Project	Stakehill, Middleton		
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NOISE APPRAISAL

1.0 Background

1.1 BWB Consulting has been appointed to provide noise input into the evolving masterplan for the Stakehill Industrial Estate development in Middleton.

1.2 This Technical Note considers the prevailing noise environment, the nearest existing noise sensitive receptors and the proposals. An appraisal of the potential for noise impacts on the nearest receptors, and the scheme itself, has been completed, along with initial advice regarding outline mitigation measures.

1.3 The Note draws on available strategic noise mapping for existing transportation noise, traffic data provided by the project transport consultant, and daytime on-site observations during a recent site visit.

2.0 Site Description

Site Location

2.1 The site is located to the north east of Middleton and lies to the north and east of the existing Stakehill Industrial Estate. The main sources of noise are considered to be:

- The A627(M) to the north and east of the site; and
- Commercial/industrial noise associated with the existing businesses at Stakehill Industrial Estate to the south and east of the site.

2.2 The available noise contours published by Manchester Airport indicate that aircraft noise is unlikely to be an issue on site and no further consideration has been given to such noise in this Technical Note.

2.3 The nearest existing noise sensitive receptors to the site are:

- Dwellings on the north side of Bentley Avenue (west of the site);
- Dwellings on Stakehill Lane (north of the site, adjacent to the A627(M)); and
- Dwellings on Stakehill Lane (south west of the site, opposite Shenton House).

2.4 The main features of the site location pertinent to noise are shown in **Figure 2.1**.

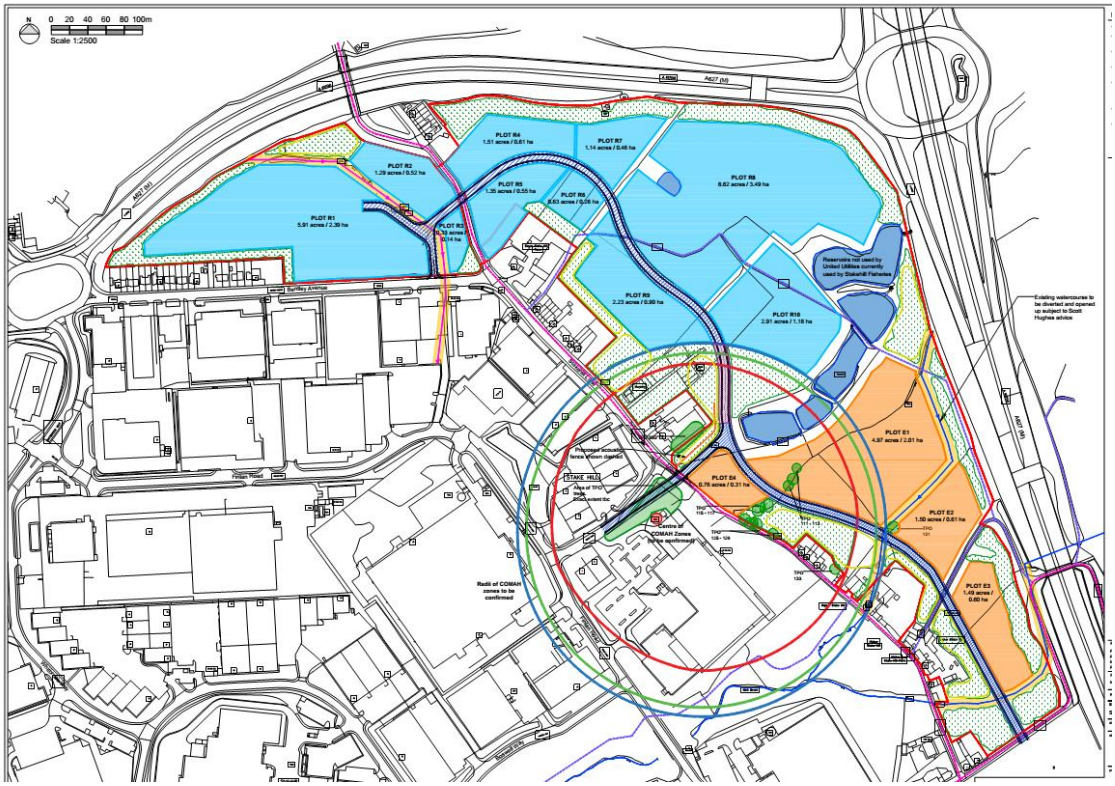
Figure 2.1: Site Location

- Indicative red line boundary
- Nearest existing commercial/industrial noise sources
- Nearest road traffic noise sources
- Nearest existing noise sensitive receptors

Site Proposals

2.5 The proposed site will be split into two class uses; residential and employment. **Figure 2.2** shows the residential area marked within the blue boundary and the employment area is within the orange boundary.

