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**For**            **Recycle For Future**

183 Fengate

Peterborough

PE1 5BH

**Recycle For Future**  
**Application for an Environment Agency Permit**  
**BS4142 Noise Assessment**

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## The Author

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## WBM

WBM (the trading name of Walker Beak Mason Limited) is an established independent acoustic consultancy specialising in architectural & building acoustics, environmental noise, planning issues and expert work. WBM is a member of the Association of Noise Consultants and is also a Corporate Member of the Institute of Environmental Management & Assessment. The consultants are members of the Institute of Acoustics.

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## Document Control

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## **1 Introduction**

Recycle For Future (RFF) are submitting an application for an Environment Agency permit at their site in Fengate, Peterborough.

WBM has been retained to provide a noise impact assessment for the site. This report sets out the measured and calculated noise levels arising from the operation of the site for use in a BS 4142:2014+A1:2019 assessment at the nearest dwellings to the site.

To aid comprehension, a glossary of acoustic terms is presented in Appendix A.

## **2 Site Description**

The RFF site is located in Fengate, a largely commercial / industrial area to the east of Peterborough city centre. The site is surrounded by other commercial / industrial premises (to the north, east, south and west) with the road, Fengate, directly to the south.

The nearest residential receptors are located to the south west of the site. No. 169 Fengate is the closest dwelling to the site. The dwelling is part of a two storey terrace, the eastern boundary of the dwelling and garden area neighbours the RFF site. The next nearest residential receptors to the site are approximately 100m to the south east of the site and consist of a number of single storey dwellings within Fengate Park.

Noise surveys on site confirmed that during day time the main sources of noise in the locality are frequent road traffic (including regular HGV movements) along Fengate, commercial / industrial operations from RFF and other nearby operators with some occasional contribution from birdsong and the distant rumbling of military jet flights.

At night time the main source of noise in the locality is road traffic. Whilst traffic along Fengate is much reduced at night time, there is dominant and near constant road traffic on other nearby roads including the dual carriageway, Frank Perkins Parkway, running to the west of the site.

### **2.1 Site Operation**

The site is currently operating 24 hours a day, 5 days per week. There are no current operations at weekends.

The main sources on site include:

- Fixed recycling plant housed within the building;
- Lorry movements into site for unloading / collection of material;
- Material-handling equipment (MHE) movements within the building and around the site when loading / unloading lorries.

All sources can operate during daytime, but at night time there is only the fixed plant operation and infrequent MHE movements within the building. There are no lorry movements or lorry loading / unloading operations at night time.

#### Fixed Recycling Plant

Within the main building there are a number of items of fixed plant, including a blending and bagging machine, an extruder, a baler, guillotine and a compressor (serving the extruder). Previously there was a shredder and granulator on site, but these plant items are being moved to another site and so are no longer in use. An additional extruder has arrived on site but is not yet in use, this is expected to be operation in February / March 2024. The main noise source in the building is from the current extruder, from intermittent MHE movements and some residual contribution from other fixed plant.

#### Lorry Movements

Lorries are only permitted to arrive on site between 0700 and 1900. Unloading / loading of lorries typically occurs between 0700 and 1700.

Lorries enter the site from Fengate and then will either park to be loaded / unloaded at the front of the site in the main yard area south of the main building, or will reverse along the western boundary of the site, over the weighbridge to be unloaded within the north western area of the site.

Typically, there are 12 lorries unloading in the northwestern area of the site per day, approximately 1 per hour, and up to 2-3 per hour at the loading / unloading at the front of the site.

### MHE Movements

There can be up to 10 MHEs operating at the site, though typically not simultaneously. This includes MHE movements within the building, unloading in the northwestern corner of the site, unloading lorries at the front of the site and loading lorries predominantly in the south eastern area of the site. Currently when unloading lorries at the front of the site (and in the absence of a lorry in the northwestern area of the site) MHEs will travel along the south and west of the site. There is scope to change the path that MHEs take when unloading lorries and this is discussed in the main body of this report below.

## **3 Guidance**

Operations at the RFF site are commercial / industrial in nature and as such the appropriate guidance to use in assessing noise impact from the site is British Standard (BS) 4142:2014+A1:2019 "*Methods for rating and assessing industrial and commercial sound*".

### **3.1 British Standard 4142:2014+A1:2019**

British Standard (BS) 4142:2014+A1:2019 "*Methods for rating and assessing industrial and commercial sound*" describes methods for assessing the likely effects of sound of an industrial and/or commercial nature on residential properties. It includes the assessment of sound from industrial and manufacturing processes, M&E plant and equipment, loading and unloading of goods and materials, and mobile plant/vehicles on the site. It can be used to assess sound from proposed, new, modified or additional industrial / commercial sources, at existing or new premises used for residential purposes.

