be required.

Taking account of the above standards and their recommendations, it would be prudent to set the design target noise levels in accordance with accepted limits recognised both nationally and internationally.

Based upon this, the limiting recommendations of WHO 1999 and BS8233:2014 will be utilised for the purposes.

Table of Recommended Design Target Noise Limits

Period	External Noise Limits	Equivalent Internal Noise Limits
Daytime (0700 – 2300 Hrs)	LAeq, 16 Hours – 50 dB	NR 35
Night-time (2300 – 0700 Hrs)	LAeq, 8 Hours – 40 dB LAFmax - 60 dB	NR 25

The above noise levels are in keeping with the values recorded for the site for daytime periods, however, nighttime values noted above are lower than those recorded in the vicinity of the site, due to the pre-existing industrial activities within the vicinity of the site and the traffic flow along the A638, Westgate.

The tabled limitations are recognised maximum upper levels which will provide the necessary internationally and nationally acceptable amenity for the nearby premises, and provided that the contribution of the introduced site activities fall within these values there is no reason to suspect that there will be any loss of existing amenity for the nearby residential premises.

In order to ensure that the above recommendations are achieved it is necessary to consider the contribution of the additional noise sources resulting from the development of the site.

The noise sources likely to be introduced fall into 4 main categories.

- 1 Construction Phase (Temporary)
- 2 Car Park Noise
- 3 Service Yard Noise
- 4 Fixed Plant Noise

We shall deal with each of these sources and advise on the likely effect they will have on the noise sensitive dwellings nearby.

Each assessment will deal with the proposed operational or activity time period relevant to that particular source.

The assessments will be based upon the advised retail stores trading times as follows;

Monday to Saturday	08.00 to 22.00
Sunday & Bank Holidays	10.00 to 17.00

Servicing of the stores	06.00 to 19.00 hours Monday to Saturday
	10.00 to 17.00 hours Sunday and Bank Holidays

12.1 Construction Phase Noise (Temporary)

It is common practice that construction will take place during typical daytime hours only, assumed to be 07.30 to 18.00 hours during week days only and Saturday 08.00 to 13.00 hours. No construction work assumed for Sunday or Public Holidays.

There are items of plant, such as generators that may operate 24 hours dependent upon their function and these plant items may unduly affect the existing amenity of the nearby residential premises.

Noise generated by construction work has the potential to increase the noise levels at the nearby noise sensitive residential premises due to the operation of plant and equipment associated with the construction phase of the development. The level of potential increase will depend on many factors, including locality of the activities on site relative to the recipient, type of activity being undertaken and control measures implemented.

To minimize the potential impact of the noise impact mitigation measures are proposed for the construction phase as noted below.

12.1.1 Construction Noise Mitigation

Construction noise is an inevitable part of any development, however, the change in noise levels is usually short term and temporary during the construction phase of the project only.

12.1.2 Noise Action Plan

It is recommended that a Noise Action Plan is implemented for the development, addressing all aspects of the construction, including mitigation measures and procedures for dealing with on-site activities and complaints, should any arise.

The Control of Pollution Act and BS 5228 define a set of Best Practice working methods and mitigation measures, referred to as Best Practicable Means (BPM).

The following are examples of what could be included within a Noise Action Plan.

- Selective location temporary plant so that it is screened by on-site structures, such as site cabins;
- Using modern equipment and ensuring such equipment is properly maintained and correctly operated by trained staff;
- Acoustically enclosing noisy equipment if possible;

- Ensure that mobile plant is well maintained and there are no excessive rattles or vibrations that can be addressed;
- Ensuring plant machinery is turned off when not in use;
- Provide local residents with 24-hour contact details for a site representative;
- Inform local residents about the works advising of any specific noisy events and provide a contact telephone number, as noted above;
- Keep noisy deliveries to the midday period where possible.

12.1.3 Site Training / Instruction

The site training and induction programme, including site specific rules will include good working practice instructions for site staff, managers, visitors and contractors to minimise noise whilst working on the site. Good working practice guidelines/instructions should include the following points as a minimum requirement:

- Avoid unnecessary revving of plant and equipment engines;
- Intermittently used plant should be isolated between operational periods;
- Avoid reversing unnecessarily using tonal reverse horns, fit broad band warning horns where possible;
- Report any defective equipment/plant immediately so that corrective maintenance can be completed; and
- Minimise noise when handling or moving materials on site.

