



Princes Ltd, Bridge Road, Long Sutton, PE12 9EQ

Planning Noise Assessment Raw Materials Handling & Kitchen Facility

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Comments

Comments

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Introduction

As part of an investment in facilities Princes wish to rationalise their Long Sutton site to maximise site efficiency. The proposal consists of the demolition of several buildings and construction of a new Raw Materials Warehouse and Kitchen with associated undercover loading docks and new car-parking area. The proposal would also include the slight relocation of the existing Pea Processing Unit northwards.

The report provides an assessment of the potential change to operational noise emissions at the nearest residential receptors to the site as a result of the proposed changes.

A glossary of the acoustic terminology used within this report is presented in Appendix A.

Site Description

Princes Long Sutton site is located in a rural location, predominantly surrounded by arable land use. Bridge Road runs directly adjacent to the northern boundary. There are several residential dwellings on Bridge Road which overlook the eastern area of the site together with a small number of residential dwellings adjacent to the eastern site boundary proximate to Bridge Road. **Figure 1** presents the existing site layout.

Operation at the site is 24/5 with seasonal operation 24/7.

Development Description

The Development consists of the construction of a new Raw Materials Warehouse (RMW) building within the eastern part of the site, with associated undercover loading docks adjacent to the eastern façade of the RMW and with a new car parking area further to the east. To accommodate the new building, several existing buildings would have to be demolished and the existing Pea Processing Unit would be moved slightly north. Fixed external plant (compressors) serving the Cold Store within the new RMW would also be installed. HGVs would be re-routed within the Site passing to the east of the new RMW to access the unloading area further passing up to the northern boundary adjacent to Bridge Road to access the Pea Processing Unit. The number of daily HGV movements associated with the RMW is forecast to increase from 60 to 90.

Figure 2 presents the proposed development layout.

Noise Assessment Criteria

1.1 Local Authority Consultation

The Environmental Health Department of South Holland District Council (SHDC) were consulted prior to conducting the baseline noise survey to agree the strategy and assessment approach. SHDC confirmed by e-mail that they agreed in principle with the baseline survey strategy and assessment approach. Further to this SHDC confirmed that target noise limits of any new fixed external plant is that rating level should not exceed prevailing background noise level by more than 5dB.

1.2 New Fixed External Plant & Building Service

The primary source of guidance in determining the significance of sound of an industrial and/or commercial nature on residential receptors, is provided in BS 4142:2014¹.

BS 4142 states that the potential impact from fixed external plant is based on the noise level difference between the source, known as the 'specific sound level ($L_{Aeq,T}$)', compared with the 'background sound level ($L_{A90,T}$)' that exists in the absence of the source in question. Where the sound contains any acoustic characteristics such as tonality, impulsiveness and intermittency then the specific noise level is adjusted in-line with BS 4142 advice to determine the rating level ($L_{Ar,Tr}$).

Typically, the greater the difference between the rating level and the background sound level the greater the potential of an adverse impact. BS 4142 states:-

- A difference of + 10dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- A difference of +5dB or more is likely to be an indication of an adverse impact, depending on the context.
- 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.

SHDC seek a target rating level ($L_{Ar,Tr}$) at the nearest sensitive receptors not to exceed the prevailing background sound level (L_{A90}) by 5dB.

1.3 Changes to Existing Operations

The proposed Development would result in some changes to the existing operations, namely:

- Slight re-routing of HGV with an increase in daily movements from 60 to 90;
- Relocation of staff car parking area (further east compared to current location);
- New car park to west;
- Relocation of HGV unloading area; and
- Slight relocation of Pea Processing Unit north.

Essentially there are no change to the operations *per se* just location changes to existing permitted operations.

Where a comparative assessment has been undertaken, current prevailing noise levels established through baseline survey are compared against the with Development scenarios to determine the potential impact from these proposed changes. Generally, a noise level change from an existing noise source of 3dB is just discernible whereas an increase or decrease of 10dB is perceived as a doubling or halving of the noise level. Table 1 presents the potential level of noise impact from comparative changes in source noise levels.

¹ BSI. British Standard 2014, BS 4142:2014 'Methods for rating and assessing industrial and commercial sound'. BSI,

Table 1: Potential Noise Impact From Comparative Changes in Existing Source Noise Level

Change in Source Noise Level dB	Impact	Comments
+≤3dB	Negligible	Just perceptible depending on prevailing ambient noise levels and therefore should be acceptable without mitigation.
+>3-4.9dB	Minor	Potentially perceptible depending on prevailing ambient noise levels. May require consideration of mitigation depending on absolute noise level, frequency and time of day.
+5 to 9.9 dB	Moderate	Potentially clearly perceptible depending on prevailing ambient noise levels that could result in behaviour changes by residents such as closing of windows. Mitigation is likely to be required to reduce the potential impact, depending on absolute noise level, frequency and time of day.
+>10dB	Substantial	Potentially unacceptable to residents depending on the prevailing ambient noise levels. Mitigation is likely to be required to reduce the impact.

Environmental Noise Survey

Sensitive Receptors

The nearest sensitive receptors to the Site are the residential houses fronting Bridge Road to the north of the eastern area of the site and several isolated dwellings adjacent to the eastern site boundary. **Table 2** presents the identified sensitive receptors which are illustrated in **Figure 1**.

Table 2: Identified Residential Sensitive Receptors

Ref (Figure 1)	Description	Distance from Site Boundary (m approx.)	Distance from RMW (m approx.)	Distance from relocated pea processing unit (m approx.)
SR A	Residential houses Bridge Road	30	45	60
SR B	Residential houses east of site	5	65	180

Environmental Noise Survey

A baseline environmental noise survey was conducted at Princes Long Sutton, from Wednesday 18th July to Thursday 19th July 2018 to establish the prevailing ambient noise levels within the vicinity of the nearest existing sensitive receptors to the site.

Environmental noise loggers were installed at the eastern site boundary (LT1) in line with the rear garden of the house (approximately 60m south of Bridge Road and within the vicinity of the northern boundary with Bridge Road (LT2 approximately 15 metres from the road edge). LT2 was considered to be representative of prevailing noise levels within the vicinity of the houses fronting onto Bridge Road.

Table 3 presents a summary of the environmental noise survey results with monitoring locations illustrated in Figure 1. Full details of the baseline survey are presented in Appendix B. The daytime period is taken as 07:00-23:00 with night-time period as 23:00-07:00.

Table 3: Summary of Baseline Survey Results

ID	Description	Period	L _{Aeq} ¹	L _{AFmax} ²	L _{A10} ³	L _{A90,5min} Range	L _{A90} ³	Modal L _{A90}
LT1	Eastern Boundary (SR A)	Day	Day	51	68	50	38-52	44
		Night	Night	46	59	47	37-48	40
LT2	Northern Boundary (SR B)	Day	Day (1300-2300)	59	78	63	38-49	44
		Night	Night	53	75	51	38-50	43

Note: ¹ Logarithmic average. ² 95th Percentile. ³ Arithmetic average.

