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NOISE IMPACT ANALYSIS
(FIRST REVISION)

of

PROPOSED CHANGE OF USE TO INCLUDE B2 IN ADDITION TO B1 AND B8, UNIT 17 VALLEY ROAD, WOMBWELL,

Dates of measurements:	15th, 18th & 19th February, 27th & 28th April 2015
Date of report:	29th April 2013
Prepared for:	Naylor Industries plc, Clough Green, Cawthorne, Barnsley S75 4AD
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1.0 **Summary and Conclusions**

Change of use is proposed to include B2 in addition to B1 and B8 at Unit 17, Valley Road, Wombwell. The premises is located 140m from residential properties and for this reason the applicant has commissioned this survey and report on the existing sound levels at the development. The report describes background sound levels at the nearest dwellings, predicts the impact of the proposal and compares the results with the usual acceptance standards. The revisions to this report take account of a different interior layout of plant items to that proposed in our original report dated 20th February 2013.

1.1 The sound levels reaching the nearest dwellings during the daytime caused by sources at the proposed development are predicted in the range 29-36 dB LA_{eq}.

1.2 The existing daytime background sound levels were measured at the dwellings at 37-47 dB LA_{90} during a weekday daytime and 35-45 dB LA_{90} on a Sunday afternoon. It is concluded that the proposed daytime operations will have a low sound impact on the nearest dwellings.

1.3 The outdoor movements of vehicles and forklift trucks at night are predicted to cause an impact at dwellings on Littlefield Lane which is “adverse” but lesser than the “significant adverse impact” described in BS 4142. This assumes that a fence will be constructed to an acoustical standard between the outdoor yard of the premises and the direction of dwellings in Littlefield Lane. A full specification and position of the fence will be provided at a later stage when the outdoor Yard layout has been determined.

2.0 **Planning Requirements on Noise**

There are no formal requirements at this stage on the acceptance criteria of the LPA with regard to the sound levels generated at the proposed development. As a starting point this report refers to the guidance of BS 4142: 2014 “Methods for rating and assessing industrial and commercial sound” which is summarised below.

BS 4142: 2014

The sound rating method of BS 4142 is to measure, or as in this application predict, the outdoor sound levels at noise-sensitive properties during the emission of noise from the industrial premises under consideration and measure the background sound level typical of that location in the absence of the industrial sound. A correction factor is applied if appropriate to the industrial sound levels for some acoustic features which affect its acceptability, described as tonal, impulsive or other characteristic features which are distinctive against the residual acoustic environment. The corrected measured level, the rating level, is compared with the background.

- If the rating level exceeds the background by around +10 dB or more then this is an indication of a significant adverse impact, depending on the context.

- A difference of around +5 dB is an indication of an adverse impact, depending on the context.

- The lower the rating level is relative to the background, the less likely it is that the industrial source will have an adverse impact.

- Where the rating level does not exceed the background, this is an indication of the industrial source having a low impact, depending on the context.

Situations where a noise impact assessment may need to be modified due to the context include those where:

- The residual sound levels in the absence of the industrial / commercial source are particularly high or low.

- The character of the residual sound has acoustic features comparable to those of the industrial / commercial sound.

- The sensitivity of the receptor is significant, and whether residential properties incorporate design measures that secure good internal or outdoor acoustic conditions.

3.0 Proposed Sound Sources

It is proposed to process plastic materials and manufacture, store and distribute plastic pipes at the premises. All production lines and machinery will be housed inside the factory building. Access to the building will be through a zip door in the northwest elevation which will be open for minimal time periods when materials are being handled to or from outdoors.

Raw materials for processing and production will be delivered by road-going lorries, usually in one-tonne bags, and unloaded and transported into the production buildings using forklift trucks or a side loader. Products for transportation off site will be handled and loaded using the same equipment. It is estimated that the flow rate of HGVs will not exceed 2 vehicles in and 2 vehicles out per hour during the daytime with an unspecified but lesser vehicle flow rate at night.