The standard describes methods to measure and determine ambient, background and residual sound levels, and the rating levels of industrial / commercial sound.

BS 4142:2014+A1:2019 is not intended to be used for the derivation or assessment of internal sound levels, or for the assessment of non-industrial / commercial sources such as recreational activities, motorsport, music and entertainment, shooting grounds, construction and demolition, domestic animals, people, and public address systems for speech.

Ambient sound is defined in BS 4142: 2014+A1:2019 as "totally encompassing sound in a given situation at a given time, usually composed of sound from many sources near and far". It comprises the residual sound and the specific sound when present.

Residual sound is defined in BS 4142: 2014+A1:2019 as "ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound".

The background sound level is the  $L_{A90,T}$  of the residual sound level, and is the underlying level of sound. Measurements of background sound level should be undertaken at the assessment location where possible or at a comparable location.

The measurement time interval should be sufficient to obtain a representative value (normally not less than 15 minutes) and the monitoring duration should reflect the range of background sound levels across the assessment period. The background sound level used for the assessment should be representative of the period being assessed.

The specific sound level is the  $L_{Aeq,T_r}$  of the sound source being assessed over the reference time interval,  $T_r$ . BS 4142:2014+A1:2019 advises that  $T_r$  should be 1 hour during the day and 15 minutes at night.

The rating level is the specific sound level plus any adjustment for the characteristics of the sound (tone, impulse, intermittent or other acoustic feature).

The standard describes subjective and objective methods to establish the appropriate adjustment. The adjustments for the different features and assessment methods are summarised in the table below.

Acoustic Feature	Adjustment for Acoustic Feature		
	Subjective Methods	Objective Methods	
Tonality	+2 dB if just perceptible	Third Octave Analysis	Narrow Band Analysis
	+4 dB if clearly perceptible +6 dB if highly perceptible	+6 dB if tones identified	Sliding scale of 0 to +6 dB depending on audibility of tone
Impulsivity	+3 dB if just perceptible +6 dB if clearly perceptible +9 dB if highly perceptible	Sliding scale of 0 to +9 dB depending on prominence of impulsive sound	
Intermittency	+ 3 dB if intermittency is readily distinctive	n/a	
Other	+ 3 dB if neither tonal nor impulsive, but otherwise readily distinctive	n/a	

Where tonal and impulsive characteristics are present in the specific sound within the same reference period then these two corrections can both be taken into account. If one feature is dominant, it might be appropriate to apply a single correction. The rating level is equal to the specific sound level if there are no features present.

The level of impact is assessed by comparing the rating level of the specific sound source with the background sound level. Other factors that may require consideration include the absolute level of sound, the character and level of the residual sound compared to the specific sound, and the sensitivity of the receptor and scope for mitigation.

When the rating level is above the background sound level, a difference of around +5 dB is likely to indicate an adverse impact and a difference of around +10 dB or more is likely to indicate a significant adverse impact, depending on the context.

The lower the rating level with respect to the background sound level, the less likely it is that the specific sound source will have an 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.

### **3.2 Environment Agency Permit and Requirements**

For this application the Environment Agency require a Noise Impact Assessment (NIA) conducted in line with the requirements of BS4142:2014+A1:2019.

Guidance on noise and vibration management for environmental permits is provided by the EA in an online document dated 31 January 2022 and this describes how the assessment outcomes in BS4142:2014+A1:2019 can relate to the definitions of pollution as commonly used by the EA:

***“Unacceptable level of audible or detectable noise***

*This level of noise means that significant pollution is being, or is likely to be, caused at a receptor (regardless of whether you are taking appropriate measures).*

*You must take further action or you may have to reduce or stop operations. The environment agencies will not issue a permit if you are likely to be operating at this level.*

*The closest corresponding BS 4142 descriptor is ‘significant adverse impact’ (following consideration of the context).*



***Audible or detectable noise***

*This level of noise means that noise pollution is being (or is likely to be) caused at a receptor.*

*Your duty is to use appropriate measures to prevent or, where that is not practicable, minimise noise. You are not in breach if you are using appropriate measures. But you will need to rigorously demonstrate that you are using appropriate measures.*

*The closest corresponding BS 4142 descriptor is ‘adverse impact’ (following consideration of the context).*

***No noise, or barely audible or detectable noise***

*This level of noise means that no action is needed beyond basic appropriate measures or BAT.*

*The closest corresponding BS 4142 descriptor is ‘low impact or no impact’ (following consideration of context).*

*Low impact does not mean there is no pollution. However, if you have correctly assessed it as low impact under BS 4142, the environment agencies may decide that taking action to minimise noise is a low priority. Note that BS 4142 is unlikely to be the appropriate methodology on its own to assess low frequency noise.”*

Additional guidance on the use of BS 4142:2014+A1:2019 when applying for a permit is provided in the Environment Agency “*Method implementation document (MID) for BS 4142*” dated 27 March 2023. The information to be reported, as specified in Section 12 of BS 4142:2014+A1:2019, is set out in full in Appendix E (where relevant).

