

F.P McCann - Wisbech Road, Littleport, Ely
Proposed Site Expansion

Report On Predicted Noise Impact

Marefen Drove and Little Marefen Drove

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1. INTRODUCTION

It is proposed that the existing premises of FP McCann Ltd, Wisbech Road, Littleport be extended to provide additional production facilities.

A previous report produced for the proposed development reference 'FP McCann, Wisbech Road, Littleport, Ely - Site Expansion - R6' dated 24th August 2016 concentrated on what was considered to be the nearest properties located along Wisbech Road, including Benhope and Silver Birches, 190 and 178 Wisbech Road.

Since the submission of this report, additional information has been requested from the council regarding other properties in the local area. Therefore, the purpose of this addendum report is therefore to determine the likely impact of the proposed new development upon nearby residential properties located to the west on Marefen Drove and to the north on Little Marefen Drove.

Site operations on the existing site are currently limited by the following condition:

'There shall be no operation of plant or machinery or workers on the site hereby approved for the storage of concrete products, outside the hours 07:00 - 19:00 Monday to Friday and 07:00 - 12:00 on Saturdays. There shall be no operation of plant or machinery or workers on the site at any time on Sundays or Bank Holidays.'

An older condition for the site dated 6th April 2001 stated:

'Machinery and plant which is likely to emit a noise must not operate on Sundays or Bank Holidays and between the hours of 6.00pm and 7.00am on other days.'

It is not known whether similar operating hour restrictions apply to other adjacent and nearby commercial operations.

Assessment has been made of typical activity and production noise levels for the existing facility.

This report reviews these levels with respect to the existing noise climate at the residential properties located to the west on Marefen Drove and to the north on Little Marefen Drove. Recommendations for noise control measures are provided where appropriate.

2. SITE AND DEVELOPMENT PROPOSALS

The FP McCann works are located approximately 1 mile north west of the village of Littleport, approximately 6 miles north of Ely, East Cambridgeshire. It is proposed that the existing works be expanded to the north west as shown in Figure 1 below.

The existing works produce precast concrete structures and ready mix concrete for the construction industry and comprise two large covered warehouse buildings and a large yard area used for the storage and handling of materials and concrete products.

FP McCann is seeking to achieve maximum flexibility in relation to operating hours and would ideally wish the new facility to be able to operate 07:00hrs to 19:00hrs on both week days and weekends.

The proposed development site is bounded to the south west by Wisbech Road which provides a principal traffic route between the A10 and Ely to the south and Wisbech to the north. Traffic flows on Wisbech Road are, generally, fast and free flowing throughout the day and evening.

The development site also adjoins an area of land currently occupied by Wrights Engineering, providing Horsebox manufacturing and refurbishment and Thurlow Nunn Standen Ltd, providing farm equipment, agricultural tractors and used farm machinery.

All remaining boundaries to the development site adjoin open land.

There is an existing access road from Wisbech Road serving Thurlow Nunn Standen Ltd and it is proposed that this will be extended to allow all vehicle access to the proposed development site.

Located towards the north of the site along the north west, north and eastern site perimeter will be a 3 metre high bund which is envisaged to provide significant screening to dwellings to the west and north from activities which occur in and around the production building, the batching plant and storage area 3.

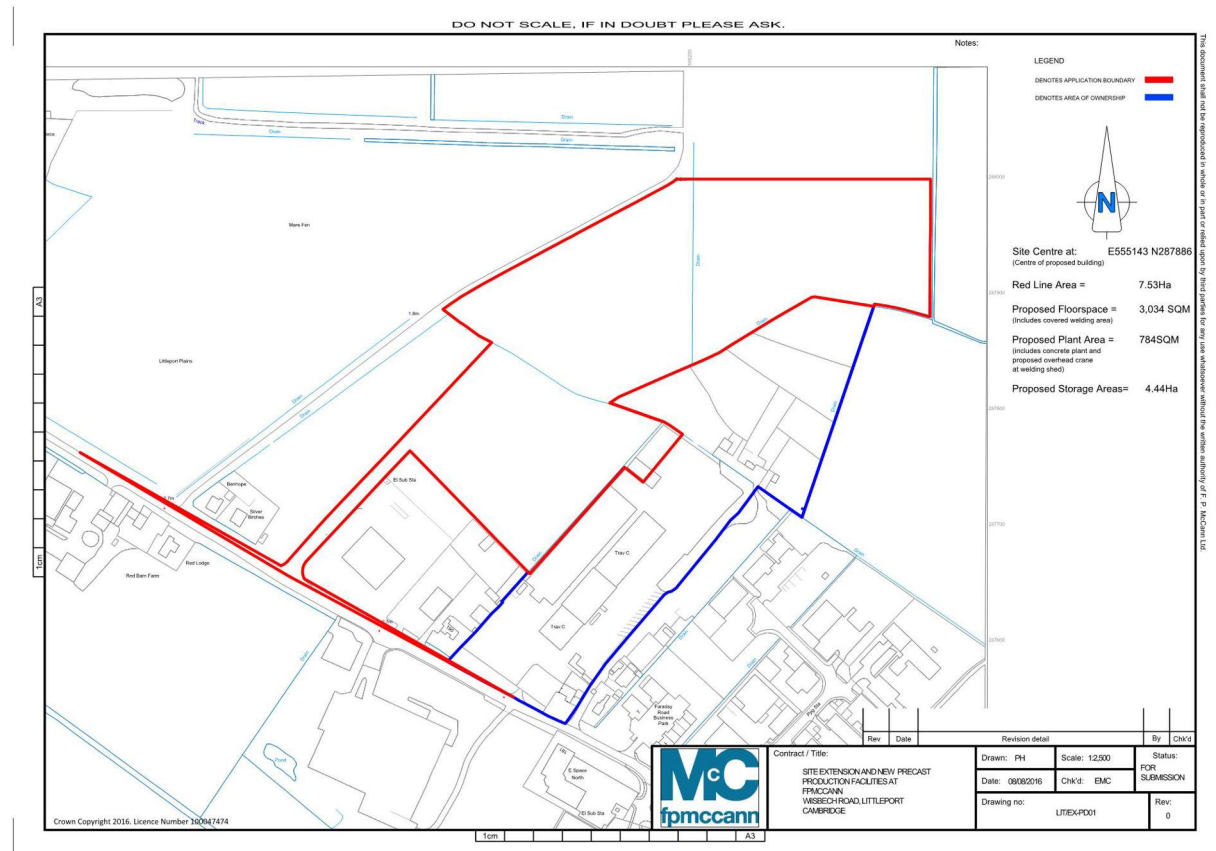
The proposed new facility will provide concrete production within a warehouse type building located towards the north of the site. Externally, the yard area will utilise diesel powered fork lift trucks for moving materials and the loading and unloading of delivery vehicles with the storage of materials towards the south west.