The sound sources at the premises will be:

- production machinery inside the main building with closed doors
- a fan assisted chiller located outdoors
- forklift trucks and side loader inside the building and outdoors
- lorries transporting incoming materials and finished products

4.0 Sound Measurements

4.1 Existing Production Sound Levels

The sound levels generated by the applicant's existing production activities were measured at the factories in Wath-on-Dearne on 27th April and in Hyde, Cheshire on 28th April 2015. The existing production machinery at these two factories is similar to that proposed at Valley Road, Wombwell. It is intended to move all plastic pipe production from Wath and Hyde to Wombwell. Either the existing machinery will be used at Wombwell or the new facility will be have new but similar production machinery.

Readings were taken at 18 positions inside the two existing factories. The following table shows the overall dB LA_{eq} results, sound frequency spectra are stored on file for all measurement positions if required.

Position in Factory	Sound Level dB LA_{eq}
Existing Wath Factory	
Roving sweep 1 around extruders	85.9
Roving sweep 2 around extruders	89.5
Roving sweep 3 around extruders	86.7
Roving sweep 1 around fabrication area	63.7
Roving sweep 2 around fabrication area	69.8
Mitre saw at 2m	89.9
Band saw at 2m	85.2
Hole punch at 2m	78.7
Extraction fan 1 inside factory	69.8
Extraction fan 2 inside factory	65.9
Inside granulator building	105.2
Existing Hyde Factory	
Granulator at 2m	101.2
Pulveriser 1 at 2m	103.7
Pulveriser 2 at 2m	106.2
Circular saw at 2m	105.7
Ribbon blender at 2m	78.7
Roving sweep 1 around factory	99.0
Roving sweep 2 around factory	96.0

The results show consistent sound levels up to 90 dB LA_{eq} throughout the Wath factory with the exception of a higher local level at 105 dB LA_{eq} inside the granulator building. Sound levels at Hyde are higher, being consistent at 96-99 dB LA_{eq} throughout the factory with local levels up to 106 dB LA_{eq}.

The octave band sound frequency spectra of roving sweeps around both factories and the higher local sound levels at the Wath granulator and the Hyde pulveriser were :

Sound pressure levels, dB linear, L_{eq}:

Frequency (Hz)	63	125	250	500	1k	2k	4k	8k
Roving, Wath	80.6	76.0	80.1	79.4	79.9	81.2	81.3	86.2
Roving, Hyde	86.2	87.0	89.0	87.5	85.8	90.5	95.1	92.7
Wath granulator	79.1	91.0	87.3	91.1	91.5	93.2	103.2	97.0
Hyde pulveriser	90.8	89.9	89.5	89.1	89.0	95.9	93.7	90.4

Outdoor sound sources

Position outdoors	Sound Level dB LA_{eq}
Existing Wath Factory	
Outdoor compressor at 2m	68.9
Outdoor chiller at 2m	75.7
HGV movements at 30m (average)	66.0
Forktruck loading at 15m (average)	62.0

4.2 **Background Sound Levels**

Background sound measurements were taken at the nearest dwellings during the afternoon of Sunday 15th February, on Wednesday afternoon 18th February and at night on Thursday 19th February 2015. Conditions were dry with no wind during all measurement periods.

Background dB LA_{90}	Sunday Afternoon 1430-1600	Weekday Daytime 1330-1500	Weekday Night 0000-0130
Littlefield Lane dwellings	43.6	46.6	33.2
r/o Station Road dwellings	45.2	46.2	37.0
r/o Bramham Croft dwellings	34.8	37.0	33.6

5.0 **Sound Predictions**

5.1 **Receptor Positions**

The nearest noise-sensitive properties to the proposed development are dwellings on Littlefield Lane at 155m to the west of the proposed production building and 140m from the nearest part of the outdoor yard. The Littlefield Lane dwellings have a direct sightline to the premises. Other dwellings are on Station Road at 230m to the south and on Hall Croft at 340m to the east of the premises. These latter dwellings are shielded from the development by other existing industrial buildings.

5.2 **Sound Levels at Receptors**

Calculations are given in the appendix to this report of the sound levels reaching the nearest dwellings from production activities inside the buildings, vehicles in the outdoor yard and outdoor plant items. The predictions are summarised below as dB LA_{eq} values.