Figure 2.2: Proposed land uses



3.0 Relevant Standards and Guidelines

BS8233:2014 Guidance on sound insulation and noise reduction for buildings

3.1 This standard provides guidance for the control of noise in and around buildings. The guidance provided within the document is applicable to the design of new buildings, or refurbished buildings undergoing a change of use, but does not provide guidance on assessing the effects of changes in the external noise levels to occupants of an existing building.

3.2 The guidance provided includes appropriate internal and external noise level criteria which are applicable to dwellings for steady external noise sources. It is stated that it is desirable that the internal ambient noise level does not exceed the following criteria set out in **Table 3.1**.

Table 3.1: Summary of internal ambient noise levels to be achieved in habitable rooms

Activity	Location	Period	
		07:00 to 23:00 Hours	23:00 to 07:00 Hours
Resting	Living Room	35 dB $L_{Aeq, 16\ Hour}$	-
Dining	Dining Room	40 dB $L_{Aeq, 16\ Hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq, 16\ Hour}$	30 dB $L_{Aeq, 8\ Hour}$

3.3 Whilst BS 8233:2014 recognises that a guideline value may be set in terms of SEL or L_{AFmax} for the assessment of regular individual noise events that can cause sleep disturbance during the night-

time, a specific criterion is not stipulated. Accordingly, reference has been made in this statement to the World Health Organisation (WHO) 1999: *Guidelines for Community Noise*.

World Health Organisation Guidelines for Community Noise (1999)

3.4 The internal ambient noise level criteria from BS 8233 are broadly concordant with those stated within the World Health Organisation (WHO): 1999: *Guidelines for community noise*. The guidelines also contain guidance on L_{AFmax} noise levels during the night, the document draws upon guidance from Vallet and Vernet, which states:

> *"For good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{AFmax} more than 10-15 times per night"*

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

3.5 The BS 4142 Standard describes methods for rating and assessing the following:

- Sound from industrial and manufacturing processes;
- Sound from fixed installations which comprise mechanical and electrical plant and equipment;
- Sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and
- Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train movements on or around an industrial and/or commercial site.

3.6 The methods use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident. The Standard advises the purpose of the methodology includes the assessment of sound from any plant and activities associated with existing industrial and/or commercial uses at proposed residential dwellings.

3.7 If appropriate, the specific sound level of the source ($L_{Aeq,T}$) is corrected, by the application of one or more corrections for acoustic features such as tonal qualities and/or distinct impulses, to give a 'rating' level ($L_{Ar,Tr}$). The Standard effectively compares and rates the difference between the rating level of the specific sound and the typical background sound level ($L_{A90,T}$) in the absence of the specific sound.

3.8 The Standard advises that the time interval ('T') of the background sound measurement should be sufficient to obtain a representative or typical value of the background sound level at the time(s) the source in question operates or is proposed to operate in the future.

3.9 Comparing the rating level with the background sound level, BS 4142 states:

> *"Typically, the greater this difference, 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 on the context.*
>
> *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.*
>
> *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."*

4.0 Potential for Noise Impacts

Noise from road traffic onto proposed receptors

4.1 The available 2017 Defra noise mapping indicates road traffic noise levels during the daytime and night-time from the strategic road network. Although the noise maps are produced for strategic purposes only, they do provide some insight into the potential level of risk from road traffic noise. **Figures 4.1 and 4.2** show the daytime $L_{Aeq,16h}$ and night-time $L_{Aeq,8h}$ maps for the local area.