12.1.4 Plant Maintenance

All temporary plant items arriving on site should be in good working order and have written proof of maintenance prior to use.

Maintenance of temporary plant on site should be carried out routinely and in accordance with the manufacturers' guidance and recommendations.

Regular inspection of all plant and equipment must be undertaken to ensure that:

- all plant is in a good state of repair and operating correctly;
- any plant found to require maintenance has been identified and isolated until maintenance has been completed;
- acoustic enclosures fitted to plant are in a good state of repair and correctly fitting;
- doors and covers remain closed during operation; and

- all repairs should be completed by a fully qualified maintenance engineer for the specific plant item under consideration.

Although the above are mainly procedural recommendations and not fully quantifiable it is possible that they could reduce perceived noise levels on the site by about 5 dB.

12.2 Impact Assessment from Car Park Noise

Noise from the customer car parking area will be assessed as commercial sources for the purpose of this assessment, and the activity associated with the noise will be restricted to the confines of the site only.

The impact of the car park activities during trading hours will be assessed to demonstrate that no adverse effect to the amenity of the local residents will result.

The main car park areas proposed for the site serving the retail unit and garden centre are positioned along the south and west side of the site, as illustrated in Appendix A-2.

The activities of concern centre on arrival and departure of vehicles, together with associated events such as engine start-up, door slamming etc. In order to make predictions of the noise level at some distance from the car park, it is first necessary to establish reference noise levels. A series of detailed measurements have been carried out at a number of other similar retail developments, the results of which are summarised in the following table. The results are based upon a distance of 1m, for ease of comparison.

Activity	Duration, s	LAeq,T	LAmx
Open door, get in, close door, start engine, reverse out of parking space, drive away to distance	20	73 dB	85 dB
Drive towards bay, park, switch-off engine, open door, get out and slam door shut	20	69 dB	88 dB

Calculations have been carried out to determine resultant noise levels at the nearest affected existing residential dwellings, these being considered as the premises directly west of the site car park at Boundary Street, from No's 3 to 23, as these premises are located closest to the site boundary.

Since we are dealing with daytime trading periods only (07.00 to 23.00 classified as daytime), then the predicted LAeq, 1h and LAmx façade noise levels are relevant and are set out in the table below.

Experience indicates that for car park usage during the trading hours, customers will seek to park as close to the store entrance as possible. The car parking spaces noted as Spaces 33 to 42, along the western site boundary have therefore been used as the datum for the predictions; these are deemed as 10m from the façade of the residences considered. For the purposes of this exercise, consideration of 10 No car parking bays in simultaneous use will be used to predict the likely noise levels at the residential premises. There is an existing wall on the boundary of the car park and the residential gardens with the residential dwellings below the level of the site by approximately 2m. This existing wall will provide approximately -8 dB sound reduction to the direct transmission of the car park activity noise.

Receiver	Floor	Car Park Activity	Predicted Noise Levels	
			LAeq.1h	LAmx
Boundary Street Residents	Ground Floor Level (Bungalow)	Vehicles arrive and park at bays	32 dB	59 dB
		Vehicles depart from bay	28 dB	
		Cumulative	34 dB	

Comparison of the above calculated noise levels due to car park usage of 34 LAeq.1h; with the design target noise levels for the area of 50 LAeq dB, for daytime periods at the residential premises, indicates that there will be no cumulative increase due to the car parking activities. The predicted noise levels fall within the design target limits and below the pre-existing monitored value of 51 LAeq dB for the daytime periods at this location. As such the car parking activities should not give rise to complaints relating to noise from existing residents.

All other car parking spaces are at greater distances from the noise sensitive western site boundary location and as such the cumulative noise attributable to the car park will be diminished accordingly.

12.3 Impact Assessment for Service Vehicle Noise

It is considered appropriate to assess noise from delivery vehicles, unloading of delivery vehicles. The methodology underpinning the assessment of these noise sources is discussed in the following sections.