The weather conditions during the survey period were monitored remotely with reference to weather station ID ISPALDIN8 at Long Sutton located approximately 2.2km to the west of the Site. Conditions during the survey period were suitable for noise monitoring, being dry and wind speed less than 5 m/s.

At both locations road traffic noise was considered to be the dominant noise source. Traffic movements on Bridge Road were noted as being frequent but not continuous. Noise from the A17 was noted as being distant but continuous during the daytime period. Noise from the Princes Site was also noted as being occasionally discernible and subjectively considered to contribute to the environmental noise climate at both noise monitoring locations.

Time history plots for both locations are presented in **Appendix B**.

When operational, noise emissions from the Pea Processing Unit contributes to the existing environmental noise levels, as evidenced by the time history plots presented within Appendix B.

Noise Impact Assessment

Fixed External Plant

At this stage detail on candidate compressor plant serving the RMW Cold Store is not known. On this basis plant noise limits at the nearest sensitive receptors have been recommended based on established background noise levels and the requirement of South Holland District Council, who generally target a rating noise level not to exceed 5dB above the prevailing background noise level.

Table 4: Recommended Compressor Plant Noise Limit At Sensitive Receptors

Period	Bridge Road SRs		Eastern Boundary SRs	
	Background Noise Level dB LA90,T (Modal)	Plant Noise Limit dB LA,r,T (free-field)	Background Noise Level dB LA90,T (Modal)	Plant Noise Limit dB LA,r,T (free-field)
Day 0700-1900	45dB LA90,5min	≤45dB LA,r,T	44 LA90,5min	≤44dB LA,r,T
Night 2300-0700	44 LA90,5min	≤44dB LA,r,T	40 LA90,5min	≤45dB LA,r,T

It should be noted that the plant noise limit is a rating level as defined in BS4142:2014 and therefore a penalty is added to take account of acoustic character, intermittency etc. Further to this it is the cumulative level from all new fixed external plant which form part of the proposed Development.

Pea Processing Unit

At its proposed new location the Pea Processing Unit will be approximately 60 metres from the nearest sensitive receptor on Bridge Road compared to the current 70 metres (approximate).

The distance to sensitive receptors adjacent to the eastern boundary will approximately remain unchanged. Noise emissions from the Pea Processing Unit will continue to be screening from intervening buildings, being the new RMW.

Table 5 presents the predicted change in the prevailing noise level at the nearest sensitive receptors based on the changes outlined above. The noise levels have been predicted using Cadna-A noise modelling software and are based on the existing Pea Processing Unit walls and roof providing a sound reduction comparable to Kingspan KS1000 wall panel (25dB Rw), the measured noise emissions at a distance of 35 metres from the southern open façade of the Pea Processing Unit and 15dB screening afforded by the intervening buildings to the sensitive receptors adjacent to the eastern site boundary.

Table 5: Predicted Change in Prevailing Noise During Pea Processing Operations

Receptor / Period	Measured Noise Level dB LAeq,T	Pea Processing Predicted Noise Level dB LAeq,T	Predicted Change in Noise Level During Pea Processing Operations	Significance
Nearest Bridge Road Receptor				
Day	59	47	<+1	Negligible
Night	53	47	<+1	Negligible
Nearest Eastern Boundary Receptor				
Day	51	44	+1	Negligible

Receptor / Period	Measured Noise Level dB LAeq,T	Pea Processing Predicted Noise Level dB LAeq,T	Predicted Change in Noise Level During Pea Processing Operations	Significance
Night	46	44	+2	Negligible

During operation of the Pea Processing Unit slight increase in the prevailing ambient noise level is predicted. Qualitatively this already occurs based on observations made when on site and on analysis of the measured noise data. With the proposed changes the change in noise level is predicted to be negligible.

Unloading RMW

Noise levels at the sensitive receptors arising from unloading operations at the east of the RMW have been predicted based on source noise measurements undertaken on Wednesday 18th July 2018 and using Cadna-A noise modelling software. The calculations take account of the 3.5m high service yard acoustic grade fence. Table 6 presents the predicted increase in the prevailing noise level during RMW unloading operations.

Table 6: Predicted Change In Noise Level During RMW Unloading Operations

Receptor / Period	Measured Noise Level dB LAeq,T	Indicative RMW Unloading Operational Noise Level dB LAeq,T	Change in Noise Level During RMW Unloading Operations	Significance
Bridge Road Receptors				
Day	59	45	0	Negligible
Night	53	45	+1	Negligible
Eastern Boundary Receptors				
Day	51	46	+1	Negligible
Night	46	46	+3	Minor Adverse

With provision of the 3.5m high service yard acoustic grade fence the predicted impacts arising from RMW unloading operations are predominantly negligible increasing to minor adverse impact during the night-time period at the eastern boundary receptors.

Car Park (Eastern)

Noise levels arising from peak usage of the eastern car-park, such as shift change have been predicted based on the number of car parking spaces (95) and using CadnaA noise modelling software. The assessment assumes 190 movements in one hour at shift change over.

Table 7 presents the predicted change in ambient noise level during usage of the car-park during shift change over and the potential impact. The calculations take account of a 2.5 metre high acoustic grade fence on the eastern site boundary.

Table 7: Predicted Change in Noise Level During Peak Usage of Car Park (Shift Change Over)

Receptor / Period	Measured Noise Level dB LAeq,T (free-field)	Indicative Car Park Noise Levels dB LAeq,T (free-field)	Change in Noise Level during Shift Change Over	Significance
Bridge Road Receptor				
Day	59	50	<+1	Negligible
Night	53	50	+2	Negligible
Eastern Boundary Receptor				
Day	51	48	+2	Negligible
Night	46	48	+4	Minor Adverse

During shift change over based on 190 movements in the eastern car park over a 1 hour period the predicted impacts are negligible at the residential receptors on Bridge Road with up to minor adverse impacts at the properties located to the east of the eastern boundary.

HGV Re-Routing

Noise levels resulting from re-routed HGV movements have been predicted using CadnaA noise modelling software based on 5 HGV movements within any 1 hour during the daytime period and 1 HGV movement within any 1 hour during the night-time period. The calculations take account of the 3.5 metre high service yard acoustic grade fence.

Table 8 presents the predicted change in ambient noise level arising from the re-routed HGV movements.

