

SHARPS REDMORE

ACOUSTIC CONSULTANTS ▪ Established 1990



Report

**KFC, 731 Altringham Road,
Baguley, Manchester,
M23 9TJ**

Assessment of noise from
fixed plant equipment to
seek discharge of planning
condition 7 of planning
permission 132835/FO/2022

Prepared by

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Date 13th December 2024

Project No: 2120813/R02

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DISCLAIMER

This report has been prepared with all reasonable skill, care and diligence commensurate with an acoustic consultancy practice under the terms and brief agreed with our client at that time. Sharps Redmore provides no duty or responsibility whatsoever to any third party who relies upon its content, recommendations or conclusions.

1.0 Introduction

- 1.1 Sharps Redmore (SR) has been instructed to undertake a noise assessment to seek the discharge of planning condition 7 of planning permission 132835/FO/2022 relating to noise from fixed plant equipment at the KFC, Altringham Road, Baguley. Planning condition 7 is in two parts, part a) is for compliance, whilst part b) is a pre-commencement condition to be discharge. It states:

“7) a) All externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with the Noise Impact Assessment (Sharps Redmore, ref. 2120813), stamped as received on 3 February 2022.

b) Prior to the operational phase of the development hereby approved, a verification report shall be submitted to and approved in writing by the City Council as local planning authority to validate that the work undertaken throughout the development conforms to the recommendations and requirements of the approved impact assessment. The report shall also undertake post completion testing to confirm that the noise criteria have been met. Any instances of non-conformity with the recommendations in the report shall be detailed along with any measures required to ensure compliance with the agreed noise criteria.

Reason - To minimise the impact of the development and to prevent a general increase in pre-existing background noise levels around the site, pursuant to Policy DM1 in the Manchester Core Strategy and saved UDP Policy DC26”.

- 1.2 The noise level requirements of planning condition 7, are discussed in section 2 of this report, with reference to the SR noise assessment report, reference 2120813 dated 28th January 2022 (with the same report being date stamped by Manchester City Council (MCC) on 3rd February 2022). The SR January 2022 noise report is reproduced at Appendix A.
- 1.3 Section 3 of this report details the findings of a commissioning noise survey at the KFC Altringham Road, Baguley.
- 1.4 The assessment conclusions are contained in section 4 of this report.

2.0 Noise level requirements of planning condition 7

2.1 Planning condition 7 states:

“7) a) All externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with the Noise Impact Assessment (Sharps Redmore, ref. 2120813), stamped as received on 3 February 2022.

b) Prior to the operational phase of the development hereby approved, a verification report shall be submitted to and approved in writing by the City Council as local planning authority to validate that the work undertaken throughout the development conforms to the recommendations and requirements of the approved impact assessment. The report shall also undertake post completion testing to confirm that the noise criteria have been met. Any instances of non-conformity with the recommendations in the report shall be detailed along with any measures required to ensure compliance with the agreed noise criteria.

Reason - To minimise the impact of the development and to prevent a general increase in pre-existing background noise levels around the site, pursuant to Policy DM1 in the Manchester Core Strategy and saved UDP Policy DC26”.

2.2 The planning application for the KFC unit was accompanied by a SR noise assessment report, reference 2120813 dated 28th January 2022, reproduced at Appendix A to this report.

2.3 Section 3 of the January 2022 noise assessment report contains details of a baseline noise survey undertaken at the site in August 2021, which identified typical daytime background noise levels of 42 dB L_{A90} and 28 dB L_{A90} at night. These are the noise criteria adopted by planning condition 7b.

3.0 Commissioning noise survey details

- 3.1 A commissioning noise survey was undertaken between Tuesday 10th and Wednesday 11th December 2024 at the new KFC unit, to seek to measure noise from the operational fixed plant equipment.
- 3.2 Attended noise measurements were taken at two principle locations, firstly close to the KFC unit, and secondly within the closest residential estate to the west of the KFC at Sandy Lane/Churchstoke Walk. The noise measurement positions are indicated in the plan at Figure 1 below. Plant source noise levels were measured at 1 metre, 3 metres and 5 metres from the KFC unit plant area, to the south (s) and west (w) of the KFC unit. The receptor noise levels were measured (location B) adjacent to Sandy Lane (in the same location as the 2021 baseline survey). All measurements were taken approximately 1.5 metres above local ground level in predominantly free field conditions.

FIGURE 1: Commissioning survey, noise measurement locations



- 3.3 The noise measurements were carried out using a Norsonic 140 sound level meter. The sound level meter was calibrated at the start and end of each set of measurements and no variation in levels were observed (calibration certificates are available on request). Noise measurements at location B were taken over 15-minute sample periods. The sound level measurements at location B of the new plant equipment were typically 30 seconds in duration.
- 3.4 Weather conditions were dry and partly cloudy, with temperatures of around 2°C; winds were light (<5m/s) and predominantly from the north east. Weather conditions are not considered to have affected the noise measurements.

- 3.5 At location A (to both the south and west), only at a distance of 1 metre from the KFC plant area was the plant just perceptible, at 3 and 5 metres KFC plant noise was not perceptible. At location B no plant noise was perceptible, only local and distant road traffic sources.
- 3.6 The results of the attended plant noise commissioning survey are displayed at Table 1 below:

TABLE 1: Commissioning noise survey results

Location	Date	Measured noise levels				Comments
		Time	L _{A90}	L _{Aeq T}	L _{Amin}	
A1(s)	10.12.24	22:05	47.8	49.3	46.9	1m from KFC bin store, plant just perceptible (south of unit, towards Tesco PFS)
A3(s)		22:06	48.4	49.8	47.3	3m from KFC bin store, plant not perceptible (south of unit, towards Tesco PFS)
A5(s)		22:07	49.4	53.4	48.5	5m from KFC bin store, plant not perceptible (south of unit, towards Tesco PFS)
A1(w)		22:08	50.8	54.7	49.4	1m from KFC bin store, plant just perceptible (west of unit, towards Churchstoke Walk)
A3(w)		22:09	54.3	58.6	52.6	3m from KFC bin store, plant not perceptible (west of unit, towards Churchstoke Walk)
A5(w)		22:10	48.8	51.4	47.4	5m from KFC bin store, plant not perceptible (west of unit, towards Churchstoke Walk)
B		22:20	43.3	48.6	40.9	Off Sandy Lane (Churchstoke Walk), local and distant RTN, no plant audible
		22:35	40.7	48.0	38.2	Off Sandy Lane (Churchstoke Walk), local and distant RTN, no plant audible
		22:50	38.9	44.5	37.3	Off Sandy Lane (Churchstoke Walk), local and distant RTN, no plant audible
A1(s)	11.12.24	02:02	40.8	41.6	40.0	1m from KFC bin store, plant just perceptible (south of unit, towards Tesco PFS)
A3(s)		02:03	41.5	43.4	40.8	3m from KFC bin store, plant not perceptible (south of unit, towards Tesco PFS)
A5(s)		02:04	42.6	43.7	41.6	5m from KFC bin store, plant not perceptible (south of unit, towards Tesco PFS)
A1(w)		02:05	43.1	44.0	42.3	1m from KFC bin store, plant just perceptible (west of unit, towards Churchstoke Walk)
A3(w)		02:06	41.3	41.8	40.8	3m from KFC bin store, plant not perceptible (west of unit, towards Churchstoke Walk)
A5(w)		02:07	40.1	41.1	38.1	5m from KFC bin store, plant not perceptible (west of unit, towards Churchstoke Walk)
B		02:15	33.6	35.5	32.2	Off Sandy Lane (Churchstoke Walk), local and distant RTN, no plant audible
		02:30	31.8	34.6	30.9	Off Sandy Lane (Churchstoke Walk), local and distant RTN, no plant audible
		02:45	31.1	34.3	30.4	Off Sandy Lane (Churchstoke Walk), local and distant RTN, no plant audible

- 3.7 As noted previously and within the 'comments' column of Table 1 above, only at a distance of 1 metre from the KFC plant area was noise from the plant just perceptible. It follows therefore that if KFC plant noise was not perceptible at 3 and 5 metres, then it would not be affecting the noise climate in any way in Churchstoke Walk or Sandy Lane over 120 metres away to the west.
- 3.8 The highlighted cells within Table 1 above are the measured (daytime and night time) ambient noise levels at the KFC unit at 1 metre, and then at 5 metres. These can be used to calculate the level of KFC plant noise at the closest properties in Sandy Lane/Churchstoke Walk.
- 3.9 The measured daytime background noise level at position A1(w) was undertaken with all KFC plant operating (kitchen ventilation fans and refrigeration plant, since the KFC was trading at this time). Whilst the measured night time background noise level at position A1(w) was undertaken with only the refrigeration plant running, since the KFC was closed at this time.