The nearest residential properties to the proposed new development are two detached dwellings located adjacent to the junction of Wisbech Road and Little Marefen Drive referred to as Benhope and Silver Birches. It is noted that both of these dwellings are single storey bungalows and do not have windows above ground level. An area of open land behind these dwellings and running along Little Marefen Drive will result in all on-site operations occurring at a minimum of 130 metres distance from the dwellings. North east of this buffer zone at a distance of 230 metres is an area designated for staff and visitor car parking and product storage with additional product storage space to the north and east.

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There are additional existing dwellings located to the south at 190 Wisbech Road and to the south east at 178 Wesbech Road. To the north west at a distance of approximately 460 metres are a couple of dwellings accessed via Marefen Drove. To the north at a distance of approximately 400 metres are a series of dwellings accessed via Little Marefen Drove.

The current site location (blue) and the location of the expansion (red) are shown below.



An indicative layout plan and plan showing the position of the 3 metre bund is shown at Appendix 1 of this report.

3. ASSESSMENT CRITERIA

In order to assess the potential noise impact of activities taking place on the expanded section of site it will be necessary to compare predicted noise levels for the development with established guidance and criteria.

3.1 National Planning Policy Framework

The NPPF sets out the Government planning policies for England and how these are expected to be applied. Section 11, '*Conserving and enhancing the natural environment*', paragraph 123 of NPPF states:

'Planning policies and decisions should aim to:

- Avoid noise from new developments 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 developments, 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 upon 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'

Reference is made to the DEFRA Noise Policy Statement for England 2010. This latter document is intended to apply to all forms of noise other than that which occurs in the workplace and includes environmental noise and neighbourhood noise in all forms.

NPSfE advises that the impact of noise should be assessed on the basis of adverse and significant adverse effect but does not provide any specific guidance on assessment methods or limit sound levels. Moreover, the document advises that it is not possible to have 'a single objective noise-based measure...that is applicable to all sources of noise in all situations'. It further advises that the sound level at which an adverse effect occurs is 'likely to be different for different noise sources, for different receptors and at different times'.

In the absence of specific guidance for assessment of environmental noise within NPPF and NPSfE it is considered appropriate to base assessment on current British Standards and/or national guidance. It is noted, however, that NPSfE also advises that the general principle that increases in ambient noise should be 'minimised', needs to be put into context and, in this regard, states:

'Of course, taken in isolation and to a literal extreme, noise minimisation would mean no noise at all. In reality, although it has not always been stated, the aim has tended to be to minimise noise as far as is reasonably practical... the application of the NPSfE should enable noise to be considered alongside other relevant issues and not to be considered in isolation. In the past, the wider benefits of a

particular policy, development or other activity may not have been given adequate weight when assessing the noise implications’.

3.2 BS 8233:2014

BS8233:2014 ‘Guidance on sound insulation and noise reduction for buildings’ is the current British Standard providing guidance for acoustic requirements in and around new buildings. The Standard advises appropriate criteria and limits for different building types including dwellings.

BS8233 provides guidance regarding acceptable internal and external noise level criteria for dwellings but does not form any statutory requirement to achieve the guidance values provided therein.

The BS8233 internal design criteria for dwellings are as follows:

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

Section G1 of BS 8233 advises that sound reduction is limited to 15dB where windows are open.

For gardens and terraces, the Standard states that it is desirable that the steady noise level does not exceed $L_{Aeq,T}$ 50dB whilst a level of $L_{Aeq,T}$ 55dB would be acceptable in noisier environments.

3.3 BS 4142:2014

BS4142:2014 ‘Methods for rating and assessing industrial and commercial sound’ is the current British Standard providing guidance for assessment of noise impact from industrial and commercial sites. In general, the likelihood of adverse impact for a particular noise source is dependent upon factors including the margin by which it exceeds the background noise level, the character of the noise and its occurrence. The Standard recommends the determination of the Rating Level of the specific source and advises a correction factor of between +3dB and +9dB if the sound has a tonal quality, is intermittent or impulsive or has any other distinct characteristics which would make it more noticeable.

The degree of impact is assessed by comparing the measured background level with the Rating Level. Where the Rating Level exceeds the background, the level of impact increases as shown below:

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Comparison with background	Assessment
+0 dB or below measured background	Low impact
+ 5 dB	Adverse impact
+ 10 dB or more above measured background	Significant adverse impact

It should be noted that the assessment method applies to free field external sound levels.

4. MEASUREMENTS

Measurements have been made to determine the existing background noise climate at the dwellings located to the west on Marefen Drove and to the north on Little Marefen Drove as detailed below.