Table 8: Predicted Change in Noise Level from Re-Routed HGVs

Receptor / Period	Measured Noise Level dB LAeq,T	Indicative Car Park Noise Levels dB LAeq,T	Change in Noise Level during Shift Change Over	Significance
Bridge Road Receptor				
Day	59	42	0	Negligible
Night	53	35	0	Negligible
Eastern Boundary Receptor				
Day	51	44	+1	Negligible
Night	46	37	+1	Negligible

The re-routing of HGV movements within the site boundary is predicted to result in negligible impacts.

Mitigation

Fixed External Plant

In order to achieve the recommended plant noise limits presented in Table 1 it is likely that incorporation of mitigation will be required such as:

- Purchase of acoustic 'quiet' model (if available);
- Provision of localised screening/enclosure; and
- Inclusion of anti-vibration mounts and flexible coupling.

Boundary Treatments

Provision of a 3.5 metre high acoustic grade fence to the service yard area provides attenuation to noise arising from the RMW unloading area but also to noise from HGV movements and emissions from the Pea Processing Unit.

Provision of a 2.5 metre high acoustic grade fence on the eastern site boundary with the car park provides attenuation to noise arising from vehicle movements within the car park area. In particular this provides attenuation to maximum noise levels emissions during vehicle movements at shift changeover.

Conclusions

The proposed changes as a result of the new RMW would predominantly result in relocation of existing operations, such as:

- Pea Processing Unit;
- Unloading Operations;
- Car Park; and
- HGV Increase and Re-Routing.

It would also result in the introduction of new fixed external plant, such as the new compressors serving the cold store area of the RMW.

Relocation of existing operations would predominantly result in negligible impacts when account is taken of inherent mitigations such as:

- Boundary treatments (3.5m high acoustic grade service yard fence and 2.5 metre high acoustic grade eastern boundary fence with car park).

When the Pea Processing Unit is operational although slight increase in prevailing ambient noise levels is predicted to occur, this is predicted to be negligible.

During RMW unloading operations there is the potential for some minor adverse impacts during the night-time period at the nearest residential property to the eastern site boundary.

During shift change over based on 190 vehicle movements within a 1 hour period in the eastern car park, there is the potential for some minor adverse impacts at the nearest residential properties adjacent to the eastern site boundary during the night-time period.

Daily increase in HGVs associated with RMW from 60 to 90 together with re-routing within the site is predicted to give rise to negligible impacts.

Noise limits for new fixed external plant have been recommended to safeguard the existing residential amenity.

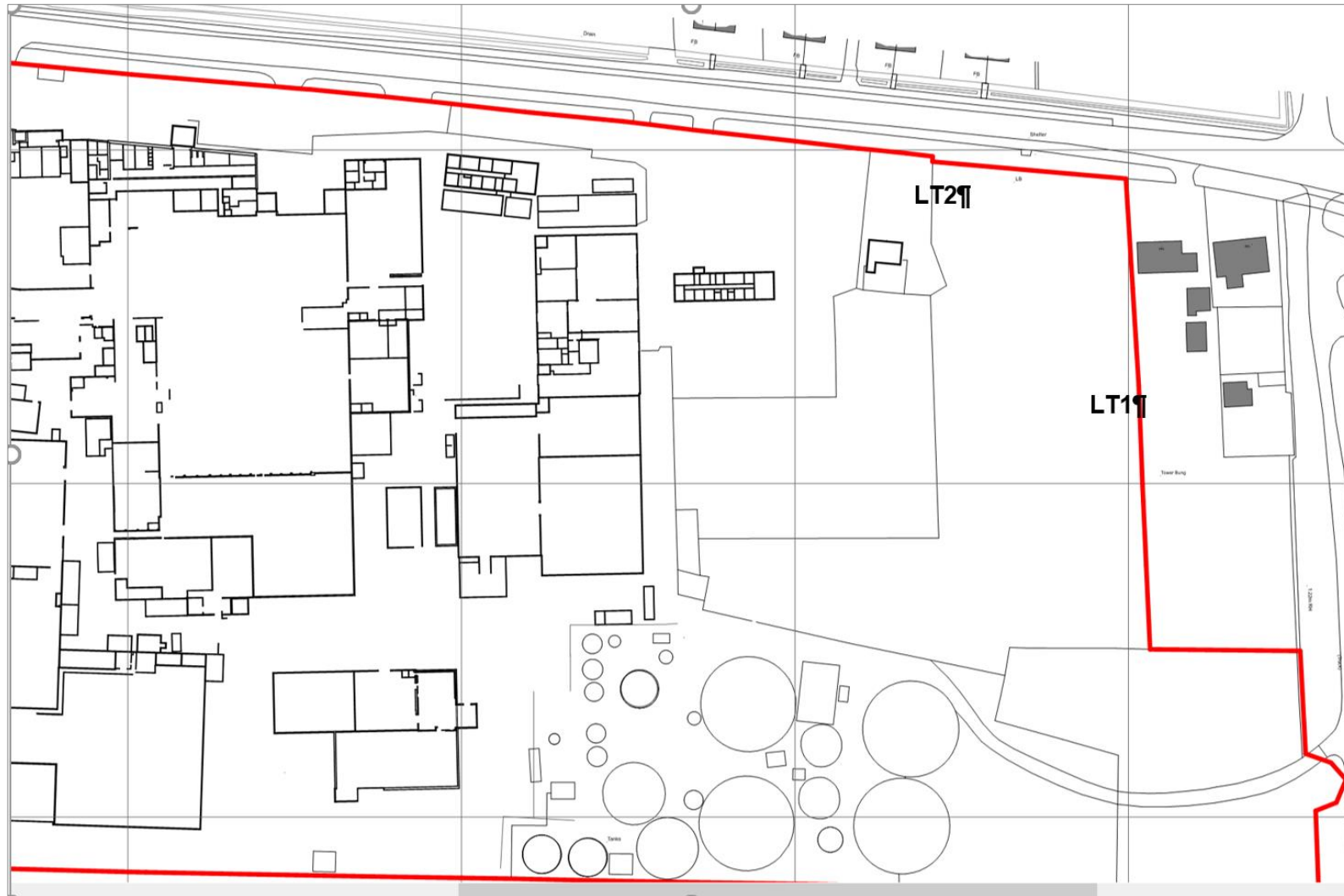


Figures

Figures

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Figure 1: Existing Site Layout and Noise Monitoring Locations



