BT Fleet

Crossley Street
Manchester
M18 8BA

Noise Impact Assessment

On behalf of

BUSINESS SUPPORT

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For and on behalf of Noise Solutions Ltd				

Revision	Date	Description	Prepared	Reviewed/ Approved

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Executive Summary

Noise Solutions Ltd (NSL) has been commissioned by ELAS to undertake a noise impact assessment for a proposed small self-contained vehicle repair workshop (or "pod") within the existing BT Fleet facility at Crossley Street, Manchester.

The assessment shows that the proposed pod will have a negligible impact when assessed using the methodology described in BS 4142:2014 and therefore should be acceptable to the local planning authority.

1.0 Introduction

1.1. Noise Solutions Ltd (NSL) has been commissioned by ELAS to undertake a noise impact assessment for a proposed small self-contained vehicle repair workshop (or "pod") within the existing BT Fleet facility at Crossley Street, Manchester.

1.2. An environmental sound survey has been undertaken to establish the prevailing background sound pressure levels at a location representative of the sound levels outside the nearest noise sensitive receptors to the site.

1.3. Based on noise readings taken at a similar existing facility, cumulative noise emission levels for typical pod activity have been predicted at the most affected noise sensitive receptors and assessed using the method described in BS 4142:2014.

1.4. To assist with the understanding of this report a glossary of acoustic terms can be found in **Appendix A**. An in-depth glossary of acoustic terms can be viewed online at www.acoustic-glossary.co.uk.

2.0 Details of development proposals

2.1. It is proposed to install a vehicle bodywork repair facility at the BT Fleet site at Crossley Street, Manchester. Activities undertaken within the pod will include small dent and scratch repair, paint spraying / baking and sanding (using a combination of air powered grinders and hand tools).

2.2. While paint spraying is taking place, the pod is ventilated by a filtered air extract system. Fresh air intake is via small louvres on all four sides of the pod, through internal filters into two fans within the pod each discharging vertically through the roof.

2.3. During the course of repair and finishing works, the air powered palm sanders or grinders would be used in conjunction with hand sanding.

2.4. It is understood that two vehicles are repaired in a typical working day. For each vehicle, the extract fans are likely to operate for a maximum of 30 minutes while spraying takes place and are shut down while heat lamps are used to cure the paint.

2.5. The air powered grinders/sanders are likely to be used for only around 30 minutes in total per repair.

2.6. While the extract fans and air tools are shut off, there are no specific noise sources other than hand sanding and finishing, administrative tasks etc. associated with the pod.

2.7. Photographs of a typical pod facility are shown in **Appendix D**.

3.0 Nearest noise sensitive receptors

3.1. The area surrounding the site contains a mixture of commercial and residential property. There are other industrial units to the north east, beyond the rail line running along the eastern boundary of the site, and brownfield land to the south. There are residential areas to the north and west. The Monastery (currently an events venue) is to the north west, beyond Gorton Lane which forms the northern site boundary.

3.2. The most affected noise sensitive properties will be the new residential dwellings (Reference R1) on the opposite (west) side of Crossley Road. The fronts of these two-storey properties are around 17m from the proposed facility and may have direct line of sight.

3.3. A site plan showing the site and surrounding area, the nearest noise sensitive properties and noise monitoring location used in this assessment is presented in **Appendix B**.

4.0 Existing noise climate

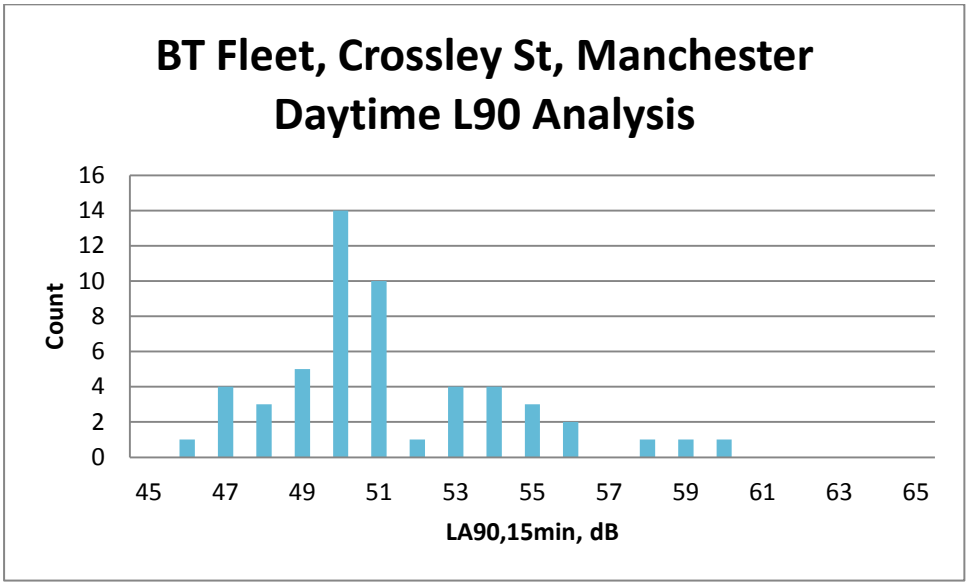
4.1. An environmental noise survey was undertaken to establish the typical background sound levels at a location representative of the noise climate outside the façades of the nearest noise sensitive receptors to the proposed plant area during the quietest times at which the plant will operate.