TABLE 2: Determination of KFC plant noise levels via direct source measurements

Results	Evening period	Night time period
	Sound level dB	
Measured ambient noise level at 1m from KFC	54.7 dB $L_{Aeq T}$	44 dB $L_{Aeq T}$
Residual sound level (at 5m, no KFC plant audible)	51.5 dB $L_{Aeq T}$	41.1 dB $L_{Aeq T}$
Specific level KFC plant only at 1 metre	51.9 dB $L_{Aeq T}$	40.8 dB $L_{Aeq T}$
Acoustic feature correction	0 dB	0 dB
Rating level	51.9 + 0 dB	40.8 + 0 dB
Distance attenuation $20 \cdot \log(1/122)$	-41.7 dB	-41.7
Rating plant noise level at Churchstoke Walk, based on measured plant noise levels	10 dB	0 dB
Comparison with 2022 predicted plant rating noise level at Churchstoke Walk	21 dB	8 dB
Measured 2021 background noise level criteria required by planning condition 7b	42 dB	28 dB
Comply	YES	YES

- 3.10 The calculated KFC plant rating noise levels at Churchstoke Walk are substantially below the criteria secured by planning condition 7b.
- 3.11 Whilst the 2021 baseline noise survey established typical background noise levels of 42 dB L_{A90} daytime and 28 dB L_{A90} at night at Sandy Lane/Churchstoke Walk, the recent December 2024 noise survey measured 39 dB L_{A90} during the late evening (daytime) period and 31 dB L_{A90} at night at this location. Site observations indicated that plant noise was not perceptible at the Sandy Lane/Churchstoke Walk noise measurement location during either the evening (daytime) or night time periods. The August 2021 and December 2024 noise survey results demonstrate that the noise climate is materially the same, and is therefore not affected by noise from KFC plant operation.
- 3.12 It is therefore concluded that the requirements of planning condition 7b are being complied with and this planning condition may be formally discharged.

4.0 Assessment conclusions

4.1 This assessment considers noise associated with fixed plant equipment at the recently opened KFC unit at Altringham Road, Baguley, Manchester.

4.2 This report is presented to seek the discharge of planning condition 7 of planning permission 132835/FO/2022 which states:

“7) a) All externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with the Noise Impact Assessment (Sharps Redmore, ref. 2120813), stamped as received on 3 February 2022.

b) Prior to the operational phase of the development hereby approved, a verification report shall be submitted to and approved in writing by the City Council as local planning authority to validate that the work undertaken throughout the development conforms to the recommendations and requirements of the approved impact assessment. The report shall also undertake post completion testing to confirm that the noise criteria have been met. Any instances of non-conformity with the recommendations in the report shall be detailed along with any measures required to ensure compliance with the agreed noise criteria.

Reason - To minimise the impact of the development and to prevent a general increase in pre-existing background noise levels around the site, pursuant to Policy DM1 in the Manchester Core Strategy and saved UDP Policy DC26”.

4.3 This assessment objectively confirms through direct plant noise measurements that the requirements of planning condition 7b are being met.

APPENDIX A

**SR NOISE ASSESSMENT REPORT 2120813, DATED 28TH JANUARY
2022**

SHARPS REDMORE

ACOUSTIC CONSULTANTS ▪ Established 1990



Report

**Noise assessment of a
proposed KFC Drive-thru
restaurant at Tesco
Altrincham Road, Baguley,
Manchester**

Prepared by

K J Metcalfe BSc (Hons). MIOA

Date 28th January 2022

Project No: 2120813

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- C. 'NoysPlot' noise model: plant noise predictions
- D. 'Drive-thru' noise calculations
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1.0 Introduction

- 1.1 Sharps Redmore (SR) has been instructed to undertake a noise assessment of a proposed KFC restaurant with drive-through facility, at Altrincham Road, Baguley.
- 1.2 The proposed KFC site is within the existing Tesco car park and is bordered by Altrincham Road to the north, Wythenshawe Football Club to the west, with the closest residential properties in Churchstoke Walk beyond.
- 1.3 The proposal is for a KFC restaurant with a drive thru facility and associated car parking. The KFC restaurant would be located on the western side of the Tesco site, as indicated at Appendix A.
- 1.4 The objective of the assessment is to determine how noise that may be generated as a result of the proposal would affect the amenity of the closest residential properties.
- 1.5 Section 2 of this report contains a discussion of the available methods of assessment and assessment criteria.
- 1.6 Section 3 of this report sets out the findings of an environmental noise survey, undertaken at a location representative of the noise climate at the closest noise sensitive properties to the proposal site.
- 1.7 The different components of operational noise are considered in sections 4 to 6 of this report.
- 1.8 The assessment conclusions are contained in section 7 of this report.
- 1.9 A guide to the acoustic terminology used in this report is shown in Appendix E.

2.0 Assessment methodology and criteria

- 2.1 The National Planning Policy Framework (NPPF), July 2021, sets out the Government's planning policies for England and "these policies articulate the Government's vision of sustainable development." In respect of noise, Paragraph 185 of the NPPF states the following:

"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
- b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and*
- c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation".*

- 2.2 Guidance on the interpretation of the policy aims contained within the NPPF is contained within National Planning Policy Guidance (NPPG). The NPPG introduces the concept of a noise exposure hierarchy based on likely average response. The guidance contained in the NPPG is summarised in the table below:

TABLE 1: Noise Exposure Hierarchy

Response	Examples of Outcomes	Increasing Effect Level	Action
No Observed Effect Level			
Not noticeable	No Effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

2.3 The NPPF and NPPG reinforce the March 2010 DEFRA publication, “Noise Policy Statement for England” (NPSE), which states three policy aims, as follows:

“Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- *avoid significant adverse impacts on health and quality of life;*
- *mitigate and minimise adverse impacts on health and quality of life; and*
- *where possible, contribute to the improvement of health and quality of life.”*

2.4 Together, the first two aims require that no significant adverse impact should occur and that, where a noise level which falls between a level which represents the lowest observable adverse effect and a level which represents a significant observed adverse effect, then according to the explanatory notes in the statement:

“... all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life whilst also taking into consideration the guiding principles of sustainable development. This does not mean that such effects cannot occur.”

2.5 Taking an overview of national policy aims and guidance it is clear that when considering the impact of noise that the fact can be heard and causes impact, is not reason to refusal an application as consideration should also be given to the significance of the impact and the mitigation measures available.

2.6 It is possible to apply objective standards to the assessment of noise and the effect produced by the introduction of a certain noise source may be determined by several methods, as follows:

- i) The effect may be determined by reference to guideline noise values, such as those contained in the World Health Organisation (WHO) *“Guidelines for Community Noise”*.
- ii) Alternatively, the impact may be determined by considering the change in noise level that would result from the proposal, in an appropriate noise index for the characteristic of the noise in question. There are various criteria linking change in noise level to effect. This is the method that is suited to, for example, the assessment of noise from road traffic because it is capable of displaying impact to all properties adjacent to a road link irrespective of their distance from the road.
- iii) Another method is described within BS 4142:2014 to determine the significance of sound impact from sources of industrial and/or commercial nature. The sources that the newly revised standard is intended to assess are sound from industrial and manufacturing processes, sound from fixed plant installations, sound from loading and unloading of goods at industrial and/or commercial premises and the sound from mobile plant and vehicles, such as forklift, train or ship movements.

Guidelines for Community Noise

2.7 The WHO *“Community Noise Guidelines”* (CNG) values are appropriate to what are termed *“critical health effects”*. This means that the limits are at the lowest noise level that would result in any psychological or physiological effect. They are, as defined by NPSE, set at the Lowest Observed Adverse Effect Level (LOAEL), but do not define the level above which effects are significant (the SOAEL). Compliance with the LOAEL should, therefore, be seen as a robust aim.

2.8 In 2018 the WHO published the *“Environmental Noise Guidelines for the European Region”* (ENGER). The new WHO Environmental Noise Guidelines (page 28) explain that *“The*

current environmental noise guidelines for the European Region supersede the CNG from 1999. Nevertheless, the GDG (Guideline Development Group) recommends that all CNG indoor guideline values and any values not covered by the current guidelines (such as industrial noise and shopping areas) should remain valid". Hence the CNG remain relevant to this assessment.