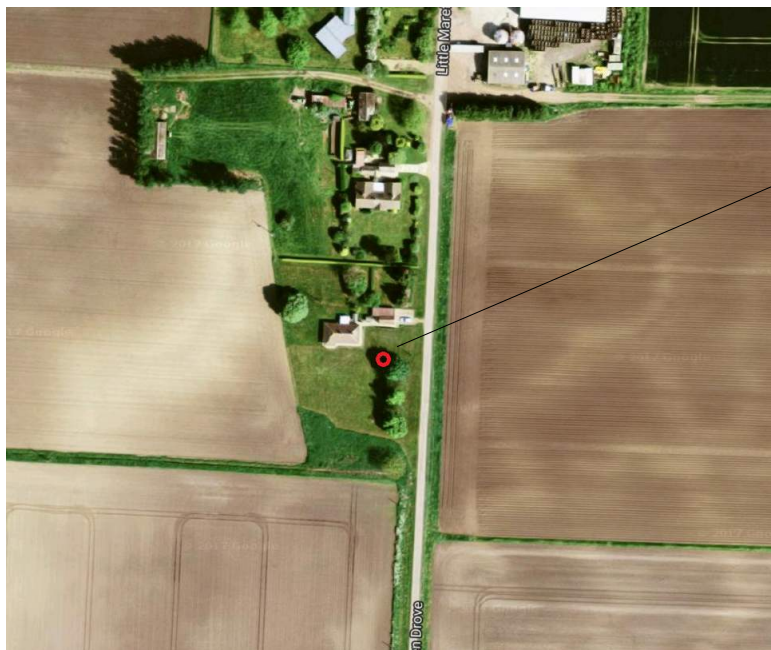
Position L1: Marefen Drove



Automated Noise Logging Meter

The microphone was located on the eastern edge of the nearest private garden on Marefen Drove to the proposed development with a view of the existing works to the east.

Position L2: Little Marefen Drove



Automated Noise Logging Meter

The microphone was located within the private garden at the nearest dwelling on Marefen Drove to the proposed development with a view of the existing works to the south.

In each instance, the microphone was located in a free-field position. Levels were recorded continuously in 15 minute samples over a period of five days including a weekend period. Measurements were made to determine the equivalent continuous sound level, L_{Aeq} , and the percentile L_{A90} .

Typical operational sound levels were also measured for the FP McCann works. These measurements were recorded in close proximity to common activities to determine typical existing operational sound levels.

Weather conditions during the survey were suitable for noise measurement with little to no wind strength and dry and generally clear conditions.

All measurements were made with a calibrated precision grade sound level meter in accordance with BS EN 60651 and BS 7445. The measurement position is indicated in Appendix 1.

5. RESULTS

5.1 Existing noise climate

The results of all measurements are tabulated at Appendix 2. Levels are given as hourly values derived from the 15min sample data.

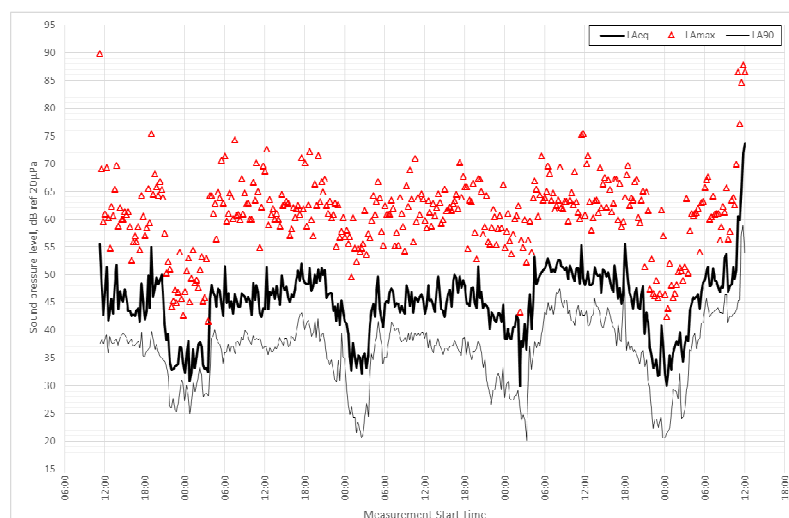
The overall daytime and night time sound levels at the measurement positions were as follows:

5.1.1 Logger Measurement Position L1 - Marefen Drove:

Period	L _{Aeq} dB	L _{A90} dB
Friday	46.6	35.9
Friday night	43.3	32.3
Saturday	47.5	38.0
Saturday night	42.6	31.0
Sunday	46.2	36.8
Sunday night	47.1	32.5
Monday	49.5	39.9
Monday night	44.2	31.5
Tuesday*	60.5	45.1

[*] It is noted that noise levels on the Tuesday morning are artificially high directly as a result of lawn mowing the garden in close proximity to the automated noise logging meter.

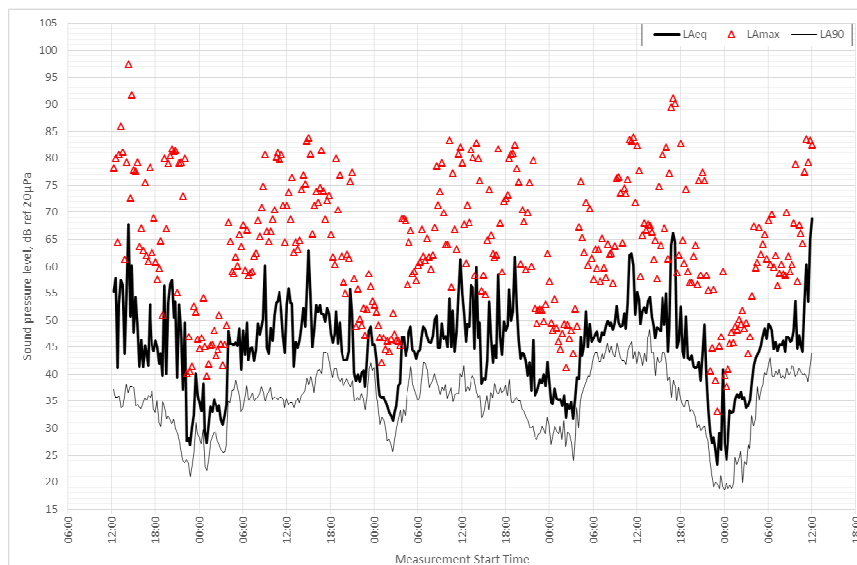
The lowest background sound level for the proposed working period of the new development was L_{A90(1hr)} 36.9dB measured during Sunday morning. The following graph shows the variation in the noise climate over the survey period.



5.1.2 Logger Measurement Position L2 – Little Marefen Drove:

Period	L _{Aeq} dB	L _{A90} dB
Friday	54.8	32.4
Friday night	42.5	30.2
Saturday	51.5	37.3
Saturday night	44.2	34.5
Sunday	51.7	35.9
Sunday night	43.5	32.9
Monday	54.7	38.7
Monday night	42.7	28.1
Tuesday	54.4	40.2

The lowest background sound level for the proposed working period of the new development was L_{A90(1hr)} 34.8dB measured during Sunday morning. The following graph shows the variation in the noise climate over the survey period.