4.2. The results of the environmental sound survey are summarised in Table 1 below. The full set of measurement results and details of the survey methodology are presented in **Appendix C**.

Table 1 Summary of survey results

Measurement period	Range of recorded sound pressure levels (dB)			
	$L_{Aeq(15mins)}$	$L_{AFmax(15mins)}$	$L_{A10(15mins)}$	$L_{A90(15mins)}$
Daytime (07.00 – 23.00 hours)	54-87	71-101	53-92	46-68
Night-time (23.00 – 07.00 hours)	46-59	56-79	47-63	45-50

Figure 1 Histogram of daytime L_{A90} background sound pressure levels



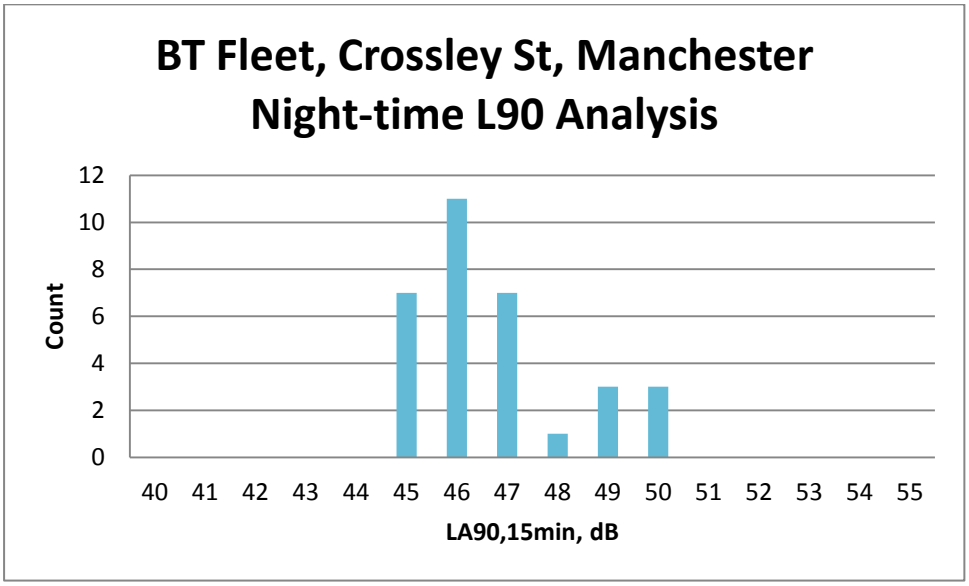
4.3. Further statistical analysis has been carried out on the data, and the mean and median values are shown in Table 2 below.

Table 2 Statistical analysis of $L_{A90,15min}$ levels during the daytime period

dB, L_{A90} daytime period	
mean	51
modal	50
median	51

4.4. It is noted that the early morning measurements may have been affected by local site works. As such, with reference to the time history graph in **Appendix C** a level of 49dB has been selected as a robust representation of the background noise level during the daytime period.

Figure 2 Histogram of night-time L_{A90} background sound pressure levels



4.5. Further statistical analysis has been carried out on the data and the mean and median values are shown in Table 3 below.

Table 3 Statistical analysis of $L_{A90,15min}$ levels during the night-time period

dB, L_{A90} night-time period	
mean	47
modal	46
median	46

4.6. Again from the histogram analysis, 46dB has been chosen to be representative of the background sound level during the night-time period.

4.7. Therefore, the following values are considered representative of the existing background sound pressure levels at nearby noise sensitive premises:

- 49dB L_{A90} during the daytime period; and
- 46dB L_{A90} during the night-time period.

5.0 Acoustic standards and guidance

BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings

5.1. This Standard provides recommended guideline values for internal noise levels within dwellings which are similar in scope to the guideline values contained within the World Health Organisation (WHO) document, Guidelines for Community Noise (1999). These guideline noise levels are shown in Table 4, below.