Figure 4.1: 2017 Defra Noise Map – daytime $L_{Aeq,16h}$ from road traffic noise

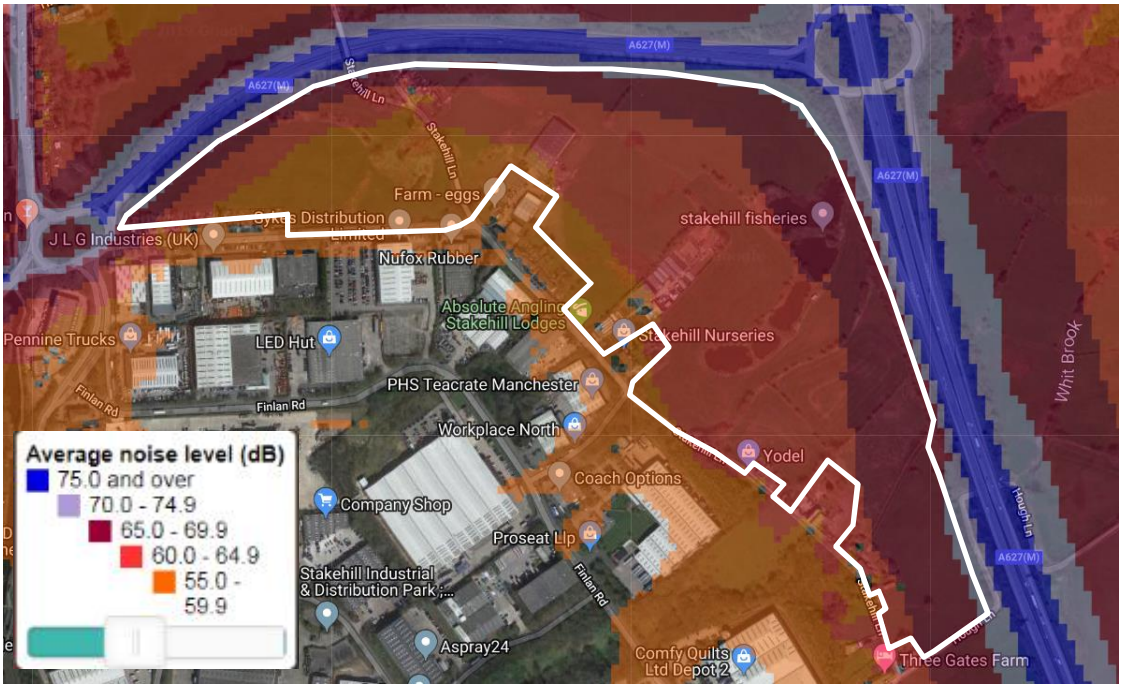
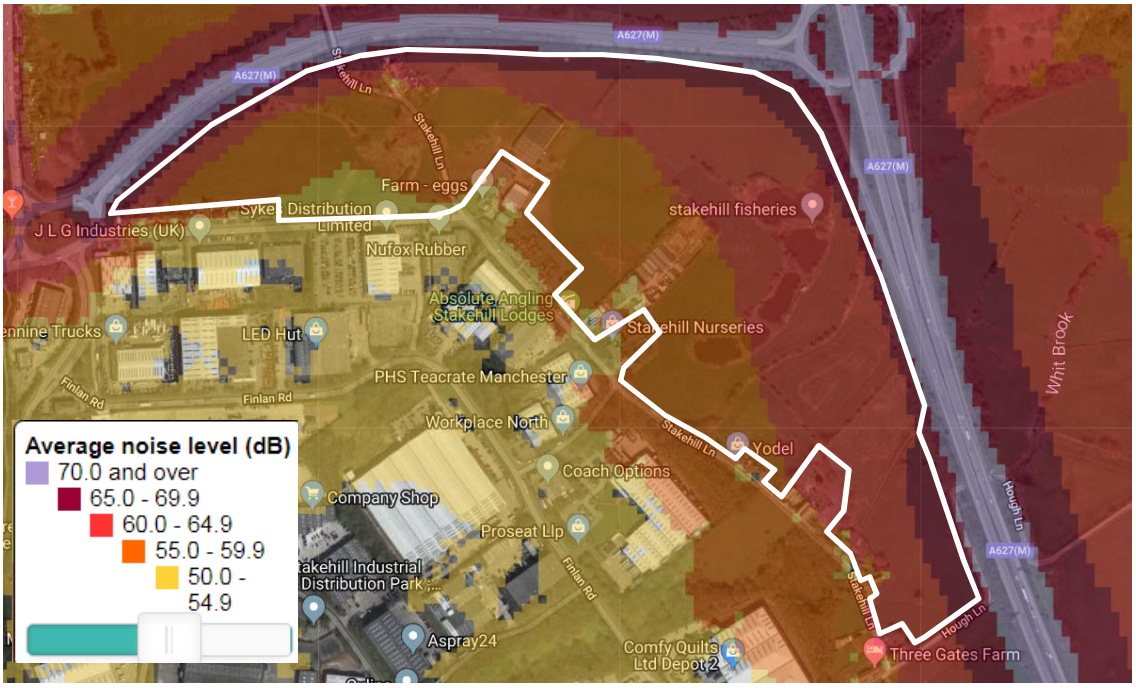