5.1.3 Typical activity noise levels

The following Table shows the measured noise levels for a range of on-site activities that occur within the existing works. The listed activities are those which occur within the yard area. All noise levels were recorded at the nominal distance indicated.

Activity and distance	L _{Aeq} dB(A)	L _{Amax}	Duration
Lorry passing through internal security gate at 10 metres	65	69	30 seconds
	66	71	25 seconds
	66	72	25 seconds
Diesel Forklift driving at 25 metres	59	62	10 seconds
	63	67	8 seconds
	60	65	15 seconds
Diesel Forklift reversing with beeper at 25 metres	58	63	10 seconds
	58	61	5 seconds
Overhead Bridge Crane moving and loading at 25 metres	58	71	20 seconds
	57	68	15 seconds
Wisbech Road at 25 metres (no on-site activity)	55	59	5-minutes
	58	67	5-minutes
	54	65	5-minutes
Car entering and leaving car park at 10 metres	54	70	20 seconds
	55	72	20 seconds

It should be noted that whilst the operation of the overhead bridge crane itself is relatively quiet, it is the movement of materials associated with the crane which appears to account for the highest noise levels recorded for this activity.

In addition to the above, noise levels for a concrete batching plant have been established from BS 5228:2009 which indicates an overall typical sound power level of 108dB(A) for a large (360m³ per day) unit. It is normal for these operations that the main sources of noise are the concrete fill operations and the associated vehicle movements. Noise levels at the nearest residential dwellings has been established using the following equation: $SPL = SWL - 20 \log r - 8$...where r is the distance from the source position to the receiver. It is understood from site that normal operation will consist of 10 loads of aggregate per day with 1 load of concrete every two days will be required with each load taking no longer than 4 minutes.

6. DISCUSSION

6.1 Existing noise climate

The general noise climate at the development site is attributable to traffic flows on Wisbech Road and other local roads in the area including the A10 Littleport by-pass. Measured noise levels indicate that traffic flow levels are reduced on Saturday afternoons with significantly lower levels of traffic on Sundays. It would be expected that there is some occasional noise from the Thurlow Nunn Standen site.

Highest noise levels for the existing works site are attributable to the movement of vehicles around and through the site, and the loading and unloading of vehicles by hand, forklift and overhead bridge crane. Maximum noise levels are usually associated with the start-up and revving of engines, and the loading processes. These maximum noise levels are usually brief and do not occur for prolonged periods of time.

Noise from the batching plant include the concrete fill operations and the associated vehicle movements.

Activity noise associated with the proposed development site can be expected to be similar to that which already occurs at the existing works.

6.2 BS 4142 assessment

6.2.1 Operational Activities

Measured noise levels have been corrected for the effect of residual sound by use of the following formula (as detailed in BS 4142 Section 7.3):

$$L_s = 10 \lg (10^{L_a/10} - 10^{L_r/10})$$

Where:

L_s is the specific sound level

L_a is the ambient sound level

L_r is the residual sound level

Using the measured on-site noise level at the site boundaries as detailed in Section 5 in conjunction with noise levels measured during periods of inactivity, noise levels solely from on-site activities can be established.

Operation	Average Event Noise L_{Aeq}	Residual Noise level $L_{Aeq, 1-hr}$	Calculated Specific Sound level
Lorry Passing through gate at 10m	65.7	56.0	65.2
Diesel Forklift driving at 25 metres	61.0	56.0	59.3

Diesel Forklift reversing with beeper at 25 metre	58.0	56.0	53.7
Overhead Bridge Crane moving and loading at 25 metres	57.5	56.0	52.2
Car entering and leaving car park at 10 metres	54.5	56.0	54.0

The assessment periods are taken as one hour for the daytime period in accordance with BS 4142. From on-site observations at the existing site it has been taken for the purposes of calculation that for a typical one-hour period, activities within the warehouse buildings operate continuously with the overhead bridge in operation for 15-minutes, 60 forklift reversing alarms sound per hour where each operation is of 15 seconds duration, 60 car movements where each car movement is of 30 seconds duration and 10 lorry movements where each lorry movement is 30 seconds in duration. Forklift movements are assumed to operate continuously during this one hour period.

Furthermore, noise levels at the nearest dwellings to the west and north of site will be reduced as a result of both distance attenuation and barrier screening as provided by the 3 metre bund. In this instance, distance attenuation has been calculated assuming point-source attenuation whilst barrier attenuation has been calculated in accordance with the principles of CRTN.

On this basis the total noise level from activities taking place at FP McCann to the nearest dwellings to the west of site can be summarised as follows:

Dwellings to West (Marefen Drove)

Operation	Calculated Specific Sound Level	On-time Correction	Distance to boundary Correction	Barrier Attenuation	Receiver Level L _{Aeq, 1hr}
Lorry Passing through gate (nearest access road at 415m)	65.2	-10.8	-32.4	-8	14
Diesel Forklift driving around centre of nearest product storage area (455m)	59.3	0	-25.2	-8	26.1
Diesel Forklift reversing with beeper around centre of nearest product storage area (455m)	53.7	-6	-25.2	-8	14.5
Overhead Bridge Crane moving and loading at warehouse (335) metres	52.2	-6	-25.3	-8	12.9
Overhead Crane (Eastern Boundary) (580m)	52.2	-6	-27.3	-8	10.9
Car entering and leaving car park on access road (415m)	54.0	-3	-32.4	-8	10.6
Concrete Batching Plant	46.4	-13.8	n/a	-5	27.6
Total					30.3

The proposed concrete batching plant is located at a distance of 480 metres from the nearest residential dwelling and therefore, the calculated specific sound level is $(108 - 53.6 - 8)$ 46.4dB.