Table 4 BS 8233 Desirable Internal Ambient Noise Levels for Dwellings

Activity	Location	07:00 to 23:00 hours	23:00 to 07:00 hours
Resting	Living room	35 dB $L_{Aeq,16h}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16h}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16h}$	30 dB $L_{Aeq,8h}$

5.2. BS 8233:2014 advises that: "regular individual noise events…can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$ depending on the character and number of events per night. Sporadic noise events could require separate values."

Guidelines for Community Noise, 1999 World Health Organisation, (WHO)

5.3. The (WHO) 1999 Guidelines for Community Noise also sets out guidance on suitable internal and external noise levels in and around residential properties. The following internal noise levels are recommended by the WHO in Table 4.1 (of the WHO document):

- 35 dB $L_{Aeq,T}$ in living rooms over a 16 hour day; and
- 30 dB $L_{Aeq,T}$ in bedrooms during the 8 hour night.

5.4. With respect to the night-time maximum noise levels, the WHO guidelines in Section 3.4 state:

"For a 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."

5.5. The guidelines refer to community noise (also called environmental noise), residential noise or domestic noise. WHO states that this noise encompasses all sources except noise at the industrial workplace. Main sources of community noise include road, rail and air traffic, industries, construction and public work, and the neighbourhood. The main indoor sources of noise are ventilation systems, office machines, home appliances and neighbours. Typical neighbourhood noise comes from premises and installations related to the catering trade (restaurant, cafeterias, discotheques, etc.); from live or recorded music; sport events including motor sports; playgrounds; car parks; and domestic animals such as barking dogs.

World Health Organisation (WHO) 2009

5.6. The introduction of the Directive on Environmental Noise obliges Member States to assess and manage noise levels. With the support of the European Commission, the WHO Regional Office for Europe has developed night noise guidelines for Europe to help Member States develop legislation to control noise exposure.

5.7. The guidelines are based on scientific evidence on the effects of noise and the thresholds above which these effects appear to harm human health.

5.8. There is limited evidence that night noise is related to hypertension, heart attacks, depression, changes in hormone levels, fatigue and accidents.

5.9. The WHO report summarises the threshold levels of night noise above which a negative effect starts to occur or above which the impact becomes dependent on the level of exposure. For example, the threshold level for waking in the night and/or too early in the morning was 42 dB.

5.10. It also establishes that there are differences in the intensity and frequency of noise depending on the source, which lead to different impacts. Road traffic is characterised by low levels of noise per event, but as there are a high number of events, on average it has a greater effect on awakenings than air traffic, which has high levels of noise per event but fewer events.

5.11. Integrating these findings, the report proposed a guideline target limit of outdoor night noise of 40 dB (annual average defined as 'L_{night}' in the Environmental Noise Directive). There is not sufficient evidence that the biological effects observed below this level are harmful to health but adverse effects are observed above 40dB.

BS 4142:2014 Methods for rating and assessing industrial and commercial sound

5.12. British Standard (BS) 4142:2014 describes a method for rating and assessing sound of an industrial or commercial nature, which includes:

- 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 or ship movements on or around an industrial and/or commercial site.

5.13. The industrial or commercial sound is assessed outside a dwelling or premises used for residential purposes, upon which sound is incident.

5.14. The procedure contained in BS 4142 is to quantify the "specific sound level", which is the measured or predicted level of sound from the source in question over a one hour period for

the daytime and a 15 minute period for the night-time. Daytime is defined in the standard as 07:00 to 23:00 hours, and night-time as 23:00 to 07:00 hours.

5.15. The specific sound level is converted to a rating level by adding penalties on a sliding scale to account for either potentially tonal or impulsive elements. The standard sets out objective methods for determining the presence of tones or impulsive elements, but notes that it is acceptable to subjectively determine these effects.

5.16. The penalty for tonal elements is between 0dB and 6dB, and the standard notes: *"Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible."*

5.17. The penalty for impulsive elements is between 0dB and 9dB, and the standard notes: *"Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible."*

5.18. The background sound level should be established in terms of the L_{A90} noise index. The standard states that the background sound level should be measured over a period of sufficient length to obtain a representative value. This should not normally be less than 15- minute intervals. The standard states that: *"A representative level ought to account for the range of background sound levels and ought not automatically to be assumed to be either the minimum or modal value."*

5.19. The assessment outcome results from a comparison of the rating level with the background sound level. The standard states:

a) Typically, the greater this difference, the greater the magnitude of the impact.

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

c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.

d) 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.

Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact."

5.20. The standard goes on to note that: "*Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night."*

5.21. In addition to the margin by which the Rating Level of the specific sound source exceeds the Background Sound Level, the 2014 edition places emphasis upon an appreciation of the context, as follows:

"An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context."