- 2.9 The WHO ENGER brings together the latest research on the effects of specific types of noise on health in relation to transportation noise sources (road, rail and aircraft noise exposure), wind turbines and leisure noise. Hence in direct relation to the specific proposal that this noise assessment considers, the new WHO ENGER are not of material consideration.
- 2.10 The relevant World Health Organisation (CNG) noise values are summarised in the following table:

TABLE 2: WHO CNG values

Document	Level	Guidance
World Health Organisation "Community Noise 2000"	$L_{AeqT} = 55 \text{ dB}$	Serious annoyance, daytime and evening. (Continuous noise, outdoor living areas)
	$L_{AeqT} = 50 \text{ dB}$	Moderate annoyance, daytime and evening. (Continuous noise, outdoor living areas).
	$L_{AeqT} = 35 \text{ dB}$	Moderate annoyance, daytime and evening. (Continuous noise, dwellings, indoors)
	$L_{AeqT} = 30 \text{ dB}$	Sleep disturbance, night-time (indoors)
	$L_{Amax} = 60 \text{ dB}$	Sleep disturbance, windows open at night. (Noise peaks outside bedrooms, external level).
	$L_{Amax} = 45 \text{ dB}$	Sleep disturbance at night (Noise peaks inside bedrooms, internal level)

- 2.11 For L_{AeqT} criteria the time base (T) given in the documents is 16 hours for daytime limits and 8 hours for night time limits. When assessing impact, this has the tendency to smooth out the hourly variations in noise level. As such, our calculations are carried out to a 1 hour time base, which is a more stringent assessment than is given in WHO Guidelines for Community Noise.
- 2.12 The internal CNG values can be converted to an external value by the addition of the attenuation provided by a partially open window of 15 dB.

Changes in noise level

- 2.13 Changes in noise levels of less than 3 dBA are not perceptible under normal conditions and changes of 10 dBA are equivalent to a doubling of loudness. This guidance has been accepted by inspectors, at inquiry, to encompass changes in noise levels in the index L_{AeqT} .
- 2.14 Table 3 below shows the response to changes in noise (known as a semantic scale); this table has been developed from general consensus opinion of acousticians.

TABLE 3: Change in noise level

Change in noise level L_{AeqT} dB	Response	Impact
<3	Imperceptible	None
3 – 5	Perceptible	Slight/moderate
6 – 10	Up to a doubling	Moderate/significant
11 – 15	More than a doubling	Substantial
>15	-	Severe

- 2.15 Where the existing ambient noise level is already above the criteria developed from the various guidance documents, it may be considered unreasonable to adopt such criteria. It would be reasonable, however, given the above statement, to consider criteria which do not exceed the existing noise climate, thus giving rise to an overall 3 dB increase i.e. the minimum perceptible. If it is less than the minimum perceptible it cannot be described as disturbing or to affect the amenity of residents.

Assessment using BS 4142:2014

- 2.16 As outlined, this British Standard enables the significance of sound impact to be determined in relation to industrial and commercial sources. The significance of sound impact is to be determined according to the following summary process:

- i) Determine the background sound levels, in terms of the index L_{A90} , at the receptor locations of interest.
- ii) Determine the specific sound level of the source being assessed, in terms of its L_{AeqT} level ($T = 1$ hour for day or 15 minutes for night), at the receptor location of interest.
- iii) Apply a rating level acoustic feature correction if the source sound has tonal, impulsive, intermittent, or other characteristics which attract attention.
- iv) Compare the rating sound level with the background sound level; the greater the difference between the two, the higher the likelihood of adverse impact.
- v) A difference (rating – background) of around +10 dB is an indication of significant adverse impact, depending on the context; a difference of +5 dB is 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 upon context.
- vi) The intent of the planning system is to ensure that a development does not result in “significant adverse impacts on health and quality of life.” BS 4142:2014 considers that the threshold of significant adverse impact is “a difference around +10 dB or more ... depending upon the context”. However the NPPF and NPPG state that where a noise level which falls between a level which represents the lowest observable adverse effect and a level which represents a significant observed adverse effect, then according to the explanatory notes in the statement *“...all reasonable steps should be taken to mitigate and minimise adverse effects in*

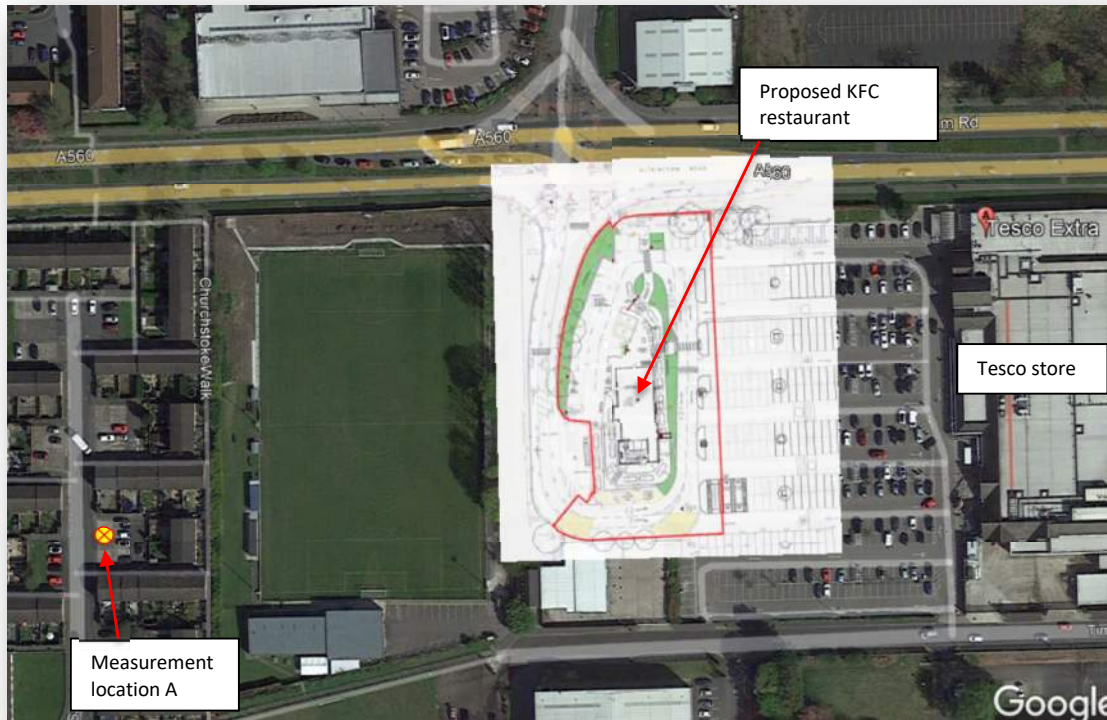
health and quality of life while together taking into account the guiding principles of sustainable development. This does not mean that adverse effects cannot occur but that effort should be focused on minimising such effects”.

- 2.17 BS 4142:2014 introduces the concept of ‘context’ to the process of identifying noise impact. Section 11 of BS 4142:2014 explains *“The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs (our emphasis). 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”* (our emphasis).
- 2.18 There are many *context* points to consider when undertaking an assessment of sound impact including:
- The absolute level of sound;
 - The character and level of the specific sound in the context of the existing noise climate; for example is the sound to occur in a location already characterised by similar activities as those proposed?
 - The sensitivity of the receptors;
 - The time and duration that the specific sound is to occur;
 - The conclusions of assessments undertaken using alternative assessment methods, for example WHO guidelines noise values or change in noise level;
- 2.19 It is therefore entirely possible that whilst the numerical outcome of a BS 4142:2014 assessment is indicative of adverse or significant adverse impact, when the proposal is considered in *context* the significance of the impact is reduced to an acceptable level.