Dwellings to North (Little Marefen Drove)

Operation	Calculated Specific Sound Level	On-time Correction	Distance to boundary Correction	Barrier Attenuation	Receiver Level L _{Aeq, 1hr}
Lorry Passing through gate (nearest access road at 470m)	65.2	-10.8	-33.4	-8	13
Diesel Forklift driving around centre of nearest product storage area (470m)	59.3	0	-25.5	-8	25.8
Diesel Forklift reversing with beeper around centre of nearest product storage area (455m)	53.7	-6	-25.5	-8	14.2
Overhead Bridge Crane moving and loading at warehouse (530) metres	52.2	-6	-26.5	-8	11.7
Overhead Crane (Eastern Boundary) (670m)	52.2	-6	-28.7	-8	9.5
Car entering and leaving car park on access road (550m)	54.0	-3	-34.8	-8	8.2
Concrete Batching Plant	45.7	-13.8	n/a	-8	26.9
Total					29.8

The proposed concrete batching plant is located at a distance of 520 metres from the nearest residential dwelling and therefore, the calculated specific sound level is $(108 - 54.3 - 8)$ 45.7dB.

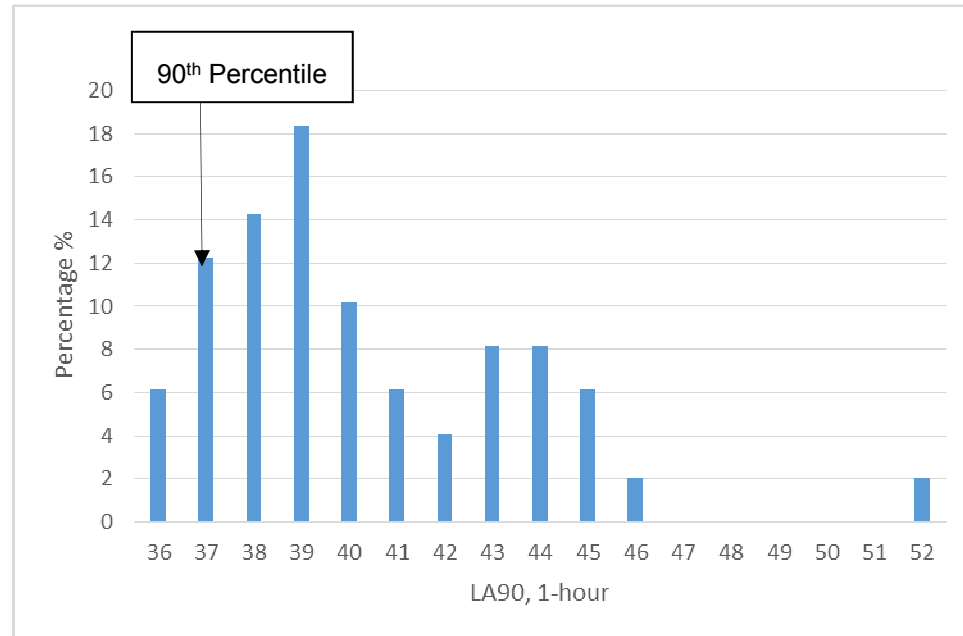
6.2.2 Background Noise Levels

Background noise levels at each of the nearest residential properties for the noise monitoring period are summarised in the table below. All values in L_{A90, 1hr}.

Position L1: Marefen Drove

From:	To:	Friday	Saturday	Sunday	Monday	Tuesday
07:00	07:59		36.9	40.6	44.5	43.4
08:00	08:59		38.1	38.9	45.8	43.4
09:00	09:59		39.1	38.6	44.4	44.2
10:00	10:59		38.3	39.1	42.0	43.0
11:00	11:59		37.8	39.4	43.3	51.7
12:00	12:59	38.1	36.6	38.4	42.0	
13:00	13:59	38.0	36.5	36.8	43.9	
14:00	14:59	38.6	37.8	37.0	42.1	
15:00	15:59	38.3	37.9	36.8	43.0	
16:00	16:59	37.7	38.9	37.5	39.9	
17:00	17:59	37.5	42.4	36.6	40.4	
18:00	18:59	36.2	40.9	37.0	39.7	

A histogram of all the hourly measured periods above is presented below.

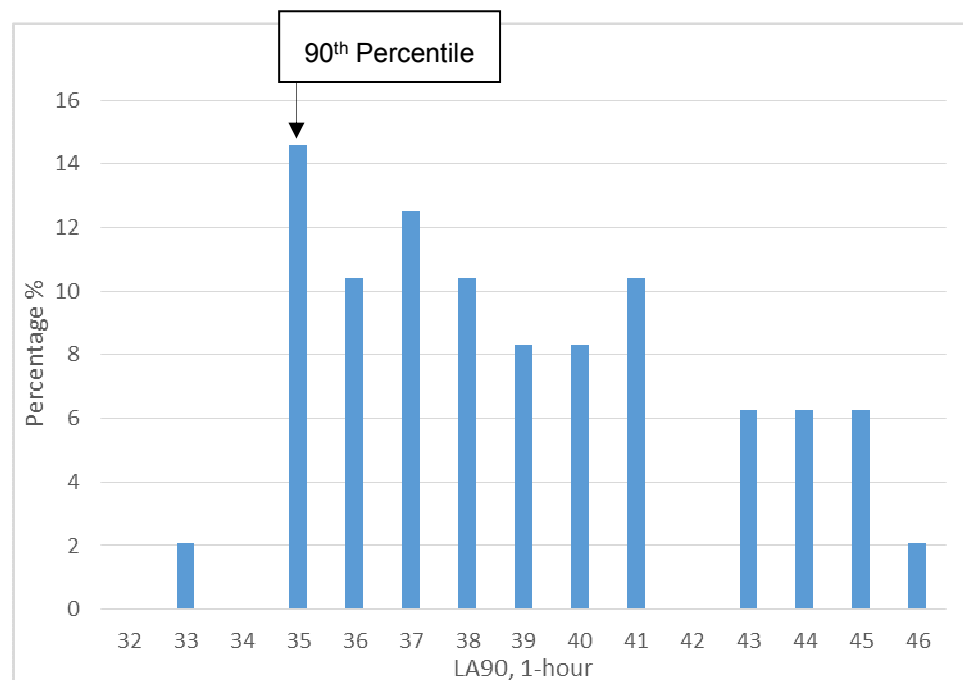


The table and histogram above indicate that for the proposed working hours, the lowest typical background noise levels at the nearest sensitive dwelling is $L_{A90,1hr}$ 37dB. Lower levels comprising 10% of the monitoring period were limited to the Sunday period where background noise levels varied between -1dB and +3dB compared to the lowest typical background noise levels detailed above. Typical background noise levels during the week are in the order of +0dB to +17dB compared to the lowest typical background noise levels detailed above.