5.22. BS 4142:2014 requires uncertainties in the assessment to be considered, and where the uncertainty is likely to affect the outcome of the assessment, steps should be taken to reduce the uncertainty.

6.0 Pod noise impact assessment

Sound pressure levels of activities associated with pod activity

6.1. The sound pressure levels associated with the pod were established by measurement of an existing facility already in operation. The measurements included all noise-producing aspects of the operation of the pod, including operation of the extract fan systems and the air-powered grinding/sanding tools.

6.2. The sound pressure levels were normalised to a distance of 5m from the pod for ease of calculation. Typical L_{Amax} levels were also established.

6.3. All tools are used only internally within the pod and all doors are kept closed when in operation.

6.4. It should be noted that, although audible, the air powered tools did not elevate the background noise level at 5m externally when in use. As such, it can be determined that the overall noise level from the tools is no louder than a level 10dB below the prevailing background noise level (which at the time of the survey was 53dB L_{A90}). The worst-case noise level of 43dB(A) is therefore used for these tools, although the true level is likely to be lower.

6.5. Table 5, below, details typical source noise levels used within the assessment, with the data presented in terms of average (L_{Aeq}) and maximum individual noise event levels (L_{AFmax}).

Table 5 Reference noise data for pod activities (at 5m)

Noise Source	L_{Aeq}, dB	L_{Afmax}, dB
Extract fan	61	66
Air sander (D.A.)	43*	56
Handheld palm grinder	43*	61

**Worst case, true level likely to be lower*

Predicted impact

6.6. The information contained in Table 5 was used to 'build-up' a source noise level based on the number of activity events over the required assessment period using the following equation:

6.7. $L_{Aeq,T} = L_{Aeq} + 10.\log\left(\frac{on\ time}{T}\right)$ (Equation 1)

Where:
L_{Aeq} is the noise level while the source is in operation;
on time is the time that the source is in use during the assessment period;
T is the reference time period in seconds; and

6.8. Although the proposed pod location is yet to be confirmed, the closest boundary of the BT Fleet site to the receptors is around 17m away. This minimum distance will therefore be used in the assessment. Also to ensure a robust assessment, it is assumed that there will be full line of sight of the pod from the houses.

6.9. Table 6 presents the calculated cumulative L_{Aeq} and 'maximum' L_{Amax} noise levels at the receptor.

Table 6 Predicted pod noise levels

Period	Receptor	Predicted noise levels at upper window of most affected residential dwelling	
		$L_{Aeq,T}$, dB	Range of L_{Afmax} (dB)
Daytime	R1	47 $L_{Aeq,1hr}$	46-55
Night-time		n/a	n/a

BS 4142:2014 operational noise assessment

6.10. Table 7 below presents the assessment of the likely impact during the daytime period in accordance with the BS 4142:2014 methodology at receptor R1:

Table 7 R1 Assessment of predicted external operational noise levels using BS 4142:2014 during the daytime

Results		Relevant Clauses of BS4142:2014	Commentary
Background Sound level	L_{A90} = 49dB	8.1, 8.2	Representative typical background sound level determined from a range of measurements
Assessment made during the daytime, so the reference interval is one hour		7.2	
Specific Sound Level	$L_{Aeq,T}$ = 47dB	7.3.6	Calculations presented in Appendix D
Acoustic Feature Correction	4dB	9.2	Tonality of some tools could be perceptible
Rating Level	(47+4) dB =51dB		
Excess of Rating Level over background sound level	(51-49) dB = +2dB		
Assessment of impact: Low impact (depending on context)		11	

BS 8233:2014 and WHO pod noise assessment

6.11. A BS 4142:2014 assessment considers only external noise levels at the location of sensitive receptors and does not consider the attenuation offered by the building envelope.

L_{Amax} assessment

6.12. The predicted L_{Amax} levels resulting from operational activities within the pod at the residential windows are lower compared than the measured daytime and night-time levels during the course of the environmental noise survey. Therefore, the anticipated L_{Amax} levels resulting from pod activities would be of negligible significance. It is noted that BS 8233:2014 gives no specific daytime guidance on the impact of L_{Amax} levels, which are predominantly associated with sleep disturbance.

External amenity

6.13. BS 8233:2014 gives the following guidance for external areas:

> *For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city*

centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.