3.0 Environmental noise survey details

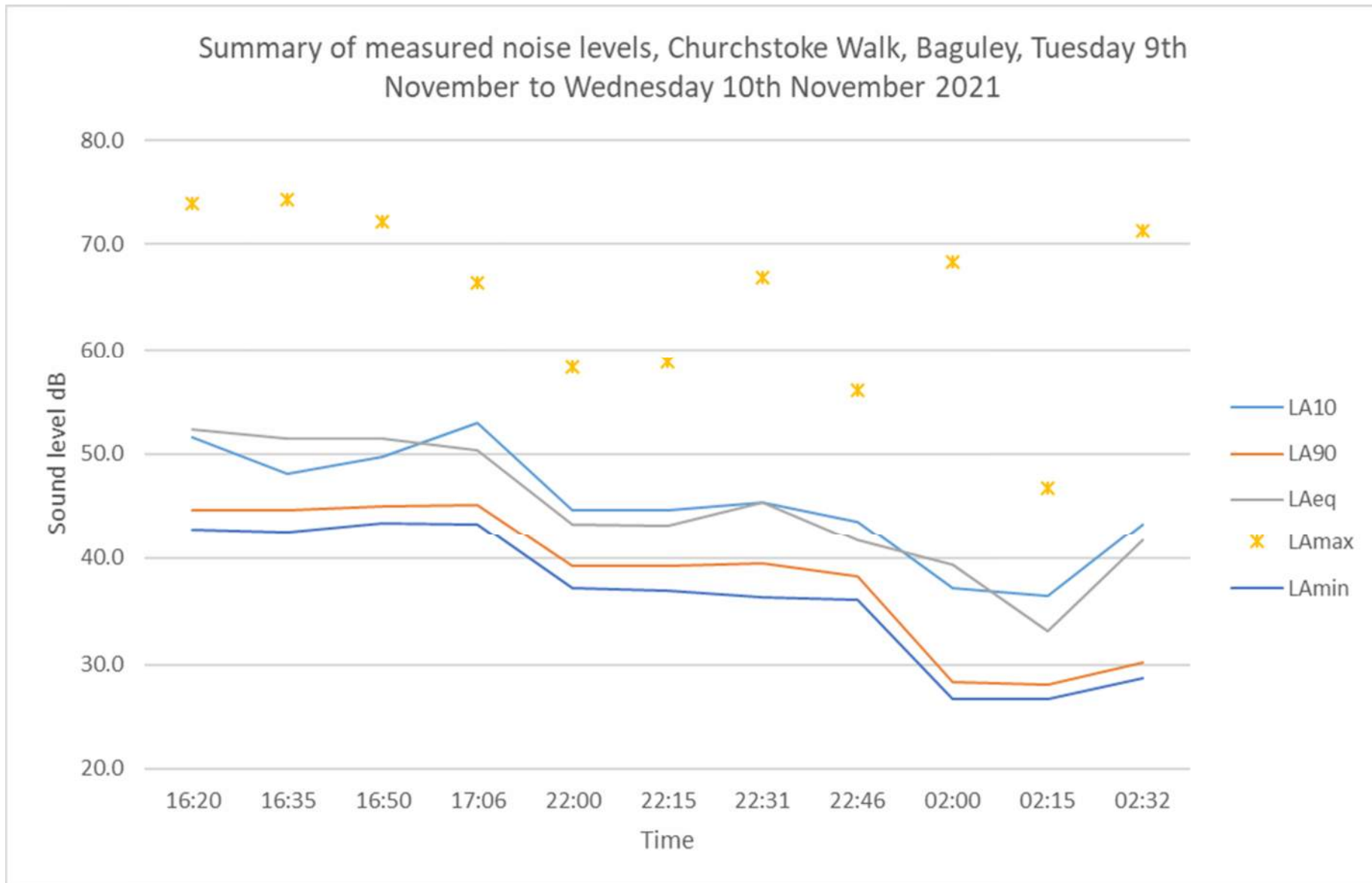
- 3.1 A attended noise survey was undertaken between the Tuesday 9th and Wednesday 10th August 2021. Sample noise measurements were taken at a single location representative of the noise climate in the vicinity of the closest residential properties to the west of the proposal site.

FIGURE 1: Noise measurement location



- 3.2 The measurements were carried using a Norsonic 118 sound level fitted with an environmental microphone kit. The sound level meter was calibrated at the start and end of the measurements and no variation in level noted.
- 3.3 The sound level meter microphone at location A was positioned approximately 2 metres above local ground level in free field conditions. Sample noise measurements were taken during the afternoon, late evening and night time periods.
- 3.4 Weather conditions during the survey were dry and overcast with temperatures of 13°C; winds were light and from the south west in direction.
- 3.5 The results of the noise survey are presented in full in Appendix B, and summarised at Figure 2.
- 3.6 The noise levels throughout the survey were dominated by road traffic sources, particularly from the A560 (Altrincham Road) to the north of the site.

FIGURE 2: Summary of measured noise levels



4.0 Assessment of noise from fixed plant equipment

- 4.1 The objective assessment of plant sound sources in commercial premises should be undertaken in accordance with British Standard 4142:2014. This Standard enables the resultant sound levels from new plant equipment to be compared against the existing typical background sound level (L_{A90}) of an area to establish the significance of the sound impact.
- 4.2 In determining suitable plant sound criteria SR have considered measured background sound levels taken during the noise survey. Figure 2 indicates typical daytime background noise levels of around 42 dB and typical night time background noise levels of around 28 dB.
- 4.3 To ensure that the amenity of local residents would not be affected, this assessment considers the robust approach that predicted plant rating noise levels should not exceed the typical measured background sound levels. The advice in BS 4142:2014 is that *"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 of having a low impact, depending on the context"* (clause 11, note 'd').
- 4.4 It is proposed to adopt the following overall plant sound limits at the nearest residential properties:

TABLE 4: Proposed plant rating sound limits

Rating level limits (dB)	
Daytime	Night time
42 dB	28 dB

- 4.5 The following planning condition is recommended to secure the above criteria:
- "No fixed plant and/or machinery shall come into operation until details of the fixed plant and machinery serving the development hereby permitted, and any mitigation measures to achieve this condition, are submitted to and approved in writing by the local planning authority. The rating level of the sound emitted from the site shall not exceed 42 dBA between 0700 and 2300 hours and 28 dBA at all other times. The sound levels shall be determined by measurement or calculation at the nearest residential premises. The measurements and assessment shall be made according to BS 4142:2014+A1:2019".*
- 4.6 The plant is to be located within an enclosed courtyard area on the southern side of the restaurant building, screened by a 3.3 metre wall. The plant would comprise of kitchen supply and extract fans, a toilet extract fan, 3x condenser units and 3x air conditioning units.

4.7 The following table contains a schedule of proposed plant equipment for the KFC.

TABLE 5: Proposed plant equipment source noise levels

Description	Octave band (Hz) sound power/ pressure levels dB L _w /dB L _p								
	L _w /L _p	63	125	250	500	1K	2K	4K	8K
Kitchen supply fan	L _w	105	101	95	85	80	76	72	69
Kitchen extract fan	L _w	58	71	54	47	48	46	39	36
Kitchen extract fan breakout	L _w	39	53	67	65	66	64	45	40
Kitchen extract fan outlet	L _w	80	89	83	81	80	76	73	73
Toilet extract fan	L _w	59	61	58	57	54	53	46	35
Condenser units CU01 & CU02	L _w	68	69	63	60	56	57	54	51
Condenser unit CU03	L _w	82	77	72	65	66	69	58	55
Air conditioning unit AC01	L _w	71	64	58	57	58	52	48	44
Air condition units AC02 & AC03	L _w	65	58	55	46	47	42	35	28

- 4.8 SR uses an environmental noise modelling software package called 'NoysPlot'. This software enables coordinates to be entered for the relative positions of noise sources, receivers and barriers to calculate a resultant noise level at a given noise receptor. The software carries out 'text book' atmospheric side calculations with regard to distance and screening attenuation by referencing relative source and receiver positions.
- 4.9 The height coordinates used in the 'NoysPlot' model have been extrapolated from the Architects elevation drawings and from site observations, and using Google Earth. The horizontal coordinates are referenced from an arbitrary 'x', 'y' position on a grid system.
- 4.10 The software considers these noise sources which are detailed in the noise source input schedule in Appendix C2. Given the screening and large distance separation no acoustic characteristic would be present at the closest residential properties.
- 4.11 NoysPlot uses operating time information to calculate noise levels for daytime and night time operation. The time period that the equipment is assumed to be operating is denoted by 'D' to indicate daytime only operation; an 'N' to denote night time usage and 'A' to indicate that the equipment runs all the time. The KFC kitchen fans would operate during the daytime, whilst the refrigeration condensers would operate all of the time.
- 4.12 NoysPlot has the capability to accept input noise data in a number of formats. Where available, the ventilation plant manufacturer's sound power level data (designated by the letter W in the L_p/L_w column of the input schedule) is used. Where the sound power level data is not available the manufacturer's un-weighted octave band sound pressure levels at

a stated distance are used (designated P but with an N in the dBA column of the schedule to indicate un-weighted). Alternatively the manufacturer's A-weighted, single figure, averaged level at the stated distance is used (designated 'P' with 'Y' in the dBA column of the schedule). For this assessment, both single figure A-weighted noise level data and unweighted sound power/pressure level data has been used.