Position L2: Little Marefen Drove

From:	To:	Friday	Saturday	Sunday	Monday	Tuesday
07:00	07:59		35.7	39.6	43.2	40.2
08:00	08:59		36.6	38.9	44.6	40.0
09:00	09:59		36.5	37.2	44.2	40.7
10:00	10:59		35.6	36.1	42.8	40.4
11:00	11:59		35.2	37.3	44.6	39.9
12:00	12:59		34.8	38.9	42.8	
13:00	13:59	34.9	34.8	38.8	45.3	
14:00	14:59	37.6	37.2	35.2	42.7	
15:00	15:59	35.0	38.1	34.2	43.2	
16:00	16:59	34.8	40.3	36.9	39.2	
17:00	17:59	35.6	43.7	36.9	37.3	
18:00	18:59	32.3	40.6	37.0	34.8	

A histogram of all the hourly measured periods above is presented below.



The table and histogram above indicate that for the proposed working hours, the lowest typical background noise levels at the nearest sensitive dwelling is $L_{A90,1hr}$ 35dB. Lower levels comprising 10% of the monitoring period were limited to the late Friday period where background noise levels varied between -2dB and +2dB compared to the lowest typical background noise levels detailed above. Typical background noise levels during the week are in the order of -2dB to +10dB compared to the lowest typical background noise levels detailed above.

6.2.3 Assessment of Activities at Site Expansion

Calculations have been undertaken to determine the likely impact from noise associated with the current range of activities at FP McCann on the site expansion during existing operational hours to the nearest proposed residential garden areas and facades.

It is unlikely that noise breakout from the production building would have any significant impact and it would be feasible to treat the building fabric to minimise break-out from any particularly noisy activities. Potential noise impact, generally, will be attributable to yard based activity and that of the batching plant.

The BS 4142 assessment for external activity at the nearest dwellings are as follows. All levels shown are in dB(A):

	Dwellings to West (Marefen Drove)	Dwelling to North (Little Marefen Drove)
Calculated $L_{Aeq,1-hour}$	30.3	29.8
Character correction	+3 Impulsivity	+3 Impulsivity
Rating Level at nearest dwelling	33.3	32.8
Typical lowest $L_{A90,1-hour}$	37	35
Difference	-3.7	-2.2
BS4142 assessment	'Low Impact'	'Low Impact'

The table above includes a character correction as detailed below.

Section 9.2 of BS 4142 allows, where appropriate, to establish a rating penalty for sound based on a subjective assessment of its characteristics. A correction for tonality can be applied with a penalty of 2dB for a tone which is just perceptible at the noise receptor, 4dB where it is clearly perceptible, and 6dB where it is highly perceptible.

A correction for impulsivity can be applied with a penalty of +3dB for impulsivity which is just perceptible at the noise receptor, 6dB where it is clearly perceptible, and 9dB where it is highly perceptible.

On the basis that this noise character of the sound source should be applied to levels at the receiver location of the nearest sensitive dwellings where many of these acoustic features will be either very faint or inaudible, low levels of correction where impulsivity are just perceptible are deemed to be appropriate.

The assessment demonstrates that rating noise level from activities associated with the existing site would, if carried out at the new site be in the order of 2-4dB below the lowest typical background noise level during the proposed operational hours. In accordance with BS4142 a difference of '0' or below results in a condition of 'low impact' at the nearest dwellings, both to the west on Marefen Drove and to the north on Little Marefen Drove.

7. CONCLUSIONS

Assessment has been made for of existing operations and noise climate at a site located off Wisbech Road, Littleport in order to determine the noise impact upon nearby dwellings for proposed expanded site to the north west of the existing works.

Site measurements indicate that the proposed new development is likely to have a low noise impact upon the existing dwellings located to the west on Marefen Drove and to the north on Little Marefen Drove and would allow operations 7-days a week, 07:00 until 19:00.

It is considered that further reduction of noise impact upon the dwellings can be achieved by careful site layout and by location of the noisiest activities away from the dwellings.

APPENDIX 2 – MEASURED SOUND PRESSURE LEVELS

Position L1: Marefen Drove

	From:	To:	Leq,1hr	Lmax,1hr	L10,1hr	L90,1hr
Day 1	12:00	12:59	47.5	69.3	49.0	38.1
	13:00	13:59	48.3	69.7	48.8	38.0
	14:00	14:59	45.6	62.1	47.8	38.6
	15:00	15:59	45.4	61.4	47.4	38.3
	16:00	16:59	42.9	57.0	45.7	37.7
	17:00	17:59	45.4	64.3	47.8	37.5
	18:00	18:59	46.0	65.5	47.2	36.2
	19:00	19:59	51.0	75.4	48.9	38.0
	20:00	20:59	48.7	66.8	49.7	35.3
	21:00	21:59	38.8	57.5	40.9	31.4
	22:00	22:59	33.3	47.3	36.7	26.2
	23:00	23:59	35.6	54.1	38.3	29.5
Day 2	00:00	00:59	35.2	53.0	37.1	27.7
	01:00	01:59	34.7	54.5	37.1	29.3
	02:00	02:59	36.8	53.2	39.5	31.2
	03:00	03:59	40.3	64.3	38.0	29.2
	04:00	04:59	46.6	64.3	49.5	39.1
	05:00	05:59	45.9	70.7	48.0	36.4
	06:00	06:59	47.9	71.4	48.5	36.4
	07:00	07:59	45.2	74.3	46.6	36.9
	08:00	08:59	45.5	67.3	47.4	38.1
	09:00	09:59	45.6	64.7	47.3	39.1
	10:00	10:59	46.7	70.1	48.3	38.3
	11:00	11:59	44.4	69.6	46.3	37.8
	12:00	12:59	47.7	72.6	46.9	36.6
	13:00	13:59	46.9	61.9	50.9	36.5
	14:00	14:59	47.7	64.5	50.4	37.8
	15:00	15:59	46.6	63.2	49.2	37.9
	16:00	16:59	47.4	62.1	50.9	38.9
	17:00	17:59	50.4	71.1	53.9	42.4
	18:00	18:59	49.3	72.2	51.7	40.9
	19:00	19:59	48.5	66.4	51.8	39.7
	20:00	20:59	50.3	71.5	53.6	39.7
	21:00	21:59	47.9	67.2	51.3	35.2
	22:00	22:59	44.4	62.9	47.9	32.4
	23:00	23:59	43.9	62.6	47.3	35.0
Day 3	00:00	00:59	39.9	58.0	42.6	29.2
	01:00	01:59	35.2	60.2	36.5	24.1
	02:00	02:59	34.7	55.6	37.4	21.9
	03:00	03:59	37.4	61.6	37.7	26.8