6.14. From Section 6.9, the worst-case one-hour L_{Aeq} resulting at the closest residential window from pod activity is 47dB(A). Assuming two vehicle repairs per day, there will be two similar worst-case hours. It is noted that each hypothetical worst-case hour contains the noisiest operations during a typical repair which are more realistically to be spread out throughout the day. For the purposes of establishing a representative 16-hour L_{Aeq}, the two hours can be considered to dominate the daily noise climate. The 16-hour average level can therefore be determined by:

$$L_{Aeq,16hour} = worst\ case\ hour\ dB(A) + 10.\log(number\ of\ repairs\ per\ day) + 10.log(\frac{1}{16})$$

(Equation 2)

6.15. Based on two repairs during the daytime period, the $L_{Aeq,16hr}$ at the front of the houses would be 38dB(A), comfortably within the guidance level of 50dB(A). Furthermore, assuming partially open windows for natural ventilation, this will result in pod noise levels of around 23dB(A) internally within the nearest residential properties. This comfortably below the guidance provided in BS 8233:2014 for internal noise levels within residential properties.

6.16. It must also be noted that the receptors outlined above front onto Crossley Street. The main external gardens of these properties are to the rear of the houses, such that significant screening is provided to the pod and the level in the gardens will be considerably lower.

7.0 Discussion

BS4142: 2014 Context and uncertainties

7.1. As the standard advises, the estimated impact must be considered within the context of the site and the surrounding acoustic environment. The following must, therefore, also be taken into consideration when determining the potential impact that may be experienced:

- The proposed location of the pod is within an existing industrial area and, as such, the proposed use is in keeping with current activities and does not represent a new type of noise source.
- The assessment is undertaken at a single residential window. The impact on all other residential windows will be lower due to distance losses and noise screening provided by the intervening industrial buildings.

- The worst-case hypothetical hours have been assessed. The noise impact will be lower at all other times and the loudest period may be quieter than assumed.

7.2. Where possible uncertainty in this assessment has been minimised by taking the following steps:

- The measurement of the background sound levels was undertaken over a period including the quietest times of the day and night.
- The sound level meter and calibrator used have a traceable laboratory calibration and the meter was field calibrated before and after the measurements.
- Uncertainty in the calculated impact has been reduced by the use of a well-established calculation method.
- Care was taken to ensure that the measurement position was representative of the noise climate outside the nearby residential dwellings and not at a position where higher noise levels are present.

8.0 Summary

8.1. Noise Solutions Ltd has been commissioned by ELAS to undertake an environmental background noise survey at the site of a proposed vehicle bodywork repair facility at the BT Fleet site on Crossley Street, Manchester.

8.2. An environmental noise survey has been undertaken to establish the existing prevailing noise levels at locations representative of the noise climate outside the nearest noise sensitive receptors to the proposed plant area and the results are presented within this report.

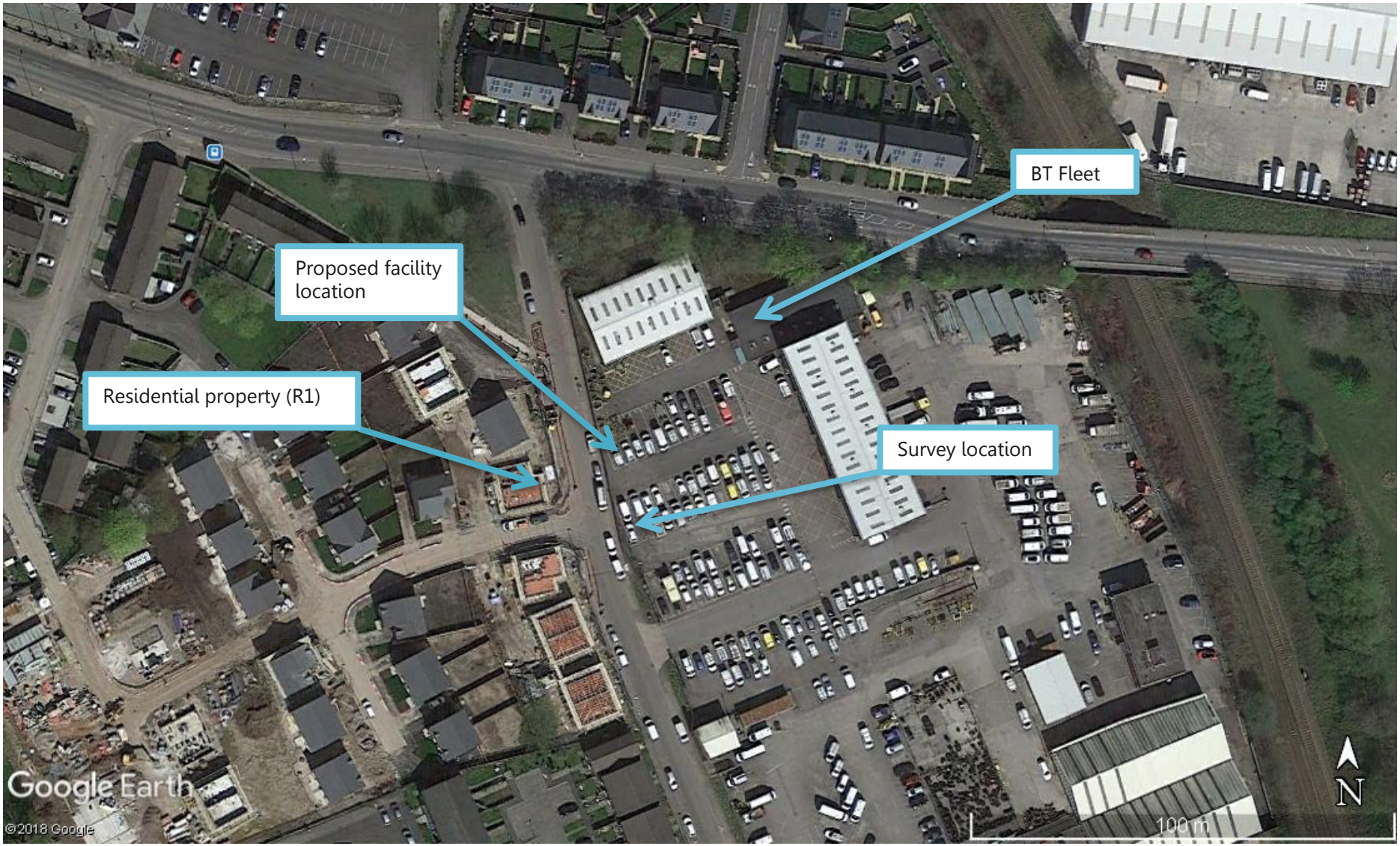
8.3. The results of the survey were used to undertake an assessment of the likely noise impact from pod activity. For the purposes of the assessment, the methodology used in BS 4142:2014 was utilised.