- 4.13 The surface directivity is also assessed for all cases – this depends on the number of adjacent reflective surfaces – the number can be seen in the column headed Q in the input schedule.
- 4.14 Where outlet dimensions are known the angle of directivity is inputted relative to a northern origin. The following directivity has been used for the following noise sources.

TABLE 6: Outlet directivity factors

Plant item	Angle of directivity relative of north	Direction opening is facing
Supply Fan	180°	South
Extract Fan Outlet	360°	Vertical discharge
Toilet Extract Fan	90°	East

- 4.15 A summary of the atmospheric noise calculations for daytime and night time are displayed in Appendices C3 and C4. Calculations for each source to receiver can be made available upon request. These calculations take into account the attenuation afforded by distance, outlet reflection, angular and surface directivity and acoustic screening. The software maintains a logarithmic summation for each receiver position and ranks the individual noise sources in order of contribution to the overall noise level (highest at the top of the list). This assists with the identification of those noise sources requiring additional noise control.
- 4.16 The input data defining the locations of the noise sources, the receivers and screening are shown in Appendix C2. The NoysPlot noise model principally considers two noise barrier types; the barrier descriptor 'R' is used in the schedule to denote a ring type whereby only noise transmitted over the top of the barrier is considered; whilst noise barriers denoted 'F' for finite consider noise transmitted over the top and around the ends of the barrier. A ring type barrier has been used in this assessment to model the proposed KFC building and parapet screen.
- 4.17 The NoysPlot calculations (see Appendices C3 and C4) show the following resultant plant rating noise levels:

TABLE 7: Predicted plant (rating) sound levels

Noise sensitive receptor	Predicted rating sound level dB(A)	
	Daytime	Night time
24 Churchstoke Walk	21	8

- 4.18 In order to achieve the predicted noise levels in Table 7, it is proposed that attenuators are to be fitted to the atmospheric side of the kitchen supply and extract fans. The table below (and the schedule at Appendix C1.2) presents the minimum insertion loss requirements for these attenuators:

TABLE 8: Minimum insertion loss requirements

Equipment name/reference	Insertion loss – Mid frequency octave bands (Hz)							
	63	125	250	500	1K	2K	4K	8K
Kitchen supply fan	4	8	12	17	23	17	12	10
Kitchen extract fan	3	6	10	19	20	14	12	10

- 4.19 The predicted plant rating noise levels are at least 10 dB below the daytime and night time background noise climate. BS 4142:2014 explains that where the rating noise level is below the existing background noise climate this situation is indicative of low impact (depending upon context).

5.0 Noise from 'drive-thru' activity

- 5.1 SR have previously undertaken measurements of customer activity and associated noise levels from drive-thru facilities at similar sites.
- 5.2 There are principally four events associated with a customer visit to the drive thru facility. These are arrival of a customer vehicle, the ordering of the food, followed by payment and collection and the movement along the access road to depart the site. These activities do not involve occupants leaving the vehicle, with the associated door slams; so peak noise levels are generated by the acceleration of the vehicle away from the order/collection windows.
- 5.3 The layout of the site would be such that the vehicles cannot travel at speed around the drive through loops. As such, noise levels generated by drive-thru facilities are not particularly high.
- 5.4 Measurements of these four activities, taken at a reference distance of 10 metres from the centre of activity gave the following typical noise levels:

TABLE 9: Drive-thru activity source noise levels

Activity	SEL	L _{AMAX}
Arrival of vehicle	72 dBA	63 dB
Ordering	70 dBA	61 dB
Collection, Payment and departure	72 dBA	62 dB
Slow movement (20km/h) on access road	72 dBA	63 dB

- 5.5 The SEL (single event or sound exposure level) is a parameter used to denote the sound energy of an event into a standard 1-second time period. This can then be used to convert a number of events of unknown or varying duration into a L_{Aeq T} ambient noise level.
- 5.6 The nearest noise sensitive receptors to the proposed drive-thru facility are to the west; the closest being the house at 24 Churchstoke Walk.
- 5.7 Sharps Redmore has been supplied with forecasted customer arrival data for the proposed KFC 'drive-thru' facility. The predicted drive thru noise levels presented in this assessment are based on the calculated hourly drive thru flows. The data used in the assessment has been provided by Mode Transport.

- 5.8 Using the forecasted customer vehicle movements the following overall noise levels are predicted (arrival, ordering, collection and departure) at the closest noise sensitive receptor from the use of the KFC drive-thru. The full calculations are presented at Appendix D.

TABLE 10: Predicted 'drive-thru' activity noise levels

TIME	Predicted drive thru noise levels dB	
	L _{Aeq} 1 hour	L _{Amax}
05:00:00	24	48
06:00:00	32	48
07:00:00	34	48
08:00:00	35	48
09:00:00	36	48
10:00:00	37	48
11:00:00	37	48
12:00:00	40	48
13:00:00	40	48
14:00:00	39	48
15:00:00	39	48
16:00:00	39	48
17:00:00	39	48
18:00:00	40	48
19:00:00	39	48
20:00:00	38	48
21:00:00	37	48
22:00:00	36	48
23:00:00	33	48

- 5.9 The noise levels predicted to arise from 'drive thru' activity at the proposed KFC restaurant fall well within the WHO guideline values for daytime and night time noise and are well below the existing noise climate. With regard to predicted drive thru noise it is concluded that the proposed KFC unit could trade during the night time without associated noise giving rise to significant adverse impact, which is the test under the NPPF.

6.0 Noise from car parking

- 6.1 This assessment considers customer car parking activity noise in the context of guideline noise values and the existing ambient noise climate.
- 6.2 SR has previously undertaken extensive noise monitoring of car parks; at 10 metres from the boundary of a busy car park measured noise levels are 48 dB $L_{Aeq,1hr}$ (free field) have been found. During off peak trading periods, car park source noise levels can be approximately 5 dB lower.
- 6.3 The closest property to the KFC car park would be property at 24 Churchstoke Walk, approximately 110 metres from the nearest proposed parking spaces.
- 6.4 The resultant predicted car park activity noise level (during peak trading conditions) at the closest existing properties at Churchstoke Walk would be 27 dB $L_{Aeq\ 1\ hour}$ (allowing for distance attenuation of 21 dB) during peak trading hours, and 22 dB $L_{Aeq\ 1\ hour}$ during off peak times. The predicted car park noise levels are significantly below both the existing ambient noise climate and the WHO guideline noise values.
- 6.5 Peak noise levels in car parks have been attributed to car door slam events. SR have measured noise from a considerable number of car door slam events and peak noise levels can be up to 66 dB L_{Amax} (free field) at 10 metres from the vehicle.
- 6.6 Resultant peak noise levels from car parking activity would therefore be in the region of 45 dB L_{Amax} ($66 - 20\log [10/110]$).
- 6.7 Predicted customer car parking activity noise levels would comply with the WHO daytime and night guideline values. On this basis the proposed KFC restaurant could trade through the night time period on an unrestricted basis, without associated noise giving rise to significant adverse impact.

7.0 Assessment conclusions

7.1 Having undertaken this assessment against objective criteria it is concluded that noise from the operation of the proposed KFC restaurant and 'drive-thru' at Altrincham Road, Baguley would not adversely affect the amenity of the existing residents.

7.2 The rating noise level of fixed plant will be designed and controlled so as to not exceed the existing background noise climate; 42 dB during the daytime and 28 dB at night. These limits can be secured by the imposition of the following planning condition.

"No fixed plant and/or machinery shall come into operation until details of the fixed plant and machinery serving the development hereby permitted, and any mitigation measures to achieve this condition, are submitted to and approved in writing by the local planning authority. The rating level of the sound emitted from the site shall not exceed 42 dBA between 0700 and 2300 hours and 28 dBA at all other times. The sound levels shall be determined by measurement or calculation at the nearest residential premises. The measurements and assessment shall be made according to BS 4142:2014+A1:2019".

7.3 Noise from both the 'drive-thru' and from customer car parking activity would comply with daytime and night time WHO guidance values and is well below the existing noise climate.

7.4 It is concluded, therefore, that the proposed KFC restaurant with 'drive-thru' could trade on an unrestricted basis without associated noise causing significant adverse impact, in accordance with national planning policy aims.