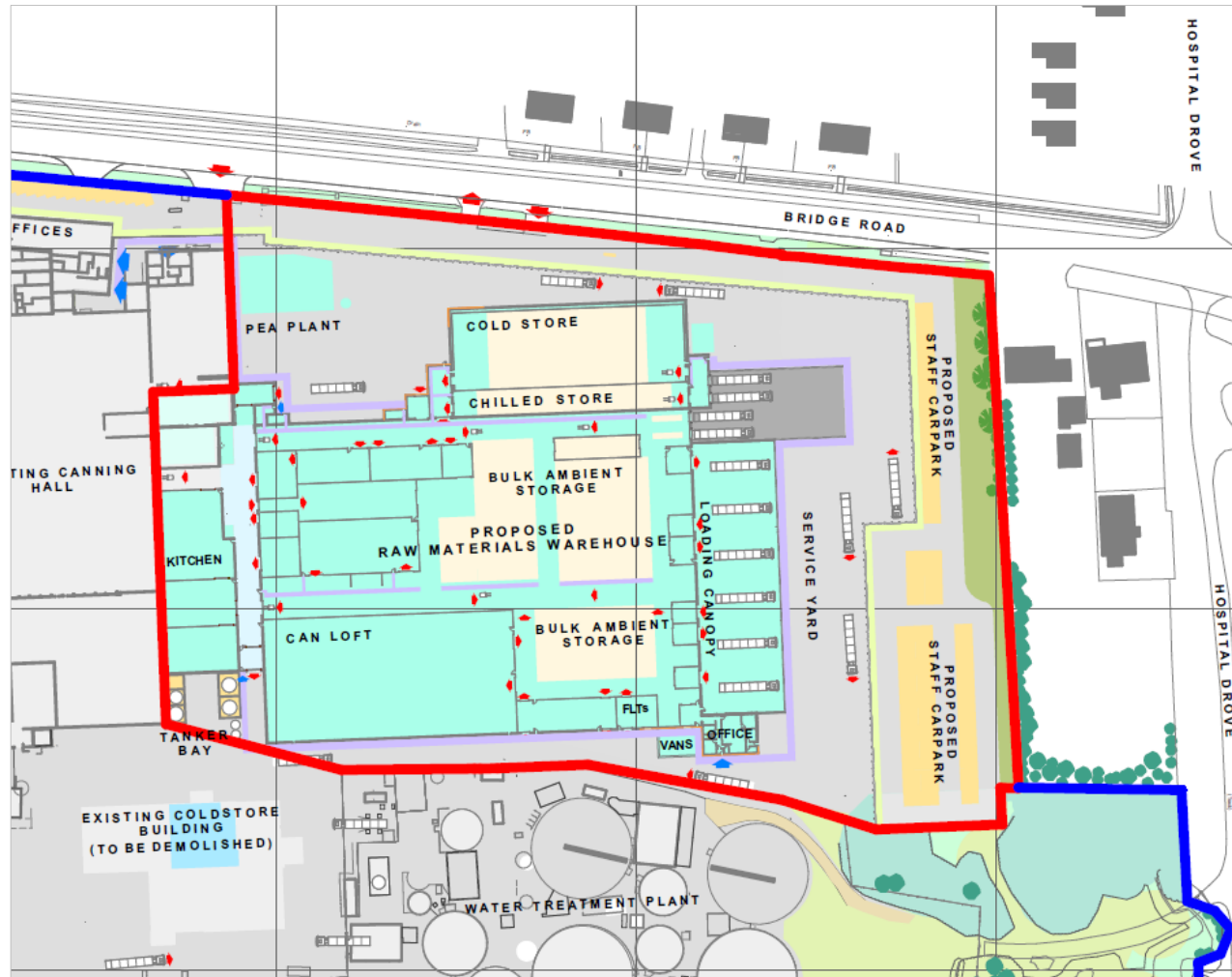
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Figure 2: Development Layout



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APPENDICES

A. Glossary of Acoustic Terms

Ambient sound	The totally encompassing sound in a given situation at a given time, usually composed of sound from all sources near and far.																		
Assessment period	The period in a day over which assessments are made.																		
A-weighting	A frequency weighting applied to measured or predicted sounds levels in order to compensate for the non-linearity of human hearing.																		
Background noise	Background noise is the term used to describe the noise measured in the absence of the noise under investigation. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the L_{90} noise level (see below).																		
Broadband	Containing the full range of frequencies.																		
Decibel [dB]	The level of noise is measured objectively using a Sound Level Meter. This instrument has been specifically developed to mimic the operation of the human ear. The human ear responds to minute pressure variations in the air. These pressure variations can be likened to the ripples on the surface of water but of course cannot be seen. The pressure variations in the air cause the eardrum to vibrate and this is heard as sound in the brain. The stronger the pressure variations, the louder the sound that is heard. The range of pressure variations associated with everyday living may span over a range of a million to one. On the top range may be the sound of a jet engine and on the bottom of the range may be the sound of a pin dropping. Instead of expressing pressure in units ranging from a million to one, it is found convenient to condense this range to a scale 0 to 120 and give it the units of decibels. The following are examples of the decibel readings of every day sounds: <table> <tr> <td>Four engine jet aircraft at 100m</td><td>120 dB</td></tr> <tr> <td>Riveting of steel plate at 10m</td><td>105 dB</td></tr> <tr> <td>Pneumatic drill at 10m</td><td>90 dB</td></tr> <tr> <td>Circular wood saw at 10m</td><td>80 dB</td></tr> <tr> <td>Heavy road traffic at 10m</td><td>75 dB</td></tr> <tr> <td>Telephone bell at 10m</td><td>65 dB</td></tr> <tr> <td>Male speech, average at 10m</td><td>50 dB</td></tr> <tr> <td>Whisper at 10m</td><td>25 dB</td></tr> <tr> <td>Threshold of hearing, 1000 Hz</td><td>0 dB</td></tr> </table>	Four engine jet aircraft at 100m	120 dB	Riveting of steel plate at 10m	105 dB	Pneumatic drill at 10m	90 dB	Circular wood saw at 10m	80 dB	Heavy road traffic at 10m	75 dB	Telephone bell at 10m	65 dB	Male speech, average at 10m	50 dB	Whisper at 10m	25 dB	Threshold of hearing, 1000 Hz	0 dB
Four engine jet aircraft at 100m	120 dB																		
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Telephone bell at 10m	65 dB																		
Male speech, average at 10m	50 dB																		
Whisper at 10m	25 dB																		
Threshold of hearing, 1000 Hz	0 dB																		
dB(A): A-weighted decibels	The ear is not as effective in hearing low frequency sounds as it is hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the 'A' filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter. The sound pressure level in dB(A) gives a close indication of the subjective loudness of the noise.																		
Façade Noise Level	A noise level measured or predicted at the façade of a building, typically at a distance of 1m, containing a contribution made up of reflections from the façade itself (+3 dB).																		
Free-Field Noise Level	A sound field region with no adjacent reflecting surfaces. Normally taken as a measurement location at a distance of at least 3.5m from reflecting surfaces (except the ground).																		
L_{Amax} noise level	This is the maximum noise level recorded over the measurement period.																		
L_{Amin} noise level	This is the lowest level during the measurement period.																		
$L_{Aeq,T}$ noise level	This is the 'equivalent continuous A-weighted sound pressure level, in decibels' and is defined in British Standard 7445 as the 'value of the A-weighted sound pressure level of a continuous, steady sound that, within a specified time interval, T, has the same mean square sound pressure as a sound under consideration whose level varies with time'.																		