8.4. The proposed installation is of 'low impact' assessed as per BS 4142:2014 and there will be negligible impact at the residences.

Appendix A Acoustic terminology

Parameter	Description
Ambient Noise Level	The totally encompassing sound in a given situation at a given time, usually composed of a sound from many sources both distant and near ($L_{Aeq,T}$).
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s1 and s2 is given by 20 log10 (s1/s2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20μPa. The threshold of normal hearing is in the region of 0 dB and 140 dB is the threshold of pain. A change of 1 dB is only perceptible under controlled conditions.
dB(A), L_{Ax}	Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness. A change of 3 dB(A) is the minimum perceptible under normal conditions, and a change of 10 dB(A) corresponds roughly to halving or doubling the loudness of a sound. The background noise in a living room may be about 30 dB(A); normal conversation about 60 dB(A) at 1 metre; heavy road traffic about 80 dB(A) at 10 metres; the level near a pneumatic drill about 100 dB(A).
Fast Time Weighting	Setting on sound level meter, denoted by a subscript F, that determines the speed at which the instrument responds to changes in the amplitude of any measured signal. The fast time weighting can lead to higher values than the slow time weighting when rapidly changing signals are measured. The average time constant for the fast response setting is 0.125 (1/8) seconds.
Free-field	Sound pressure level measured outside, far away from reflecting surfaces (except the ground), usually taken to mean at least 3.5 metres
Façade	Sound pressure level measured at a distance of 1 metre in front of a large sound reflecting object such as a building façade.
$L_{Aeq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,T}$	A noise level index defined as the maximum noise level recorded during a noise event with a period T. L_{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall Leq noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{10,T}$	A noise level index. The noise level exceeded for 10% of the time over the period T. L_{10} can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise. $L_{A10,18h}$ is the A –weighted arithmetic average of the 18 hourly $L_{A10,1h}$ values from 06:00-24:00.
$L_{90,T}$	A noise level index. The noise level that is exceeded for 90% of the measurement time interval, T. It gives an indication of the lower levels of fluctuating noise. It is often used to describe the background noise level and can be considered to be the "average minimum" noise level and is a term used to describe the level to which non-specific noise falls during quiet spells, when there is lull in passing traffic for example

Appendix B Aerial photograph of site showing areas of interest



Appendix C Environmental sound survey

Details of sound surveys

C.1 Measurements of the existing background sound levels were undertaken between 15.30 hours on Tuesday 23rd April and 13.15 hours on Wednesday 24th April 2019.

C.2 The sound level meter was programmed to record the A-weighted L_{eq}, L_{90}, L_{10} and L_{max} noise indices for consecutive 15-minute sample periods for the duration of the noise survey.