APPENDIX A

PROPOSED SITE PLAN

Appendix A: Proposed site plan showing noise receptor locations



APPENDIX B

NOISE SURVEY RESULTS

Appendix B1

Title: Noise survey results

Measurement location A: Churchstoke Walk, Baguley

Date	Sample start time	Noise Parameter - dB				
		L _{A10}	L _{A90}	L _{Aeq}	L _{AFmax}	L _{AFmin}
9.11.21	16:20	51.6	44.8	52.3	73.8	42.9
	16:35	48.1	44.8	51.4	74.2	42.7
	16:50	49.7	45.1	51.4	72.1	43.5
	17:06	52.9	45.2	50.4	66.4	43.4
	22:00	44.8	39.3	43.4	58.2	37.2
	22:15	44.8	39.2	43.3	58.7	36.9
	22:31	45.5	39.5	45.5	66.8	36.3
	22:46	43.7	38.3	41.7	56.0	36.1
10.11.21	02:00	37.2	28.4	39.4	68.3	26.8
	02:15	36.4	28.1	33.1	46.8	26.8
	02:32	43.4	30.2	41.7	71.2	28.8

APPENDIX C

‘NOYSPLOT’ NOISE MODEL: PLANT NOISE PREDICTIONS

Client: KFC	Appendix C1.1	Page: 1 of 1
Project: KFC Baguley	Project no: 2120813	
Consultant: K J Metcalfe	Date: 13 December 2021	
Sound power levels (Lw) & sound pressure levels (Lp) for fans & other equipment		

Equipment name/reference	Lw/ Lp	Dist. (m)	On time D/N/A	Mid-frequency Octave Bands (Hz)							
				63	125	250	500	1k	2k	4k	8k
Kitchen supply fan	Lw		D	105	101	95	85	80	76	72	69
Kitchen extract fan outlet	Lw		D	80	89	83	81	80	76	73	73
Kitchen extract fan	Lw		D	58	71	54	47	48	46	39	36
Kitcehn extract fan breakout	Lw		D	39	53	67	65	66	64	45	40
CU01	Lw		A	68	69	63	60	56	57	54	51
CU02	Lw		A	68	69	63	60	56	57	54	51
CU03	Lw		A	82	77	72	65	66	69	58	55
AC01	Lw		A	71	64	58	57	58	52	48	44
AC03	Lw		A	65	61	58	55	56	48	45	41
AC02	Lw		A	65	58	55	46	47	42	35	28
Toilet extract fan	Lw		D	59	61	58	57	54	53	46	35

Notes:

1. Lw/Lp

Lw means sound power level (dB)

Lp means sound pressure level at the stated distance (dB@m)

2. On times (On.time D/N/A):

D (Day) means that the fan/equipment could operate at any time between 0700 and 2300 hours

N (Night) means that the fan/equipment could operate at any time between 2300 and 0700 hours

A (All) means that the fan/equipment could operate at any time during the day and night

Client: KFC	Appendix C1.2	Page: 1 of 1
Project: KFC Baguley	Project no: 2120813	
Consultant: K J Metcalfe	Date: 13 December 2021	
Atmospheric side dynamic insertion losses for noise control equipment		

Equipment name/reference	Mid-frequency Octave Bands (Hz)							
	63	125	250	500	1k	2k	4k	8k
Kitchen supply fan	4	8	12	17	23	17	12	10
Kitcehn extract fan	3	6	10	19	20	14	12	10

Notes:

- Dynamic insertion loss is the logarithmic summation of the air regenerated sound power level and the residual fan sound power level after subtracting the proposed static insertion loss. If this concept is unclear or if you have other queries, contact Sharps Redmore.
- After tendering, please send a copy of your proposed insertion losses, air regenerated Lw, passage velocities, pressure losses, air volumes & dimensions to Sharps Redmore.

Appendix C2: NoysPlot input data, source, receptor and barrier data

Sharps Redmore Partnership
The White House, London Road, Copdock, Ipswich, IP8 3JH

Filename: p:\21 - Projects\2120813 KFC Tesco Baguley-KJM\NoysPlot\KFC Baguley
Date: 13.12.2021
Entries by: K J Metcalfe
Project no: 2120813
Project title: KFC Baguley
Client's name: KFC

Map/plot details: Length: 3200
Width: 3200
Height: 250

Source data - description, co-ordinates, outlet size, percentage to atmosphere, directivity, sound levels and running period

Source description	Co-ordinates			Outlet details			%	Q	Run	Lp/	dBA	Dist	Noise level - Octave band centre frequency Hz							
	X m	Y m	Z m	Amm	Bmm	Ang.			d/n/a	Lw	Y/N	(m)	63	125	250	500	1k	2k	4k	8k
Supply Fan	508.0	506.8	3.5	1300	400	180	100	1	D	W	N	0.0	105	101	95	85	80	76	72	69
Extract Fan Outlet	508.1	501.4	3.6	600	600	360	100	1	D	W	N	0.0	80	89	83	81	80	76	73	73
Extract Fan	502.3	502.4	3.1	0	0	0	100	1	D	W	N	0.0	58	71	54	47	48	46	39	36
Extract Fan Breakout	503.4	501.4	3.1	0	0	0	100	1	D	W	N	0.0	39	53	67	65	66	64	45	40
CU01	500.7	506.3	0.5	0	0	0	100	2	A	W	N	0.0	68	69	63	60	56	57	54	51
CU02	500.7	506.3	1.2	0	0	0	100	2	A	W	N	0.0	68	69	63	60	56	57	54	51
CU03	500.7	506.3	1.9	0	0	0	100	2	A	W	N	0.0	82	77	72	65	66	69	58	55
AC01	500.7	503.4	1.0	0	0	0	100	2	A	W	N	0.0	71	64	58	57	58	52	48	44
AC03	500.7	503.4	2.0	0	0	0	100	2	A	W	N	0.0	65	61	58	55	56	48	45	41
AC02	500.7	504.9	1.0	0	0	0	100	2	A	W	N	0.0	65	58	55	46	47	42	35	28
Toilet Extract Fan	512.7	515.2	3.0	600	300	90	100	1	D	W	N	0.0	59	61	58	57	54	53	46	35

Receptor data - description and co-ordinates

Receptor description	Co-ordinates			DNA
	X m	Y m	Z m	
24 Churchstoke Walk	376	502	4.5	A

Barrier data - description and co-ordinates

Barrier description	Co-ordinates					
	Start			End		
	X m	Y m	Z m	X m	Y m	Z m
Ring barrier	500.0	500.0	3.4	500.0	507.0	3.4
Ring barrier	500.0	507.0	3.4	501.0	507.0	3.4
Ring barrier	501.0	507.0	3.4	501.0	507.0	5.2
Ring barrier	501.0	507.0	5.2	501.0	513.0	5.2
Ring barrier	501.0	513.0	5.2	499.6	513.0	5.2
Ring barrier	499.6	513.0	5.2	499.6	517.0	5.2
Ring barrier	499.6	517.0	5.2	501.0	517.0	5.2
Ring barrier	501.0	517.0	5.2	501.0	527.0	5.2
Ring barrier	501.0	527.0	5.2	512.5	527.0	5.2
Ring barrier	512.5	527.0	5.2	512.5	507.0	5.2
Ring barrier	512.5	507.0	5.2	512.5	507.0	3.4
Ring barrier	512.5	507.0	3.4	512.5	500.0	3.4
Ring barrier	512.5	500.0	3.4	500.0	500.0	3.4

Appendix C3: Predicted daytime noise levels

Overall receptor listings

Period: Day time

Overall daytime plant noise levels (dB)	Mid frequency octave bands (Hz)								
	63	125	250	500	1k	2k	4k	8k	dBA
24 Churchstoke Walk	39	34	23	11	10	8	0	1	21

Source noise levels at receiver: 24 Churchstoke Walk

Period: Day time

Plant item	Mid frequency octave bands (Hz)								
	63	125	250	500	1k	2k	4k	8k	dBA
Kitchen supply fan	39	33	22	4	0	0	0	0	20
Kitchen extract fan breakout	0	0	12	9	10	7	0	0	14
Kitchen extract fan outlet	17	24	12	2	0	0	0	1	10
CU03	25	18	10	0	0	2	0	0	8
Kitchen extract fan	3	16	0	0	0	0	0	0	0
CU02	9	8	0	0	0	0	0	0	0
CU01	8	6	0	0	0	0	0	0	0
AC01	12	2	0	0	0	0	0	0	0
AC03	8	2	0	0	0	0	0	0	0
AC02	6	0	0	0	0	0	0	0	0
Toilet extract fan	0	0	0	0	0	0	0	0	0
Total Free field Lp and dBA	39	34	23	11	10	8	0	1	21