12.3.1 Prediction of Servicing Noise

It is proposed that access to the retail unit and garden centre will be obtained via the main carpark site entrance off Westgate and pass in front of the units down the centre of the site along the access road through to the mid-south eastern common service yard area of the site.

It should be noted at this stage that it appears that there is only space available for 1 No vehicle to access the service yard area at any one time, therefore, if multiple deliveries are considered for this site they would be on separate occasions and as such there would be no cumulative noise associated with deliveries to the units.

If we consider the retail unit and garden centre own delivery vehicles, say up to 2 per day maximum, assumed to be an articulated lorry, we must model the activity in full to determine if the noise generated is acceptable.

For the purposes of calculations, it is taken that the delivery vehicle will approach the site along Westgate and drive into the car park along the formed central road and then manoeuvre into the service area for off-loading. Upon completion of the off-loading process the vehicle drives away from the service area in a forward direction, turning on to Westgate and away to the major road network.

It is understood that goods will be unloaded directly from the vehicle into the relevant building. The complete offloading operation for such products takes approximately 35 minutes, based upon observations at several similar stores.

It is taken that goods cage movements may occur during this unloading activity, however, their movements would be contained to the vehicle trailer and the short distance between the vehicle and store building, a distance of up to 20m only. A period of 30 minutes being considered appropriate based on observations from other comparable sites.

The delivery process can therefore be modelled as a number of elements, vehicle arrival, unloading and vehicle departure, product movements, and general off-loading activities. Considering arrivals and departures, the likely path taken by the delivery vehicle has been modelled as a series of straight-line

segments to approximate the path travelled by the vehicle. HGV noise emissions have been assumed as constant and independent of vehicle speed, since tyre noise is not significant in comparison to noise from the engine and exhaust. Calculations assume point source radiation as the vehicle travels along each segment, with a correction then applied to account for the time of traverse. This approach has been derived from observations of vehicle manoeuvring operations at numerous similar retail stores. Source and receiver heights of 1.0 metres and 1.8 metres respectively have been used, with the latter corresponding to the most exposed windows of the nearest noise sensitive receptor, NSR, to the service yard.

With regard to unloading, fixed source positions have been taken for both the unloading and the transfer of goods into the store. Point source attenuation has been assumed throughout. Noise levels have been assumed as continuous throughout the entire unloading operation.

A summary of a typical unloading process for a goods delivery, together with the corresponding activity noise levels is given in the table below. The data has been taken from our library of activity noise measurements obtained at numerous similar sites.

Note that reverse horns have not been considered for daytime deliveries and if nighttime deliveries are considered to be appropriate for the site, the reverse horns would be disabled.

12.3.2 Summary of noise levels for typical service yard activities (dB re: 20uPa)

Activity	Typical Event Duration	Mean Distance	LAeq	LAmix
HGV arrives and parks in service area	1 minutes	2 metres	71 dB	88 dB
Unloading of products by pallet truck, and then wheeling into store	25 minutes	2 metres	58 dB	84 dB
General off-loading activities	10 minutes	2 metres	56 dB	86 dB
HGV departs service area	1 minutes	2 metres	70 dB	88 dB

Using the table of data above, delivery noise predictions have been carried out for various NSR positions from this activity. The activities have been taken as a ground window of the bungalows beyond the

western site boundary, having a 1.5m high boundary wall providing a -8 dB reduction to the direct transmission of the sound.

The following façade noise levels are predicted taking account of the “on-Time” of the activity defaulted to 1 hour and the natural attenuation due to distance to the recipient, assuming $20\log r$ (-6) dB.

(-6dB used due to reflections off the building façade and the source not decaying in a fully free field condition for robustness purposes)

This has been taken as a ground floor window of the residence to the west of the proposed service yard area at No 15 Boundary Street, assessed at a distance of 70m.

The following façade noise levels are predicted taking account of the “on-Time” of the activity defaulted to 1 hour and the natural attenuation due to distance to the recipients will be :-

No 15 Boundary Street at 70m = -31 dB

12.3.3 Predicted delivery/servicing noise levels (dB re: 20µPa)

Receiver	Activity	Predicted Noise Level	
		$L_{Aeq,60min}$	L_{Amax}
No 15 Boundary Street at 70m	HGV arrives and parks in service area	14 dB	49 dB
	Unloading of products by pallet truck, and then wheeling into store	15 dB	45 dB
	General off-loading activities	9 dB	47 dB
	HGV departs service area	13 dB	49 dB
	Cumulative	19 dB	N/A

Comparison of the above calculated noise levels due to off-loading at the proposed store has been calculated at 19 LAeq.1h; with the design target noise levels for the area of 50 LAeq dB, for daytime periods at the existing residential premises indicating that there will be no cumulative increase due to the off-loading activities.