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	It is a unit commonly used to describe construction noise, noise from industrial premises and is the most suitable unit for the description of other forms of environmental noise.
L_{A90} noise level	This is the noise level that is exceeded for 90% of the measurement period and gives an indication of the noise level during quieter periods. It is often referred to as the background noise level and is used in the assessment of disturbance from industrial noise.
L_{A10} noise level	This is the noise level which is achieved for 10% of the monitoring period and is often used to describe road traffic noise.
Residual sound	Ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound.
Reverberant Sound Field	The region of an enclosed space in which the reverberant sound is the major contributor to the total sound pressure level.
Rating Level, L_{A,r,Tr}	Specific sound level plus any adjustment for the characteristic features of the sound.
Sound Reduction Index (R)	The sound reduction index is a single-number rating of the sound reduction through a wall or other building element. Since the sound reduction may be different at different frequencies, test measurements are subjected to a standard procedure which yields a single number that is about equal to the average sound reduction in the middle of the human hearing range.
Specific sound level, L_{Aeq,T}	Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, Tr.
Weighted Sound Reduction Index (R_w)	Single number rating used to describe the laboratory airborne sound insulation properties of a material or building element over a range of frequencies, typically 100-3150Hz.
C_{TR}	An adjustment to the R _w scale to take account of the lower performance against a typical spectrum of road traffic noise dominated by low frequencies.
D_{ne,W}	Weighted element normalised level difference.

Appendices

B. Baseline Noise Survey

An unattended baseline noise survey was conducted at the eastern site boundary (LT1) and at 15 metres set-back from the northern site boundary with Bridge Road (LT2) from Wednesday 18th July to Thursday 19th July 2018.

The noise monitoring locations are described in Table B1 and illustrated in Figure 1.

The baseline strategy was agreed with Environmental Health of South Holland District Council (SHDC).

Table B1: Noise Monitoring Locations

Monitoring Location (Figure 1)	Description	Observations and Predominant Noise Sources
LT1	Un-attended long-term monitoring location at eastern site boundary. Environmental sound level meter used, with microphone mounted on an integral steel pole 1.2 metres above ground level.	Intermittent road traffic noise Bridge Road and distant road traffic noise from A17. Industrial noise discernible. Pea processing unit discernible when operational.
LT2	Un-attended long-term monitoring location at eastern site boundary. Environmental sound level meter used, with microphone mounted on an integral steel pole 1.2 metres above ground level.	Intermittent road traffic noise Bridge Road. Industrial noise discernible. Pea processing unit discernible when operational.

The noise parameters logged throughout the survey period were L_{Aeq} , L_{A90} , L_{A10} , and L_{Amax} measured as contiguous 5-minute periods. These parameters are described in full in Appendix A. The L_{Aeq} level is the equivalent continuous sound pressure level over the measurement period; L_{A90} is used as a descriptor of background noise levels and is the noise level exceeded for 90% of the measurement period, L_{A10} is the noise level which is achieved for 10% of the monitoring period and is often used to describe road traffic noise and L_{Amax} is an indicator of the highest sound level during the measurement period.

In addition 1/3 octave noise measurements were taken of the L_{eq} parameter.

Monitoring was undertaken by trained and competent Member of the Institute of Acoustics (MIOA).

The sound level meters were field calibrated before and on completion with no significant drift detected. Table B2 presents details of the equipment used in the baseline noise survey. All equipment used holds a valid calibration certificate which are available on request.

Table B2: Equipment Details

Location	Equipment	Model	Serial No.
LT1	Sound Level Meter	Rion NL-52 Type 1 Sound Level Meter	01043379
	Microphone	Rion UC-59 Microphone	02547
	Pre-amplifier	Rion NH-25 Pre-amplifier	10199
LT2	Sound Level Meter	Rion NL-52 Type 1 Sound Level Meter	976152
	Microphone	Rion UC-59 Microphone	12045
	Pre-amplifier	Rion NH-25 Pre-amplifier	76269
All	Acoustic Calibrator	Acoustic Calibrator Rion NC-74	35173533

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The weather conditions during the survey period were monitored remotely with reference to weather station ID ISPALDIN8 at Long Sutton located approximately 2.2km to the west of the Site. On Wednesday 18th July 2018 average temperature was 18.7°C, dry, sunny, calm up to 3 m/s northerly wind speed and direction. On Thursday 19th July 2018 average temperature was 20.8°C, dry, sunny, calm up to 3 m/s SSW wind speed and direction.

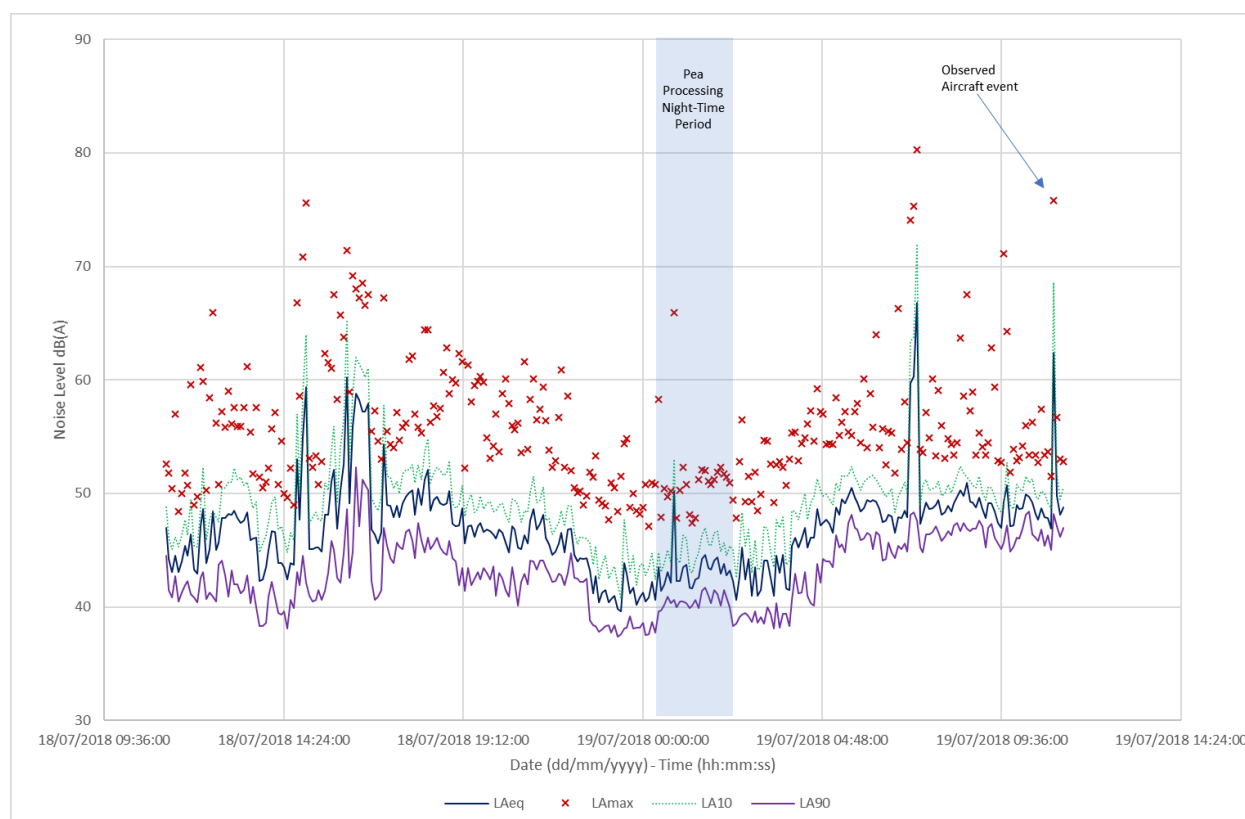
A summary of the baseline survey results are presented as Table B3 with time history plot of LT1 and LT2 presented as Figures B1 and B2 respectively. Figures B3 and B4 present the day and night L_{A90} modal plots for LT1 respectively and Figures B5 and B6 present the day and night L_{A90} modal plots for LT2 respectively.