Receptor	Sources in Main Building	Vehicles	Plant Items
Littlefield Lane	24 dBA	35 dBA	27 dBA
Station Road	10 dBA	31 dBA	23 dBA
Bramham Croft	7 dBA	28 dBA	21 dBA

The sound levels generated by production sources inside the main building and by plant items will be continuous at all times of day and night. The sound from vehicles is predicted 4 dBA higher at night than during the daytime sound levels shown above, caused by the shorter assessment period at night. The sum of the above contributions predicts overall sound levels at dwellings of:

Receptor	Overall Sound Level
Littlefield Lane	36 dB LA_{eq}
Station Road	32 dB LA_{eq}
Bramham Croft	29 dB LA_{eq}

6.0 **Assessment for Planning Purposes**

6.1 **Rating to BS 4142**

The sound sources at the premises will provide continuous broadband sound from the factory interior, intermittent sound including impulses from vehicles and forktrucks in the outdoor yard, and intermittent tonal sound from the granulator.

The existing dominant background sound sources are road traffic during the daytime and sound from other industrial premises at night.

Continuous sound from production sources inside the main building are not expected to attract attention against the existing background sources. The only characteristic features of sound from the premises which would be distinctive against the residual acoustic environment are those of forktruck and vehicle movements in the outdoor yard.

For these reasons it is anticipated that a correction factor of 3 dB for noise character is applied to the predicted sound levels. The rating noise levels are predicted at

Receptor	**Sound Rating Level**
Littlefield Lane	39 dB
Station Road	35 dB
Bramham Croft	32 dB

Background Comparison

Comparing the above predicted sound rating levels with the measured background levels described in section 4.2 shows:

Receptor	**Sunday Afternoon**	**Weekday Daytime**	**Weekday Night**
Littlefield Lane	5 dB below	8 dB below	6 dB above
Station Road	10 dB below	11 dB below	2 dB below
Bramham Croft	3 dB below	5 dB below	2 dB below

6.2 Assessment of Sound Impact

The results and predictions indicate that sound generated at the proposed development during the daytime will have a low sound impact at the nearest dwellings. At night the movements of vehicles in the outdoor yard will raise the assessment at Littlefield Lane to an “adverse impact” but it will be lesser than the “significant adverse impact” described in BS 4142.

APPENDIX TO REPORT

SOUND LEVEL CALCULATIONS

A. Sound Sources Inside Production Building

Sound levels at the nearest dwellings are calculated by taking the values inside the production building as measured inside the existing facilities at Wath and Hyde and described in section 3.3 of this report, translating them through the sound insulation of the building exterior fabric to outdoors, then over the outdoor distance to dwellings. The formulae are:

Outdoors-to-indoors:

$$SPL_{outdoors} = SPL_{indoors} - R - 6 \quad dB$$

Distance calculation:

$$SPL_1 - SPL_2 = 10 \log (r_1/r_2) \quad dB$$

for distances from 2m to 13m from the building where it is a line source,

$$SPL_2 - SPL_3 = 20 \log (r_3/r_2) \quad dB$$

for distances greater than 13m where the building is a point source.

$SPL_{1,\ 2\ \&\ 3}$ are sound pressure levels at distances $r_{1,\ 2\ \&\ 3}$ from the building façade and R is its average sound reduction index. The following sound reduction indices are typical of the building construction and are assumed in the sound predictions. The worst case is assumed in the calculation in which all three large doors in the southwest elevation are open.

Sound reduction indices dB:

Frequency (Hz)	63	125	250	500	1k	2k	4k	8k
Wall/roof cladding	16	16	23	30	33	40	46	50

A.1 Sound Reaching Littlefield Lane

The calculation of sound from the production building interior to the nearest dwellings on Littlefield Lane at 155m is:

Sound pressure levels, dB linear:

Frequency (Hz)	63	125	250	500	1k	2k	4k	8k
SPL in building	86.2	87.0	89.0	87.5	85.8	90.5	95.1	92.7
Cladding loss	22	22	29	36	39	46	52	56
Outdoors at 1m	64	75	60	52	47	45	43	37
Shielding loss	0	0	0	0	0	0	0	0
Distance loss	32	32	32	32	32	32	32	32
SPL at dwellings	32	33	28	20	15	13	11	5