12.4 Fixed Plant Noise

Fixed plant items associated with a retail development usually include air conditioning and ventilation equipment. The following plant items are likely to be installed on the roof of the store or within the service yard area.

Plant Item	Typical Location	Operational Mode
Condenser Units	Plantroom / External Areas	24-Hours
General Ventilation Fans	Plantroom and Back of House Areas	Variable dependent upon area served. Usually store trading periods only.

In the absence of finalized plant selections for the development, which vary dependent upon final ownership requirements, it would be prudent to provide limiting noise levels for the cumulative output allowable for each of the 2 No units to ensure that there is no loss of existing amenity when considered at the nearby residential premises.

The design target for the output can be determined using the pre-existing noise climate noise data and working backwards to arrive at a limitation.

The following is a calculation of the limiting noise for any incumbent fixed plant required for the individual units.

Description	Daytime Operation Only (07.00 to 23.00)	Day & Nighttime (24 Hours)
Existing Noise Climate, LAeq dB	51	44
No Perceived Increase In Levels, dB	-10	-10
Influence of 2 No Sources	-3	-3
Allowance at Residence Per Unit, LAeq dB	38	31
Less Distance Corrections for Each Unit		
Unit 1 (Retail Unit) at 50m from closest residence, 20 Log r dB	34	34
Allowable Cumulative Sound Pressure Level Unit 1, LAeq dB at 1m	70	63
Unit 2 (Garden Centre) at 50m from closest residence, 20 Log r dB	34	34
Allowable Cumulative Sound Pressure Level Unit 2, LAeq dB at 1m	70	63

As can be seen from the above, the cumulative limiting sound output varies for each unit and is time dependent. If the plant operates daytime only, within the defined time periods noted, the allowance is higher than if the plant operates 24 hours daily.

In order to ensure that there is no tonality attributable to the sound produced it would be prudent to provide a sound spectrum limitation for the output, provided below for reference.

	Cumulative Sound Pressure Level Limit at 1m Per Unit							
Frequency Hz	63	125	250	500	1000	2000	4000	8000
Unit 1 Day	95	85	78	72	69	69	69	69
Unit 1 24 Hrs	80	70	63	57	54	54	54	54
Unit 2 Day	95	85	78	72	69	69	69	69
Unit 2 24 Hrs	80	70	63	57	54	54	54	54

Provided that the above limiting sound spectrum can be adhered to there will be no increase in the pre-existing noise climate as a result of the fixed plant operation and no tonality present within the sound produced, when considered at the closest noise sensitive residential premises to the units.

13.0 Mitigating Noise Control Recommendations

Provided that the measures noted within Section 12 of the report relating to noise are taken into consideration at the design stage of the development, there is no reason to suspect that there will be any loss of amenity for the residents located beyond the western site boundary at Boundary Street and the north at Westgate.

If all limiting sound levels are adhered to for any incumbent fixed plant the noise associated with the operation, irrespective of time of day will be inaudible against the pre-existing baseline noise climate recorded at the residential premises. It should be emphasised that the sound spectrum limitation chart provide is based upon a cumulative value for each individual unit and not each plant item.

14.0 Report Summary

An attended noise survey was carried out of the existing environmental noise exposure over a typical period between 25th and 26th January 2018, by the writer, in respect of any forthcoming planning permission being sought for the redevelopment of the vacant site to the south of Westgate, Heckmondwike.

The results indicate that the site is subject to the primary background being due traffic movement along the A638, Westgate and locally when considered at the northern half of the site and industrial activities from the nearby units located beyond the southern boundary at the southern half of the site. Birdsong and aircraft noise also contributing to the noise climate.

The proposal includes for the redevelopment of the site with the erection of a purpose built retail store and garden centre within bounds of the site.