Table B3: Summary of Baseline Survey Results

ID	Description	Period	L_{Aeq}^1	L_{AFmax}^2	L_{A10}^3	$L_{A90,5min}$ Range	L_{A90}^3	Modal L_{A90}
LT1	Eastern Boundary (SR A)	Day	51	68	50	38-52	44	44
		Night	46	59	47	37-48	40	40
LT2	Northern Boundary (SR B)	Day (1300-2300)	59	78	63	38-49	44	45
		Night	53	75	51	38-50	43	44

Note: ¹ Logarithmic average. ² 95th Percentile. ³ Arithmetic average.

Figure B1: Time History Plot of Noise Levels at LT1 (Eastern Site Boundary)



Appendices

Figure B2: Time History Plot of Noise Levels at LT2 (15m Set Back Northern Site Boundary Bridge Road)

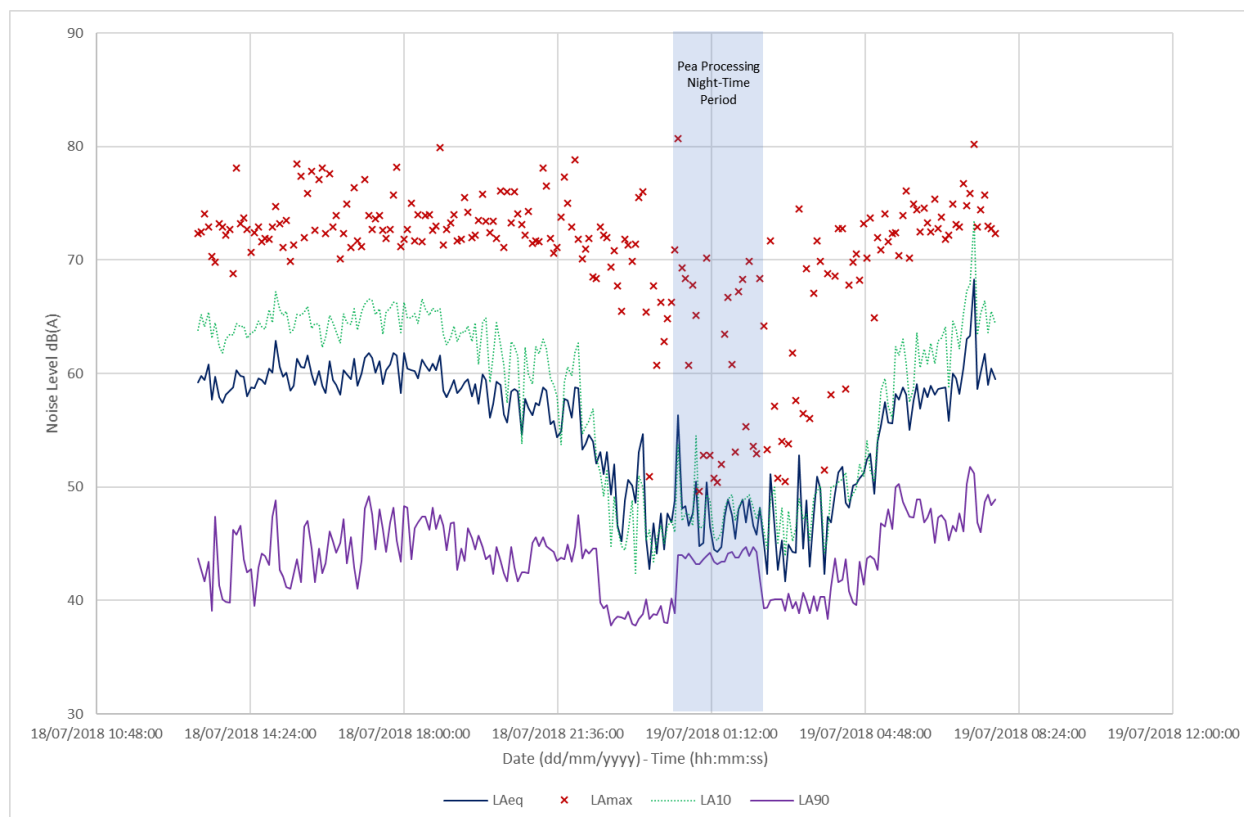
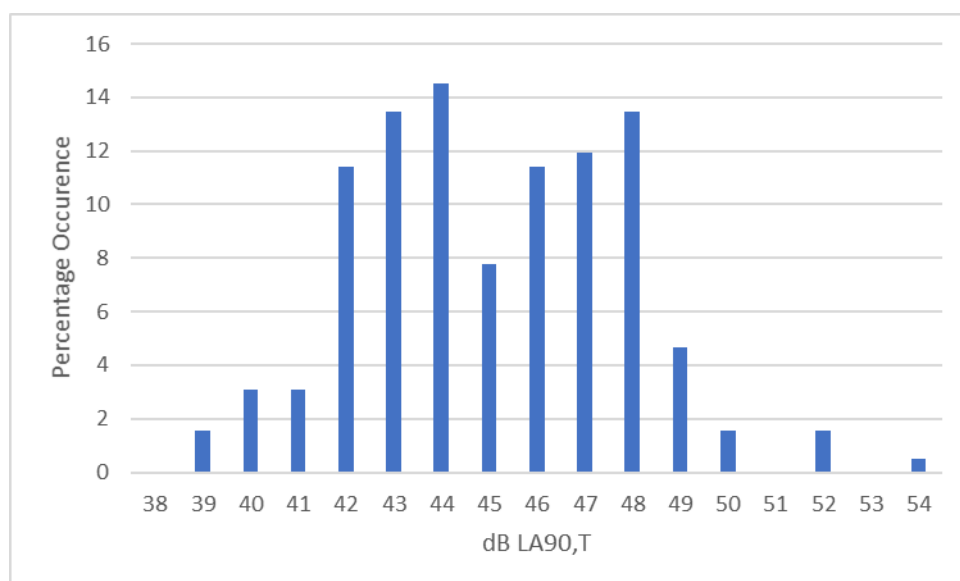