Figure 4.2: 2017 Defra Noise Map – night-time $L_{Aeq,8h}$ from road traffic noise



4.2 The above strategic maps show the impact of noise from the A627(M) across the site. For the daytime, across an open site, road traffic noise ranges from around 55 dB up to approximately 70 dB. For daytime, outdoor amenity areas should not exceed 55 dB $L_{Aeq,16h}$ during the daytime, as set out in BS8233:2014. Therefore, where this noise level is exceeded in any external amenity areas , mitigation will be required.

4.3 As a general rule, an acoustic barrier which removes line of sight to the noise source should provide at least 10 dB of attenuation. Therefore, any proposed gardens up to the 65 dB line (the border between the bright red and dark red areas shown in Figure 4.1), suitable garden levels could be achieved with one of the following approaches:

- Design the development Site such that the buildings provide a noise barrier to the garden areas;
- Provide noise barriers around the perimeters of the gardens; or
- Install an acoustic barrier along the perimeter of the development Site.

4.4 For gardens closer to the motorway, more significant mitigation is likely to be required i.e. acoustic bund and barrier combinations up to significant heights that may warrant specialist engineering input to consider ground stability, wind loading etc.

4.5 For habitable rooms such as living rooms and bedrooms, the target criteria to achieve internally are 35 dB during the daytime and 30 dB during the night-time. Assuming an open site, and a 15 dB loss through a partially opened window from free-field external levels to internal levels, this would require external levels of no more than 50 dB during the day and 45 dB during the night, which will clearly be exceeded. Therefore, for habitable rooms closest to the motorway, closed windows and alternative ventilation will be required.

4.6 From an inspection of the noise contours, it is considered that the night-time criterion is the most onerous. For the dark red area shown in **Figure 4.1** (65-70 dB), high performing glazing of around 38 dB $R_w + C_{tr}$ and high performance through wall vents providing around 44 dB $D_{n,e,w} + C_{tr}$ would typically be required. The further back from the boundary the build line is moved, the lower the required specifications.

4.7 It is important to note that, once buildings are introduced on site, they will provide significant screening to other buildings further in to the site, which will also reduce acoustic mitigation requirements. Also, should an acoustic bund and/or fence be used along the northern and eastern perimeter of the residential area, this would also reduce glazing and ventilation requirements. As the design evolves, this can be revisited.

Noise from existing commercial/industrial noise onto proposed receptors

4.8 There are a number of existing businesses identified in yellow in **Figure 2.1**, all of which have the potential to generate some level of noise. The presence of existing residential receptors identified in green in **Figure 2.1** demonstrates the principle that, with the adoption of good acoustic design, new noise sensitive receptors can be built close by without placing significant additional burden on those businesses.

4.9 A short, daytime site visit was undertaken on 13th August 2019 to make observations on the surrounding businesses in order to determine main noise sources for the purposes of masterplanning input.

4.10 The existing business that were determined to have the greatest potential for noise impact on the proposed receptors were JLG Industries (shown as red in **Figure 4.3**), where the dominant noise sources are powered tools and machinery, such as drills and saws, and RDM Engineering (shown in blue in **Figure 4.3**), where the primary noise source was determined to be forklift movements, as well as loading and unloading of goods vehicles.