	04:00	04:59	44.5	64.3	46.8	36.6
	05:00	05:59	45.6	66.8	46.4	38.0
	06:00	06:59	45.5	62.4	47.2	36.7
	07:00	07:59	46.1	63.5	48.8	40.6
	08:00	08:59	44.0	64.0	46.4	38.9
	09:00	09:59	46.1	68.9	48.4	38.6
	10:00	10:59	45.6	71.0	48.1	39.1
	11:00	11:59	45.8	64.6	48.0	39.4
	12:00	12:59	45.6	63.3	48.1	38.4
	13:00	13:59	45.3	62.8	48.1	36.8
	14:00	14:59	46.5	64.6	48.2	37.0
	15:00	15:59	45.7	65.4	48.0	36.8
	16:00	16:59	48.6	64.5	52.2	37.5
	17:00	17:59	48.4	70.2	51.0	36.6
	18:00	18:59	45.7	65.9	47.8	37.0
	19:00	19:59	46.3	66.5	48.4	36.0
	20:00	20:59	48.1	67.3	50.0	36.2
	21:00	21:59	43.7	64.3	47.2	31.1
	22:00	22:59	42.4	61.8	46.9	29.2
	23:00	23:59	43.2	66.3	47.0	31.6
Day 4	00:00	00:59	39.0	61.1	40.7	29.1
	01:00	01:59	40.8	60.6	42.9	27.8
	02:00	02:59	38.5	62.4	38.5	26.0
	03:00	03:59	42.9	59.9	45.4	27.3
	04:00	04:59	49.0	66.9	50.0	35.7
	05:00	05:59	50.1	71.4	53.9	38.7
	06:00	06:59	52.0	69.6	55.3	43.7
	07:00	07:59	50.9	64.7	53.8	44.5
	08:00	08:59	52.1	69.4	55.2	45.8
	09:00	09:59	50.8	63.4	54.0	44.4
	10:00	10:59	50.1	68.6	53.4	42.0
	11:00	11:59	52.0	75.4	52.8	43.3
	12:00	12:59	49.2	71.5	51.6	42.0
	13:00	13:59	49.7	63.4	52.6	43.9
	14:00	14:59	49.6	69.3	52.4	42.1
	15:00	15:59	49.9	67.5	52.6	43.0
	16:00	16:59	49.2	67.2	50.6	39.9
	17:00	17:59	46.4	66.5	49.1	40.4
	18:00	18:59	52.0	69.7	52.6	39.7
	19:00	19:59	46.2	67.2	46.6	36.5
	20:00	20:59	45.9	65.1	48.2	35.4
	21:00	21:59	40.8	64.9	42.4	32.3
	22:00	22:59	34.3	52.8	38.0	24.1
	23:00	23:59	37.1	61.7	36.8	22.8
Day 5	00:00	00:59	32.8	52.1	36.5	21.5

	01:00	01:59	36.4	48.2	39.7	28.3
	02:00	02:59	37.5	51.2	41.3	27.1
	03:00	03:59	40.2	63.8	42.7	30.5
	04:00	04:59	45.6	61.2	48.0	37.8
	05:00	05:59	46.8	63.2	49.3	39.9
	06:00	06:59	50.0	67.6	51.7	44.0
	07:00	07:59	49.4	64.2	51.7	43.4
	08:00	08:59	47.5	62.3	50.1	43.4
	09:00	09:59	51.4	65.6	53.8	44.2
	10:00	10:59	50.1	69.9	53.3	43.0
	11:00	11:59	67.2	87.8	65.4	51.7

Position L2: Little Marefen Drove

	From:	To:	Leq,1hr	Lmax,1hr	L10,1hr	L90,1hr
Day 1	13:00	13:59	54.9	85.9	44.7	34.9
	14:00	14:59	62.7	97.5	50.8	37.6
	15:00	15:59	50.2	79.3	43.8	35.0
	16:00	16:59	44.6	75.5	43.8	34.8
	17:00	17:59	48.4	78.3	46.5	35.6
	18:00	18:59	44.4	64.7	46.8	32.3
	19:00	19:59	52.1	79.9	43.8	33.1
	20:00	20:59	55.2	81.7	45.4	31.0
	21:00	21:59	48.3	79.2	37.6	26.6
	22:00	22:59	43.6	79.9	31.3	23.1
	23:00	23:59	36.3	52.6	38.1	27.3
Day 2	00:00	00:59	35.0	54.1	37.3	27.0
	01:00	01:59	31.8	45.4	34.1	25.6
	02:00	02:59	34.3	50.9	37.3	28.3
	03:00	03:59	32.5	49.1	35.6	26.0
	04:00	04:59	46.3	68.1	49.9	36.0
	05:00	05:59	45.9	65.9	48.4	36.3
	06:00	06:59	46.9	67.6	49.0	35.6
	07:00	07:59	44.2	62.5	47.6	35.7
	08:00	08:59	49.1	74.8	50.6	36.6
	09:00	09:59	54.6	80.7	47.5	36.5
	10:00	10:59	51.7	81.0	50.8	35.6
	11:00	11:59	51.5	80.6	47.6	35.2
	12:00	12:59	54.0	76.4	58.1	34.8
	13:00	13:59	45.0	64.8	45.8	34.8
	14:00	14:59	51.7	83.2	48.4	37.2
	15:00	15:59	57.7	83.8	51.8	38.1
	16:00	16:59	52.2	81.5	50.6	40.3
	17:00	17:59	51.2	74.0	52.1	43.7