Figure B3: LT1 Day (07:00-23:00) LA90 Modal



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Figure B4: LT1 Night (23:00-07:00) L_{A90} Modal

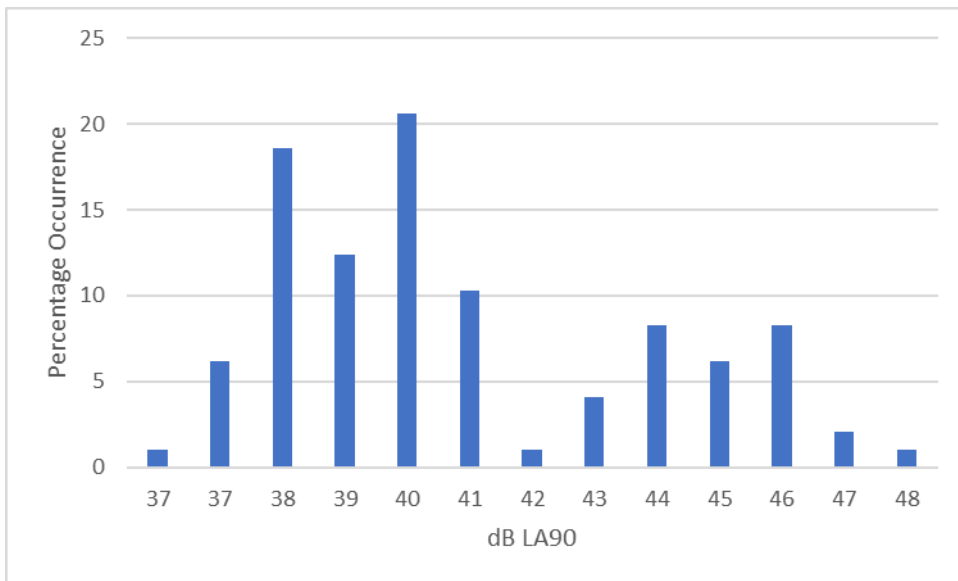
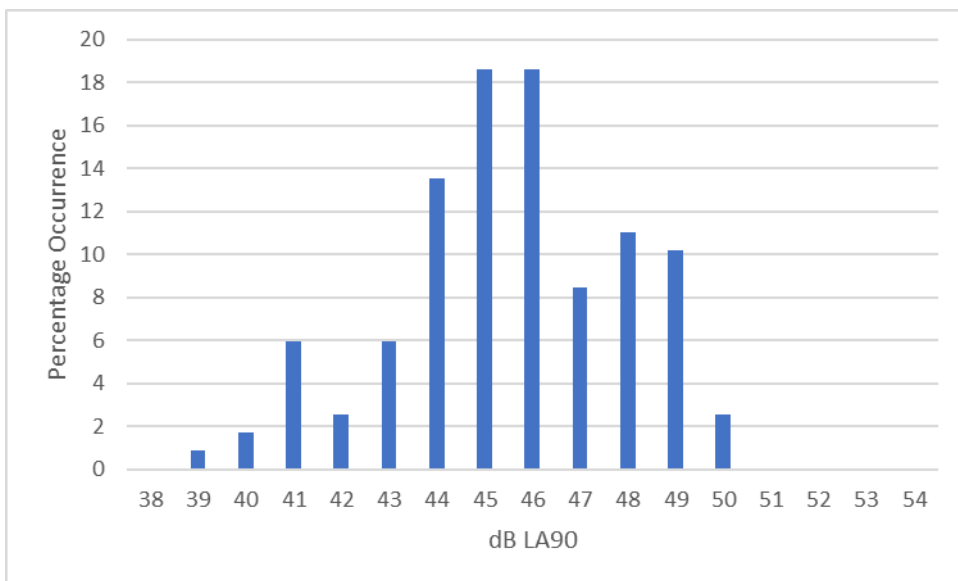
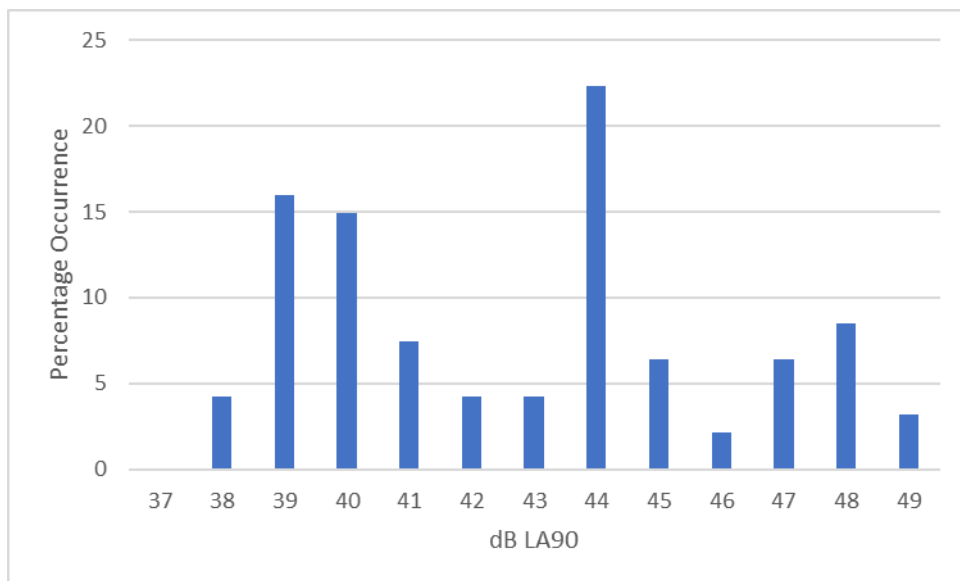


Figure B5: LT2 Day (07:00-23:00) L_{A90} Modal



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Figure B6: LT2 Night (23:00-07:00) LA₉₀ Modal



Photographs B1 and B2 present the LT1 and LT2 noise monitoring locations.