In order to achieve an acceptable and comfortable internal noise climate for the nearby residents of the site BS8233:2014 and the WHO guidance community noise has been utilized for the acoustic target levels for the internal criteria of the dwelling areas of the development.

An assessment of the proposed units has been made with respect to the incumbent fixed plant and potential store activities on the existing residential premises.

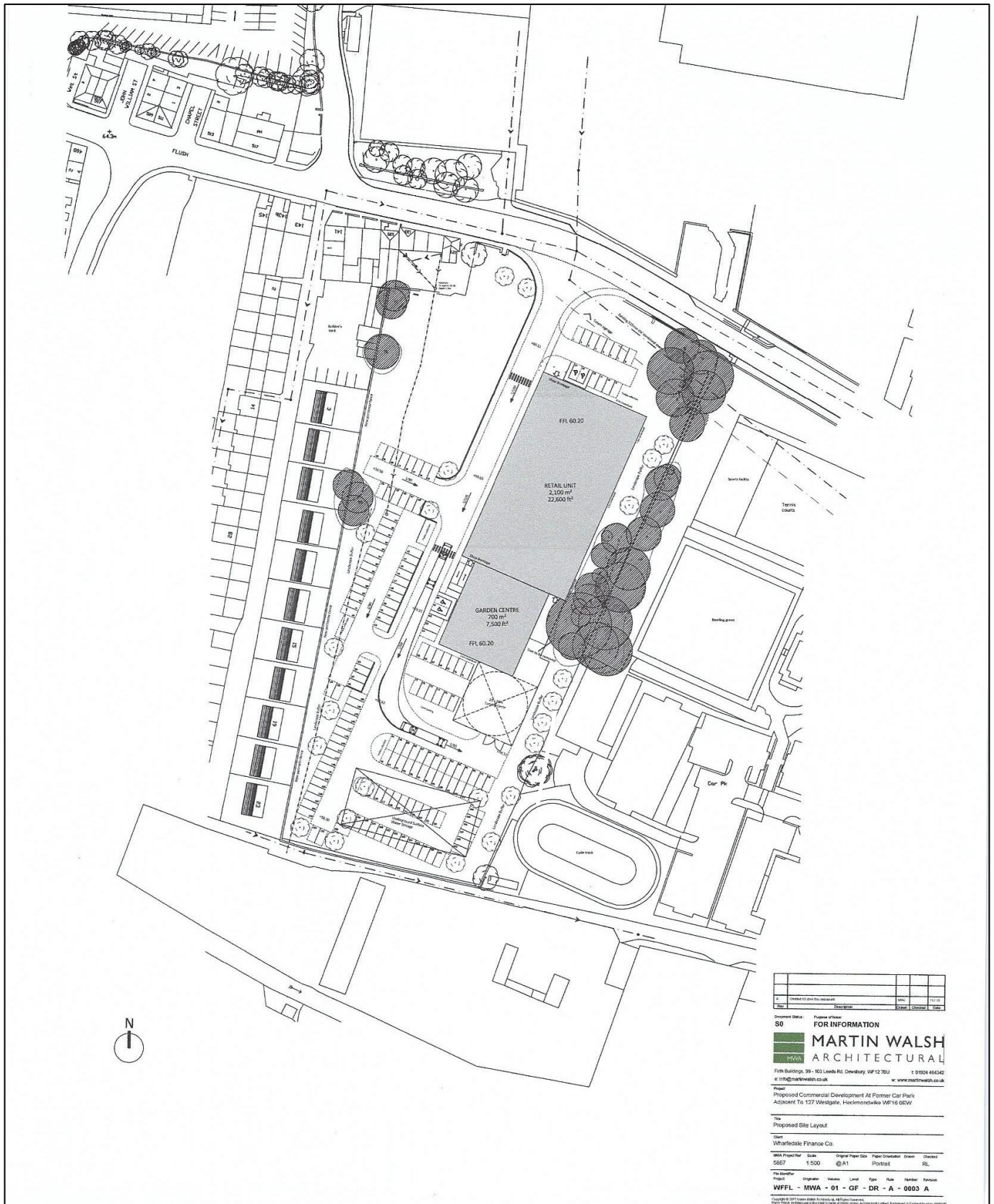
The outcome of the analysis indicates that the activities should not have a detrimental effect on the existing amenity of the nearby residents located at Boundary Street to the west of the development site. Limiting sound output levels have been provided for each individual unit to ensure that the existing amenity of the residents is preserved, irrespective of period of operation.