	18:00	18:59	48.7	79.9	50.3	40.6
	19:00	19:59	46.4	76.9	45.9	38.8
	20:00	20:59	50.5	75.7	47.1	38.4
	21:00	21:59	45.9	77.4	43.2	36.3
	22:00	22:59	39.5	52.2	41.9	35.1
	23:00	23:59	46.8	58.6	49.3	40.0
Day 3	00:00	00:59	42.0	52.8	43.6	35.6
	01:00	01:59	35.2	46.7	37.9	30.3
	02:00	02:59	32.4	51.3	35.2	27.2
	03:00	03:59	42.2	68.8	42.1	31.6
	04:00	04:59	46.1	68.8	48.3	35.3
	05:00	05:59	45.8	66.6	48.3	38.2
	06:00	06:59	46.7	66.8	49.5	38.1
	07:00	07:59	46.9	65.2	50.0	39.6
	08:00	08:59	48.8	78.5	49.7	38.9
	09:00	09:59	47.3	79.1	48.3	37.2
	10:00	10:59	50.7	83.4	47.2	36.1
	11:00	11:59	56.4	82.1	52.4	37.3
	12:00	12:59	51.4	79.1	53.2	38.9
	13:00	13:59	53.8	81.6	53.3	38.8
	14:00	14:59	54.5	82.9	45.8	35.2
	15:00	15:59	48.0	74.2	42.9	34.2
	16:00	16:59	44.6	65.7	45.6	36.9
	17:00	17:59	53.4	81.7	49.0	36.9
	18:00	18:59	51.9	80.8	51.3	37.0
	19:00	19:59	56.7	82.5	52.0	35.2
	20:00	20:59	43.3	70.5	46.1	33.4
	21:00	21:59	42.7	79.6	40.5	30.5
	22:00	22:59	37.5	52.2	41.0	28.6
	23:00	23:59	40.0	62.3	43.0	30.3
Day 4	00:00	00:59	36.5	57.2	39.7	29.1
	01:00	01:59	35.1	48.6	38.1	29.2
	02:00	02:59	34.2	49.3	36.9	29.0
	03:00	03:59	36.2	52.1	38.7	27.9
	04:00	04:59	44.6	75.7	45.8	35.0
	05:00	05:59	48.8	71.9	49.5	39.7
	06:00	06:59	47.1	63.2	49.5	43.3
	07:00	07:59	47.6	65.2	50.0	43.2
	08:00	08:59	49.2	64.1	52.0	44.6
	09:00	09:59	50.4	76.6	52.0	44.2
	10:00	10:59	50.9	76.1	51.6	42.8
	11:00	11:59	60.5	84.0	55.7	44.6
	12:00	12:59	53.0	82.4	54.1	42.8
	13:00	13:59	53.0	68.0	55.8	45.3
	14:00	14:59	48.9	66.3	51.6	42.7

	15:00	15:59	50.7	80.6	50.1	43.2
	16:00	16:59	58.6	89.5	47.1	39.2
	17:00	17:59	62.4	91.1	48.7	37.3
	18:00	18:59	49.3	82.8	48.6	34.8
	19:00	19:59	42.7	61.9	46.5	33.7
	20:00	20:59	41.1	75.8	42.4	30.6
	21:00	21:59	44.7	77.4	40.8	29.2
	22:00	22:59	27.9	55.7	30.6	21.1
	23:00	23:59	35.4	59.1	33.0	19.7
Day 5	00:00	00:59	29.3	45.7	31.9	19.1
	01:00	01:59	34.7	48.8	39.0	21.7
	02:00	02:59	36.0	51.8	39.8	23.5
	03:00	03:59	35.9	54.5	38.7	27.2
	04:00	04:59	43.2	67.4	45.7	33.8
	05:00	05:59	47.0	65.9	50.3	38.9
	06:00	06:59	48.0	69.6	50.8	40.9
	07:00	07:59	45.3	62.0	48.4	40.2
	08:00	08:59	46.2	70.0	49.5	40.0
	09:00	09:59	49.6	78.9	50.3	40.7
	10:00	10:59	45.5	67.6	47.5	40.4
	11:00	11:59	60.7	83.6	56.1	39.9

Note that the L_{Amax} value indicates the highest measured level in each one-hour period.

GLOSSARY OF TERMS

Decibel (dB)

The decibel is the unit used to quantify sound pressure levels. The human ear has an approximately logarithmic response to acoustic pressure over a very large dynamic range (typically 20 micro-Pascals to 100 Pascals). Therefore, a logarithmic scale is used to describe sound pressure levels and also sound intensity and power levels. The logarithm is taken to base 10, hence, an increase of 10 dB in sound pressure level is equivalent to an increase by a factor of 10 in the sound pressure level (measured in Pascals). Subjectively, this increase would correspond to a doubling of the perceived loudness of sound.

A-Weighting

The 'A' weighting is a correction term applied to the frequency range in order to approximate to the sensitivity of the human ear to noise. It is generally used to obtain an overall noise level from octave or third octave band frequencies. An 'A' weighted sound level is written as dB(A).

$L_{Aeq,T}$

The A-weighted equivalent continuous sound level – the level of a notionally steady sound having the same energy as the true fluctuating sound over a specified measurement period (T). $L_{Aeq,T}$ is used to describe many types of noise and can be measured directly with an integrating sound level meter. It is the preferred descriptor for environmental noise in accordance with BS 7445:1993.

$L_{A90,T}$

The A-weighted noise level exceeded for 90% of the specified measurement period (T). This is generally taken to indicate the prevailing background noise level.

L_{Amax}

The highest short duration A-weighted sound level recorded during a noise event.