Measurement position

C.3 The representative measurement position was located on a lamppost on the BT Fleet site, close to the boundary closest to the houses on Crossley Street (location indicated on the site plan in **Appendix B**).

C.4 In accordance with BS 7445-2:1991 *'Description and measurement of environmental noise – Part 2: Guide to the acquisition of data pertinent to land use'*, the measurements were undertaken under free-field conditions.

Equipment

C.5 Details of the equipment used during the survey are provided in the table below. The sound level meter was calibrated before and after the survey; no significant change (+/-0.2 dB) in the calibration level was noted.

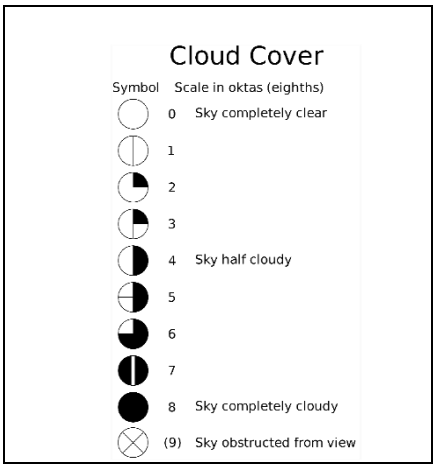
Environmental noise survey

Description	Model / serial no.	Calibration date	Calibration certificate no.
Class 1 Sound level meter	Rion NL-52 / 00876023	02/04/2019	TCRT19/1237
Condenser microphone	Rion UC-59 /14826		
Preamplifier	Rion NH-25 / 87474		
Calibrator	Rion NC-74 /34535932	09/10/2017	1657

Weather conditions

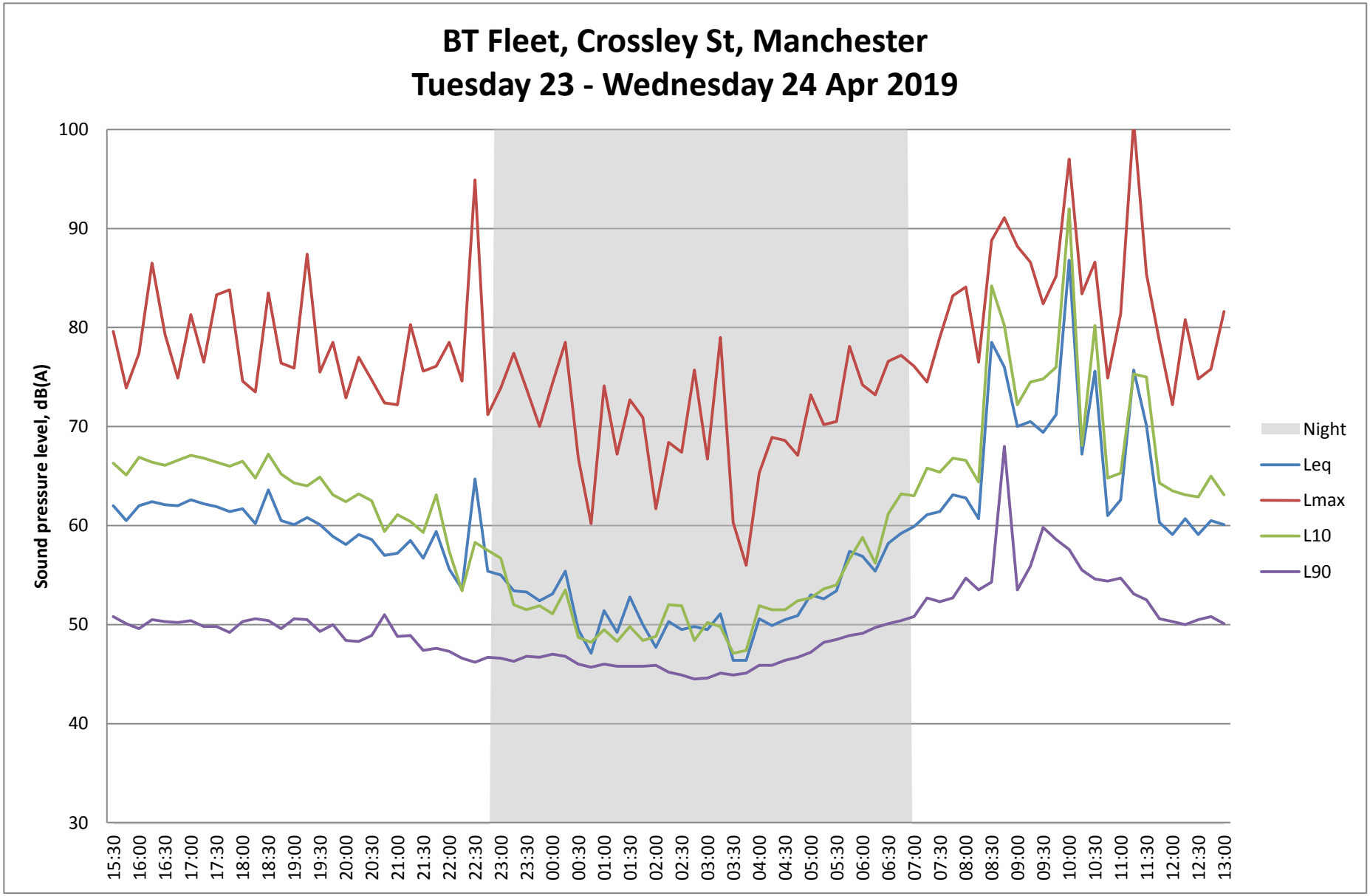
C.6 Weather conditions were determined both at the start and on completion of the survey. It is considered that the meteorological conditions were appropriate for environmental noise measurements. The table below presents the weather conditions recorded on site at the