Figure 4.3: Main noise producing businesses adjacent to the site as noted during the daytime site visit

4.11 While other businesses do have the potential to generate noise, no other business was deemed on the short site visit to present any additional noise concern that would need to be accounted for. In both instances, there are already existing noise sensitive receptors in close proximity to these businesses so it is unlikely that residential development on the site would further constrain the existing businesses.

4.12 At this stage, it is recommended that, where possible, gardens are placed away from site boundaries bordering existing businesses, and that internal roads are used as a buffer zone between noise generative and noise sensitive uses.

Noise from proposed commercial/industrial noise onto existing and proposed receptors

4.13 The proposals include an employment area in the east. Generally, at this stage, the nature of any businesses is not known and so it is difficult to provide a meaningful initial assessment of the potential for operational noise to disturb existing and future noise sensitive receptors.

4.14 There is a natural buffer in the form of the water feature between the proposed residential and employment area, which should provide a suitable setback distance so as not to require any significant further mitigation in future. There is also a buffer area of green space indicated between properties at the southern end of Stakehill Lane and the proposed employment area.

4.15 At this stage these are considered sufficient for embedded mitigation, however, where possible service yards, roller shutter doors and external fixed plant should be place on the facades furthest away from the residential receptors so that the buildings themselves provide acoustic screening.

Noise from development generated road traffic noise on existing receptors

4.16 The current masterplan shows that the main site access for the proposed employment area will be off Stakehill Lane, close to existing receptors. Therefore, there is the potential for these receptors to be affected by noise generated from additional road traffic movements along this road.

4.17 The results of the traffic assessment have been used as the basis for determining the future road traffic noise levels that would result from development generated traffic.

4.18 Due to the size of the development, the predicted future traffic flows are low and therefore fall outside the scope of the Calculation of Road Traffic Noise. The Noise Advisory Council document "A Guide to Measurement and Prediction of Equivalent Continuous Sound Level Leq" published in 1978 provides a method for estimating SELs from LGV passbys. The predicted SEL level at 10 m from the nearside kerb edge, for vehicles with an unladen weight below 1,525 kg, is stated to be derived from the following equation:

SEL = 37.8 + 20log(V)

Where V = speed in km/h

4.19 To predict the Leq level from the calculated SEL, the following equation is used:

$L_{eq} = L_{AX} + 10\log(n) - 10\log(T)$

L_{AX} = SEL

n = number of events

T = time is seconds

4.20 The Leq for the access road serving the proposed employment area has been calculated using traffic data from the project team, set out in **Table 4.1**. Please note that data is available only between 0700-1900hrs, which would generally include the vast majority of the trips generated.

Table 4.1: Available trip generation along new access route to employment area

Activity	Daily trip generation (07:00 – 19:00)		
	Arrivals	Departures	Two-way
Industrial	388	391	779
%HGVs	6.0%	6.1%	6.1%

4.21 This equates to 61 cars and 4 HGVs per hour. Assuming a speed of 30 km/h (20 mph) and adopting the above calculation methodology, the resultant LAeq,1h would be 68 dB at 10 metres from cars.

4.22 To calculate the noise from the HGV movements, the mobile plant calculation set out in BS5228:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise can be used as follows:

$L_{Aeq,T} = L_{WA} - 33 + 10\log Q - 10\log V - 10\log d$

Where

L_{WA} is the sound power of the plant (dB);

Q is the number of vehicles per hour;

V is the average vehicle speed (km/h);