The above table gives sound level predictions across the sound frequency range outdoors at the nearest dwelling. When expressed as a single-figure quantity this is:

Sound level outdoors at Littlefield Lane = 24 dB LA_{eq}

A.2 Sound Reaching Other Dwellings

The calculation of sound from the production building interior to the nearest dwellings on Station Road at 230m to the south is:

Sound pressure levels, dB linear:

Frequency (Hz)	63	125	250	500	1k	2k	4k	8k
SPL in building	86.2	87.0	89.0	87.5	85.8	90.5	95.1	92.7
Cladding loss	22	22	29	36	39	46	52	56
Outdoors at 1m	64	65	60	52	47	45	43	37
Shielding loss	10	10	10	10	10	10	10	10
Distance loss	35	35	35	35	35	35	35	35
SPL at dwellings	19	20	15	7	2	0	0	0

When expressed as a single-figure quantity this is:

Sound level outdoors at Station Road = 10 dB LA_{eq}

The same calculation over the distance of 340m to Bramham Croft predicts:

Sound level outdoors at Bramham Croft = 7 dB LA_{eq}

B. **Sound Generated by Vehicles and Forktrucks**

Sound levels were measured during the movements, loading and unloading of articulated vehicles at the existing premises. Measurements were time-averaged over the period during which the activity took place, generally between 40 and 60 seconds per vehicle manoeuvre in the outdoor yard and 15 minutes forktruck loading.

Activity	**Sound Level LA_{eq}**	**Distance**
HGV movements	64 - 68 dBA	30m
Forktruck loading	62 dBA	15m

The above sound levels were measured at distances which were convenient at the time of measurement. The average distances from vehicle movements to dwellings at the Wombwell premises will be 175m to Littlefield Lane, 270m to Station Road and 360m to Bramham Croft. Vehicle movements in the outdoor yard will be shielded from the direction of Littlefield Lane by a fence which is proposed to an acoustical standard and from all other dwellings by the factory and other buildings. Shielding attenuation of at least 10 dBA is estimated towards all receptors. After taking account of the decay of sound over the appropriate distance and the shielding attenuation the average contributions of vehicle sound to the overall sound at the dwellings is:

Activity	**Sound Level LA_{eq}**	**Duration**
Littlefield Lane		
HGV movements	40 dBA	1 min in or out
Forktruck loading	37 dBA	15 min / vehicle
Station Road		
HGV movements	36 dBA	60 sec in or out
Forktruck loading	33 dBA	15 min / vehicle
Bramham Croft		
HGV movements	33 dBA	60 sec in or out
Forktruck loading	30 dBA	15 min / vehicle

The assessment period defined in BS 4142 is one hour during daytime (0700 to 2300 hours) and 5 minutes at night (2300 to 0700 hours). It is assumed for the purpose of sound predictions that during the daytime

2 vehicles per hour will move in and out of the premises and be loaded by forktruck. During the shorter 5-minute assessment period at night there is assumed to be a worst case of one vehicle movement in or out and 5 minutes of loading. The overall values are:

Receptor	**Daytime** **dB LA_{eq}(1-hour)**	**Night** **dB LA_{eq}(5-min)**
Littlefield Lane	35 dBA	39 dBA
Station Road	31 dBA	35 dBA
Bramham Croft	28 dBA	32 dBA

It is assumed that tonal reverse warning bleepers will not be allowed on vehicles at this close proximity to dwellings and that if any reverse warning signals are used they will be of the white noise type to avoid disturbance at the dwellings.

C. **Sound from Outdoor Chiller**

The outdoor chiller at the existing Wath factory generates 75.7 dB LA_{eq} at 2m distance. After subtracting the decay of sound over the appropriate distances to the nearest dwellings and allowing an estimated 10 dBA shielding effect from buildings, the predicted sound levels at dwellings are (dB LA_{eq}):

Littlefield Lane	27 dBA
Station Road	23 dBA
Bramham Croft	21 dBA