Appendix C4: Predicted night time noise levels

Overall receptor listings

Period: Night time

Overall nighttime plant noise levels (dB)	Mid frequency octave bands (Hz)								
	63	125	250	500	1k	2k	4k	8k	dBA
24 Churchstoke Walk	26	19	10	0	0	2	0	0	8

Source noise levels at receiver: 24 Churchstoke Walk

Period: Day time

Plant item	Mid frequency octave bands (Hz)								
	63	125	250	500	1k	2k	4k	8k	dBA
CU03	25	18	10	0	0	2	0	0	8
CU02	9	8	0	0	0	0	0	0	0
CU01	8	6	0	0	0	0	0	0	0
AC01	12	2	0	0	0	0	0	0	0
AC03	8	2	0	0	0	0	0	0	0
AC02	6	0	0	0	0	0	0	0	0
Total Free field Lp and dBA	26	19	10	0	0	2	0	0	8

APENDIX D

'DRIVE THRU' NOISE CALCULATIONS

Appendix D1: KFCdrive thru ambient noise (L_{Aeq T}) level predictions: Hourly

TIME	Activity	SEL at 10 metres	No. of events	L _{Aeq} 1 hour at 10 metres	Distance to receptor (metres)	Distance attenuation (dB)	Screening attenuation (dB)*	L _{Aeq} 1 hour at receptor	Overall dB L _{Aeq} 1 hour
05:00:00	Arrival of vehicle	72 dB	1	36 dB	133 m	-22 dB	0 dB	14 dB	24 dB
	Ordering	70 dB	1	34 dB	136 m	-23 dB	10 dB	22 dB	
	Collection of order	72 dB	1	36 dB	120 m	-22 dB	0 dB	15 dB	
	Departure of vehicle	72 dB	1	36 dB	115 m	-21 dB	0 dB	15 dB	
06:00:00	Arrival of vehicle	72 dB	7	45 dB	133 m	-22 dB	0 dB	22 dB	32 dB
	Ordering	70 dB	7	43 dB	136 m	-23 dB	10 dB	30 dB	
	Collection of order	72 dB	7	45 dB	120 m	-22 dB	0 dB	23 dB	
	Departure of vehicle	72 dB	7	45 dB	115 m	-21 dB	0 dB	24 dB	
07:00:00	Arrival of vehicle	72 dB	10	46 dB	133 m	-22 dB	0 dB	24 dB	34 dB
	Ordering	70 dB	10	44 dB	136 m	-23 dB	10 dB	32 dB	
	Collection of order	72 dB	10	46 dB	120 m	-22 dB	0 dB	25 dB	
	Departure of vehicle	72 dB	10	46 dB	115 m	-21 dB	0 dB	25 dB	
08:00:00	Arrival of vehicle	72 dB	14	48 dB	133 m	-22 dB	0 dB	25 dB	35 dB
	Ordering	70 dB	14	46 dB	136 m	-23 dB	10 dB	33 dB	
	Collection of order	72 dB	14	48 dB	120 m	-22 dB	0 dB	26 dB	
	Departure of vehicle	72 dB	14	48 dB	115 m	-21 dB	0 dB	27 dB	
09:00:00	Arrival of vehicle	72 dB	15	48 dB	133 m	-22 dB	0 dB	26 dB	36 dB
	Ordering	70 dB	15	46 dB	136 m	-23 dB	10 dB	34 dB	
	Collection of order	72 dB	15	48 dB	120 m	-22 dB	0 dB	27 dB	
	Departure of vehicle	72 dB	15	48 dB	115 m	-21 dB	0 dB	27 dB	
10:00:00	Arrival of vehicle	72 dB	20	49 dB	133 m	-22 dB	0 dB	27 dB	37 dB
	Ordering	70 dB	20	47 dB	136 m	-23 dB	10 dB	35 dB	
	Collection of order	72 dB	20	49 dB	120 m	-22 dB	0 dB	28 dB	
	Departure of vehicle	72 dB	20	49 dB	115 m	-21 dB	0 dB	28 dB	
11:00:00	Arrival of vehicle	72 dB	23	50 dB	133 m	-22 dB	0 dB	28 dB	37 dB
	Ordering	70 dB	23	48 dB	136 m	-23 dB	10 dB	35 dB	
	Collection of order	72 dB	23	50 dB	120 m	-22 dB	0 dB	28 dB	
	Departure of vehicle	72 dB	23	50 dB	115 m	-21 dB	0 dB	29 dB	
12:00:00	Arrival of vehicle	72 dB	39	52 dB	133 m	-22 dB	0 dB	30 dB	40 dB
	Ordering	70 dB	39	50 dB	136 m	-23 dB	10 dB	38 dB	
	Collection of order	72 dB	39	52 dB	120 m	-22 dB	0 dB	31 dB	
	Departure of vehicle	72 dB	39	52 dB	115 m	-21 dB	0 dB	31 dB	
13:00:00	Arrival of vehicle	72 dB	41	53 dB	133 m	-22 dB	0 dB	30 dB	40 dB
	Ordering	70 dB	41	51 dB	136 m	-23 dB	10 dB	38 dB	
	Collection of order	72 dB	41	53 dB	120 m	-22 dB	0 dB	31 dB	
	Departure of vehicle	72 dB	41	53 dB	115 m	-21 dB	0 dB	31 dB	
14:00:00	Arrival of vehicle	72 dB	30	51 dB	133 m	-22 dB	0 dB	29 dB	39 dB
	Ordering	70 dB	30	49 dB	136 m	-23 dB	10 dB	37 dB	
	Collection of order	72 dB	30	51 dB	120 m	-22 dB	0 dB	30 dB	
	Departure of vehicle	72 dB	30	51 dB	115 m	-21 dB	0 dB	30 dB	
15:00:00	Arrival of vehicle	72 dB	30	51 dB	133 m	-22 dB	0 dB	29 dB	39 dB
	Ordering	70 dB	30	49 dB	136 m	-23 dB	10 dB	37 dB	
	Collection of order	72 dB	30	51 dB	120 m	-22 dB	0 dB	30 dB	
	Departure of vehicle	72 dB	30	51 dB	115 m	-21 dB	0 dB	30 dB	
16:00:00	Arrival of vehicle	72 dB	32	51 dB	133 m	-22 dB	0 dB	29 dB	39 dB
	Ordering	70 dB	32	49 dB	136 m	-23 dB	10 dB	37 dB	
	Collection of order	72 dB	32	51 dB	120 m	-22 dB	0 dB	30 dB	
	Departure of vehicle	72 dB	32	51 dB	115 m	-21 dB	0 dB	30 dB	
17:00:00	Arrival of vehicle	72 dB	35	52 dB	133 m	-22 dB	0 dB	29 dB	39 dB
	Ordering	70 dB	35	50 dB	136 m	-23 dB	10 dB	37 dB	
	Collection of order	72 dB	35	52 dB	120 m	-22 dB	0 dB	30 dB	
	Departure of vehicle	72 dB	35	52 dB	115 m	-21 dB	0 dB	31 dB	
18:00:00	Arrival of vehicle	72 dB	39	52 dB	133 m	-22 dB	0 dB	30 dB	40 dB
	Ordering	70 dB	39	50 dB	136 m	-23 dB	10 dB	38 dB	
	Collection of order	72 dB	39	52 dB	120 m	-22 dB	0 dB	31 dB	
	Departure of vehicle	72 dB	39	52 dB	115 m	-21 dB	0 dB	31 dB	
19:00:00	Arrival of vehicle	72 dB	36	52 dB	133 m	-22 dB	0 dB	30 dB	39 dB
	Ordering	70 dB	36	50 dB	136 m	-23 dB	10 dB	37 dB	
	Collection of order	72 dB	36	52 dB	120 m	-22 dB	0 dB	30 dB	
	Departure of vehicle	72 dB	36	52 dB	115 m	-21 dB	0 dB	31 dB	
20:00:00	Arrival of vehicle	72 dB	26	51 dB	133 m	-22 dB	0 dB	28 dB	38 dB
	Ordering	70 dB	26	49 dB	136 m	-23 dB	10 dB	36 dB	
	Collection of order	72 dB	26	51 dB	120 m	-22 dB	0 dB	29 dB	
	Departure of vehicle	72 dB	26	51 dB	115 m	-21 dB	0 dB	29 dB	
21:00:00	Arrival of vehicle	72 dB	20	49 dB	133 m	-22 dB	0 dB	27 dB	37 dB
	Ordering	70 dB	20	47 dB	136 m	-23 dB	10 dB	35 dB	
	Collection of order	72 dB	20	49 dB	120 m	-22 dB	0 dB	28 dB	
	Departure of vehicle	72 dB	20	49 dB	115 m	-21 dB	0 dB	28 dB	
22:00:00	Arrival of vehicle	72 dB	15	48 dB	133 m	-22 dB	0 dB	26 dB	36 dB
	Ordering	70 dB	15	46 dB	136 m	-23 dB	10 dB	34 dB	
	Collection of order	72 dB	15	48 dB	120 m	-22 dB	0 dB	27 dB	
	Departure of vehicle	72 dB	15	48 dB	115 m	-21 dB	0 dB	27 dB	
23:00:00	Arrival of vehicle	72 dB	9	46 dB	133 m	-22 dB	0 dB	24 dB	33 dB
	Ordering	70 dB	9	44 dB	136 m	-23 dB	10 dB	31 dB	
	Collection of order	72 dB	9	46 dB	120 m	-22 dB	0 dB	24 dB	
	Departure of vehicle	72 dB	9	46 dB	115 m	-21 dB	0 dB	25 dB	