The daytime servicing of the units have been assessed as providing noise output below the design target and as such not detrimental to the existing amenity of the nearby residents.

Appendix A-1 Location Plan and Survey Positions



Appendix A-2 Proposed Site Development Plan



Appendix B

Noise Survey Frequency Results Table

LAND SOUTH OF WESTGATE, HECKMONDWIKE - NOISE SURVEY FREQUENCY ANALYSIS RESULTS TABLE

Linear Leq dB Sound Pressure Levels																	
Map Location	Description of Location	Survey Period	Data ID	L _{Amax} dB	L _{Aeq} dB	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	L _{A10} dB	L _{A90} dB		
1	North West Site Boundary	Daytime	1	61.1	51.1	62.8	51.9	47.6	47.1	47.3	43.4	36.5	30.3	52.9	48.6		
			2	66.1	50.5	62.6	52.8	48.0	46.4	46.8	42.6	35.4	28.5	52.0	47.9		
			3	63.4	51.6	64.7	58.5	52.1	47.2	46.9	42.8	35.1	28.1	53.6	48.3		
		Evening	7	64.0	51.8	61.8	58.3	51.3	47.5	47.7	43.4	35.3	28.6	54.7	46.3		
			8	67.5	51.7	60.6	56.5	46.3	45.7	48.4	44.3	36.9	29.1	54.0	47.4		
			9	66.5	50.8	62.5	53.4	47.4	45.4	47.3	43.4	36.9	29.9	53.8	44.3		
		Nighttime	13	60.1	46.1	51.9	45.6	38.9	39.3	42.3	40.3	33.8	27.3	50.4	39.6		
			14	69.3	50.5	54.6	55.4	52.5	50.6	43.5	37.3	29.0	21.9	52.0	38.3		
			15	62.7	45.7	54.0	45.5	38.7	40.5	42.8	38.4	30.6	21.6	49.0	39.7		
			19	50.0	40.5	47.6	43.5	41.6	38.0	35.5	30.7	26.7	22.8	42.8	37.2		
			20	62.4	45.4	53.8	48.3	43.7	42.1	40.5	37.2	34.7	29.3	48.7	38.9		
			21	47.6	42.5	53.6	46.4	40.1	38.3	38.6	33.8	27.8	20.2	45.9	38.3		
		2	South West Site Boundary	Daytime	4	64.1	50.7	61.1	52.5	49.2	47.9	46.7	42.2	35.4	28.1	52.6	48.8
					5	64.3	52.1	59.7	51.7	48.9	50.3	47.8	43.2	38.7	32.1	54.1	49.5
					6	68.7	51.6	60.2	53.4	51.5	48.9	47.1	43.1	36.8	29.8	53.2	49.0
Evening	10			66.9	50.1	59.7	51.7	44.4	45.1	46.5	43.0	37.2	32.4	51.5	46.8		
	11			62.4	48.3	57.3	50.0	42.6	44.6	45.2	39.5	34.8	29.9	49.3	46.8		
	12			58.1	48.6	56.6	50.0	43.6	44.9	45.4	40.7	31.6	26.8	49.8	47.0		
Nighttime	16			55.8	43.3	52.1	45.6	37.5	40.8	39.6	34.4	29.6	24.2	44.5	40.9		
	17			57.1	44.9	51.4	44.9	39.3	40.3	40.7	36.8	35.0	31.3	46.9	40.9		
	18			59.1	44.9	54.0	48.3	37.8	39.7	41.8	37.2	31.6	26.3	47.4	41.1		
	22			51.7	42.9	50.4	46.0	35.9	39.5	39.4	34.8	28.6	22.7	45.7	40.5		
	23			50.3	42.5	50.4	46.0	36.1	38.3	39.0	34.4	29.5	23.8	45.1	39.9		
	24			54.3	42.3	49.1	45.4	37.4	38.8	37.7	33.7	32.6	26.7	43.7	39.7		