Photograph B1: LT1 Noise Monitoring Location – Eastern Boundary



Appendices

Princes Ltd, Bridge Road, Long Sutton, PE12 9EQ

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Photograph B2: LT2 Noise Monitoring Location – Bridge Road



Table B4 presents the measured noise levels during FLT loading operations at Princes Long Sutton and Table B5 presents the measured noise levels at a distance of 35 metres from the southern façade of the Pea Processing Unit.

Table B4: FLT Loading Operations (average distance 5 to 10m)

	LAeq ¹	LAm ²	LA10 ³	LA90
Average	68.0	87.3	68.9	55.0
Min	47.0	55.2	48.1	45.6
Max	73.4	91.7	76.3	67.3

Note: ¹ Logarithmic average. ² 95th percentile ³ Arithmetic Average

Table B5: Pea Processing Unit (35m from southern façade)

	LAeq ¹	LAm ²	LA10 ³	LA90
Average	79.7	81.4	80.1	78.9
Min	79.0	80.6	80.0	76.7
Max	79.9	81.6	80.2	79.6

Note: ¹ Logarithmic average. ² 95th percentile ³ Arithmetic Average

Appendices

Figure B7 presents the 1/3 octave measured noise levels during FLT loading operations. The measured noise levels are not identified as tonal based on BS4142 Annex C 'Objective method for assessing the audibility of tone in sound: One-Third Octave Method'.

Figure B7: 1/3 Octave Plot of Measured Leq During FLT Loading Operations

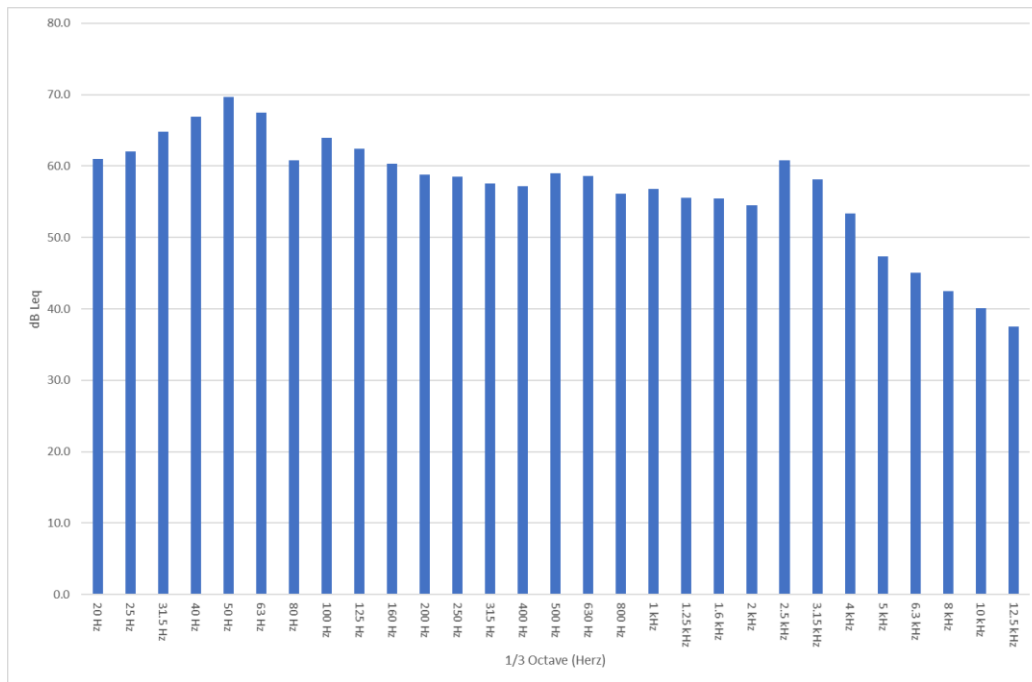
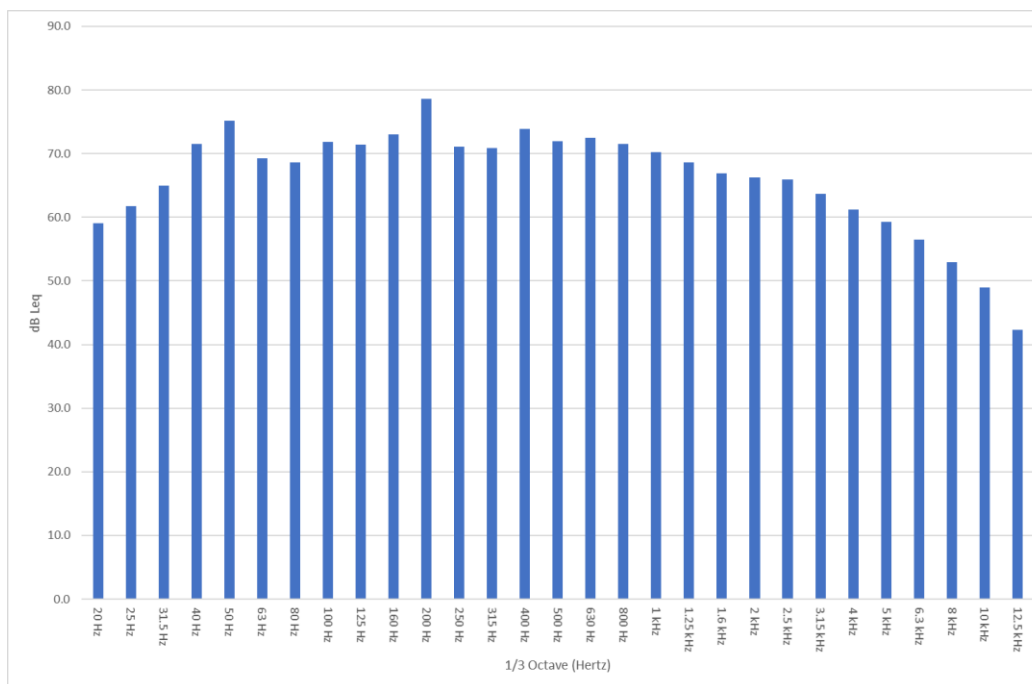


Figure B8 presents the 1/3 octave measured noise levels at 35 metres from Pea Processing Unit. The measured noise levels are not identified as tonal based on BS4142 Annex C 'Objective method for assessing the audibility of tone in sound: One-Third Octave Method'.

Figure B7: 1/3 Octave Plot of Measured Leq Pea Processing Unit (35m)



UK and Ireland Office Locations