*Screening attenuation based on a nominal reduction of 10 dB provided by the KFC building

Appendix D2: KFC drive thru peak noise (L_{Amax}) level predictions

Activity	L _{Amax} at 10 metres	Distance to receptor (metres)	Distance attenuation (dB)	Screening attenuation (dB) *	L _{Amax} at receptor	Highest dB L _{Amax}
Arrival of vehicle	63 dB	133 m	-22 dB	0 dB	41 dB	48 dB
Ordering	61 dB	136 m	-23 dB	10 dB	48 dB	
Collection of order	62 dB	120 m	-22 dB	0 dB	40 dB	
Departure of vehicle	63 dB	115 m	-21 dB	0 dB	42 dB	

APPENDIX E

ACOUSTIC TERMINOLOGY

Acoustic Terminology

- E1 Noise, defined as unwanted sound, is measured in units of decibels, dB. The range of audible sounds is from 0 dB to 140 dB. Two equal sources of sound, if added together will result in an increase in level of 3 dB, i.e. 50 dB + 50 dB = 53 dB. Increases in continuous sound are perceived in the following manner:
- 1 dB increase - barely perceptible.
 - 3 dB increase - just noticeable.
 - 10 dB increase - perceived as twice as loud.
- E2 Frequency (or pitch) of sound is measured in units of Hertz. 1 Hertz (Hz) = 1 cycle/second. The range of frequencies audible to the human ear is around 20Hz to 18000Hz (or 18kHz). The capability of a person to hear higher frequencies will reduce with age. The ear is more sensitive to medium frequency than high or low frequencies.
- E3 To take account of the varying sensitivity of people to different frequencies a weighting scale has been universally adopted called "A-weighting". The measuring equipment has the ability automatically to weight (or filter) a sound to this A scale so that the sound level it measures best correlates to the subjective response of a person. The unit of measurement thus becomes dBA (decibel, A-weighted).
- E4 The second important characteristic of sound is amplitude or level. Two units are used to express level, a) sound power level - L_w and b) sound pressure level - L_p . Sound power level is an inherent property of a source whilst sound pressure level is dependent on surroundings/distance/directivity, etc. The sound level that is measured on a meter is the sound pressure level, L_p .
- E5 External sound levels are rarely steady but rise or fall in response to the activity in the area - cars, voices, planes, birdsong, etc. A person's subjective response to different noises has been found to vary dependent on the type and temporal distribution of a particular type of noise. A set of statistical indices have been developed for the subjective response to these different noise sources.
- E6 The main noise indices in use in the UK are:
- L_{A90} : The sound level (in dBA) exceeded for 90% of the time. This level gives an indication of the sound level during the quieter periods of time in any given sample. It is used to describe the "background sound level" of an area.
 - L_{Aeq} : The equivalent continuous sound level in dBA. This unit may be described as "the notional steady noise level that would provide, over a period, the same energy as the intermittent noise". In other

words, the energy average level. This unit is now used to measure a wide variety of different types of noise of an industrial or commercial nature, as well as aircraft and trains.

- L_{A10} : The sound level (in dBA) exceeded for 10% of the time. This level gives an indication of the sound level during the noisier periods of time in any given sample. It has been used over many years to measure and assess road traffic noise.
- L_{AMAX} : The maximum level of sound measured in any given period. This unit is used to measure and assess transient noises, i.e. gun shots, individual vehicles, etc.
- E7 The sound energy of a transient event may be described by a term SEL - Sound Exposure Level. This is the L_{Aeq} level normalised to one second. That is the constant level in dBA which lasting for one second has the same amount of acoustic energy as a given A weighted noise event lasting for a period of time. The use of this unit allows the prediction of the L_{Aeq} level over any period and for any number of events using the equation;

$$L_{AeqT} = SEL + 10 \log n - 10 \log T \text{ dB.}$$

Where

n = Number of events in time period T.

T = Total sample period in seconds.

- E8 In the open, known as free field, sound attenuates at a rate of 6 dB per each doubling of distance. This is known as geometric spreading or sometimes referred to as the Inverse Square Law. As noise is measured on a Logarithmic scale, this attenuation in distance = $20 \log$ (ratio of distances), e.g. for a noise level of 60 dB at ten metres, the corresponding level at 160 metres is:

$$60 - 20 \log \frac{160}{10} = 60 - 24 = 36 \text{ dB.}$$

APPENDIX B

ACOUSTIC TERMINOLOGY

Acoustic Terminology

- B1 Noise, defined as unwanted sound, is measured in units of decibels, dB. The range of audible sounds is from 0 dB to 140 dB. Two equal sources of sound, if added together will result in an increase in level of 3 dB, i.e. 50 dB + 50 dB = 53 dB. Increases in continuous sound are perceived in the following manner:

1 dB increase - barely perceptible.

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10 dB increase - perceived as twice as loud.

- B2 Frequency (or pitch) of sound is measured in units of Hertz. 1 Hertz (Hz) = 1 cycle/second. The range of frequencies audible to the human ear is around 20Hz to 18000Hz (or 18kHz). The capability of a person to hear higher frequencies will reduce with age. The ear is more sensitive to medium frequency than high or low frequencies.

- B3 To take account of the varying sensitivity of people to different frequencies a weighting scale has been universally adopted called "A-weighting". The measuring equipment has the ability automatically to weight (or filter) a sound to this A scale so that the sound level it measures best correlates to the subjective response of a person. The unit of measurement thus becomes dBA (decibel, A-weighted).

- B4 The second important characteristic of sound is amplitude or level. Two units are used to express level, a) sound power level - L_w and b) sound pressure level - L_p . Sound power level is an inherent property of a source whilst sound pressure level is dependent on surroundings/distance/directivity, etc. The sound level that is measured on a meter is the sound pressure level, L_p .

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- B6 The main noise indices in use in the UK are:

L_{A90} : The sound level (in dBA) exceeded for 90% of the time. This level gives an indication of the sound level during the quieter periods of time in any given sample. It is used to describe the "background sound level" of an area.

L_{Aeq} : The equivalent continuous sound level in dBA. This unit may be described as "the notional steady noise level that would provide, over a period, the same energy as the intermittent noise". In other words, the energy average level. This unit is now used to measure a wide variety of different types of noise of an industrial or commercial nature, as well as aircraft and trains.

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sample. It has been used over many years to measure and assess road traffic noise.

L_{AMAX}: The maximum level of sound measured in any given period. This unit is used to measure and assess transient noises, i.e. gun shots, individual vehicles, etc.

- B7 The sound energy of a transient event may be described by a term SEL - Sound Exposure Level. This is the L_{Aeq} level normalised to one second. That is the constant level in dBA which lasting for one second has the same amount of acoustic energy as a given A weighted noise event lasting for a period of time. The use of this unit allows the prediction of the L_{Aeq} level over any period and for any number of events using the equation;

$$L_{AeqT} = SEL + 10 \log n - 10 \log T \text{ dB.}$$

Where

n = Number of events in time period T.

T = Total sample period in seconds.

- B8 In the open, known as free field, sound attenuates at a rate of 6 dB per each doubling of distance. This is known as geometric spreading or sometimes referred to as the Inverse Square Law. As noise is measured on a Logarithmic scale, this attenuation in distance = 20 Log (ratio of distances), e.g. for a noise level of 60 dB at ten metres, the corresponding level at 160 metres is:

$$60 - 20 \log \frac{160}{10} = 60 - 24 = 36 \text{ dB.}$$