beginning and end of the survey.

Weather conditions				
Measurement Location	**Date/Time**	**Description**	**Beginning of Survey**	**End of Survey**
As indicated on Appendix B	15.30 23/4/19 – 13.15 24/4/19	Temperature (°C)	19	17
		Precipitation:	No	No
		Cloud cover (oktas - see guide)	6	6
		Presence of fog/snow/ice	No	No
		Presence of damp roads/wet ground	No	No
		Wind Speed (m/s)	2	3
		Wind Direction	SE	SE
		Conditions that may cause temperature inversion (i.e. calm nights with no cloud)	No	No

Results

C.7 The results of the environmental survey are considered to be representative of the background sound pressure levels at the façades of the nearest noise sensitive receptors during the quietest times at which the plant will operate. The noise climate during the survey period was dominated by distant (and intermittent local) road traffic, with a contribution from aircraft and the BT site. On collection of the equipment, there was local site work ongoing to drains. The results of the survey are presented in a time history graph overleaf.


BT Fleet, Crossley St, Manchester
Tuesday 23 - Wednesday 24 Apr 2019
Sound pressure level, dB(A)
100
90
80
70
60
50
40
30
15:30
16:00
16:30
17:00
17:30
18:00
18:30
19:00
19:30
20:00
20:30
21:00
21:30
22:00
22:30
23:00
23:30
00:00
00:30
01:00
01:30
02:00
02:30
03:00
03:30
04:00
04:30
05:00
05:30
06:00
06:30
07:00
07:30
08:00
08:30
09:00
09:30
10:00
10:30
11:00
11:30
12:00
12:30
13:00
Night
Leq
Lmax
L10
L90

Appendix D Photographs of typical pod






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Appendix E Pod noise impact calculations

R1 Crossley Street to west – Daytime worst case hour

Activity	Measured noise levels		Distance correction		On-time correction		Screening correction (dB)	Resultant L_{Aeq} at receptor (dB)	Resultant L_{Amax} at receptor (dB)
	L_{Aeq} @ 5m	L_{Amax} @5m	Distance to receptor(m)	Correction (dB)	Usage in worst-case hour (mins)	Correction (dB)			
Extract fan	60.8	66.0	17	-10.6	30.0	-3.0	0.0	47.1	55.4
Air grinder (D.A.)	43.0	56.3	17	-10.6	15.0	-6.0	0.0	26.3	45.7
Handheld palm grinder	43.0	61.1	17	-10.6	15.0	-6.0	0.0	26.3	50.5
						Cumulative $L_{Aeq\ 1\ hr}$		47	
						Range of L_{Amax}			46 - 55

R1 Crossley Street to west – Daytime 16-hour L_{Aeq}

Activity	Measured noise levels		Distance correction		On-time correction		Screening correction (dB)	Resultant L_{Aeq} at receptor (dB)	Resultant L_{Amax} at receptor (dB)
	L_{Aeq} @ 5m	L_{Amax} @5m	Distance to receptor(m)	Correction (dB)	Usage during day (mins)	Correction (dB)			
Extract fan	60.8	66.0	17.0	-10.6	60.0	-12.0	0.0	38.1	55.4
Air grinder (D.A.)	43.0	56.3	17.0	-10.6	30.0	-15.1	0.0	17.3	45.7
Handheld palm grinder	43.0	61.1	17.0	-10.6	30.0	-15.1	0.0	17.3	50.5
						Cumulative $L_{Aeq,16hr}$		38	
						Range of L_{Amax}			46 - 55