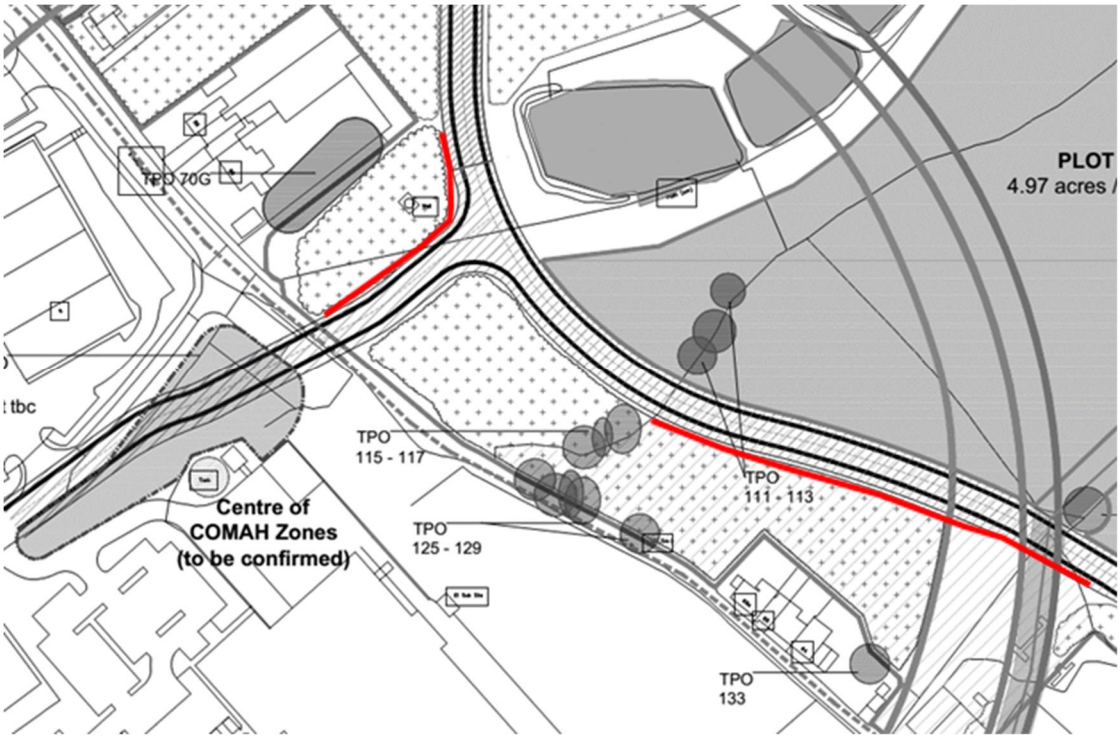
D is the distance of the receiving position from the centre of the haul road (m)

4.23 Adopting an L_{WA} of around 108 dB, this would result in an $L_{Aeq,1h}$ of 56 dB at 10 metres. Combining this with the noise from cars, it would result in 68 dB LAeq,1h at 10 metres. Assuming a line source

distance attenuation (i.e. 3 dB per doubling of distance), and given the nearest dwellings are around 30 metres from the road, and their gardens are as close as 20 metres from the road, the resultant noise levels during the daytime could be in the region of 63 dB at the nearest dwelling and 65 dB in gardens. These levels are up to 10 dB above what could be considered acceptable in gardens or outside a habitable window in the day where that dwelling was relying on open windows for ventilation.

4.24 Given this, it is likely that some form of acoustic fence/bunding would be required in order to break the line of sight between the road and the nearest existing receptor. Such a barrier would provide around 10 dB of attenuation. The exact location, height and extent would need to be confirmed as a result of a more detailed assessment. However, it is recommended that provision for an acoustic barrier of up to 3.5 metres would be prudent.

Table 4.4: Proposed indicative noise barriers, red (up to 3.5m height)



4.25 Unless the access route can be relocated a significantly larger distance away, which is unlikely, a barrier offers the best solution.

4.26 There is currently no information regarding night-time movements and so it is not possible to undertake a meaningful assessment of this.

5.0 Recommendations and Conclusions

5.1 Based on the results of the masterplan appraisal, it is considered that the site is workable from a noise perspective. The following recommendations should be taken forward to influence the masterplan:

- Where possible, the proposed residential area should remain outside of the dark red noise contour shown in **Figure 4.1** (65-70dB) to avoid significant additional noise mitigation;
- Gardens closest to the motorway should face away from the road, and placed behind buildings so as to be effectively screened;

- The current buffer zones around the employment area should be retained in order to minimise significant additional noise mitigation;
- Where feasible, service yards, roller shutter doors and externally mounted fixed plant should be placed away from boundaries with residential uses, and ideally acoustically screened from them by the associated employment buildings themselves;
- To protect existing dwellings from road traffic associated with the employment area, acoustic roadside barriers or bunding up to a height of 3.5m may be required in the locations identified in **Figure 4.4**.

5.2 By adopting the above mitigation strategies, the Site can offer an appropriate acoustic environment for all proposed class uses.

5.3 For and on behalf of BWB Consulting

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