The information that must be submitted to the Environment Agency in a noise impact assessment that uses computer modelling or spreadsheet calculations is provided in GOV.UK Guidance “*Noise impact assessments involving calculations or modelling*” and “*Guidance – Noise and vibration management: environmental permits*”. The information requested in the document “*Noise impact assessments involving calculations or modelling*” is summarised in Appendix F.

## **4 Assessment Approach**

As the site is currently operational, a combination of measurement and calculation has been used to assess the noise impact from the site.

The methods outlined in BS 4142:2014+A1:2019 are appropriate for the noise assessment of the site operations including HGV movements within the site. The assessment does not cover noise from HGV movements outside the application/site boundary.

### Daytime

During daytime, noise measurements were undertaken at the site boundary (i.e. adjacent the dwelling and garden at 169 Fengate) with the site fully operating and with a period of approximately 1 hour when the site shut down completely to obtain baseline (background and residual) sound levels.

The sound environment was dominated by road traffic noise along Fengate and although there were periods when noise from RFF operations was dominant and measurable, the intermittent nature of the operations and the relative dominance of road traffic introduced uncertainty when following the BS 4142:2014+A1:2019 approach of subtracting the residual sound level from the ambient sound level to give the specific sound level.

The measurements from the daytime survey are summarised below; however, in order to assess the noise impact from the site noise levels have been calculated based on measured source levels obtained on site.

### Night time

During the night time survey, local road traffic noise was much reduced and noise sources on site are limited to fixed plant within the building, and limited MHE movements also occurring only within the building.

Noise measurements were undertaken at the site boundary adjacent the dwelling and garden at 169 Fengate at 3.5-4m height (representative of the two storey dwellings and first floor bedroom windows) and in the south eastern corner of the site (in the direction of 2 Fengate Park) at 1.5m height (representative of the single storey dwellings and ground floor bedroom windows). Measurements were made with the site fully operating and with a period of approximately 30 minutes with the site completely shut down to obtain baseline (background and residual) sound levels.

A comparison of the measurement periods with and without the site operating has been used to assess the noise impact from the site at night time.

## 5 Noise Surveys

### 5.1 Measurement Description

Daytime noise levels were measured on site on 06 December 2023 between approximately 11:10 and 15:00. Measurements were undertaken on site along the western boundary, in line with the rear of the dwelling and garden area at 169 Fengate. Night time noise levels were measured on site on 13-14 December 2023 between 23:40 and 01:50. Measurements were undertaken at the site boundary adjacent the dwelling and garden at 169 Fengate at 3.5-4m height and in the south eastern corner of the site (in the direction of 2 Fengate Park) at 1.5m height. A plan showing the measurement locations is provided in Appendix B. The survey details and results are presented in Appendix C (daytime) and Appendix D (night time).

### 5.2 Results

A summary of the daytime measured noise levels is presented in Table 5.1 below.

**Table 5.1 – Summary of Measured Daytime Noise Levels 06 December 2023**

Site status	Start time	Measured noise level dB (T = 15 minutes)	
		L <sub>Aeq</sub>	L <sub>A90</sub>
Site fully operating: fixed plant, lorry manoeuvres around site, MHE movements in northwest and southeast areas of site.	11:15	60	51
	11:30	62	51
	11:45	65	52
	12:00	60	52
<b>Equivalent L<sub>Aeq,1hr</sub> / Average L<sub>A90,T</sub>*</b>		<b>62</b>	<b>51</b>
Site shut down.	12:15	59	51
	12:30	65	51
	12:45	59	50
	13:00	62	50
<b>Equivalent L<sub>Aeq,1hr</sub> / Average L<sub>A90,T</sub>*</b>		<b>62</b>	<b>50</b>
Site fully operating: fixed plant, lorry manoeuvres around site, MHEs loading and unloading lorries at front of site.	13:19	65	55
	13:37	62	56
	13:54	66	55
	14:10	69	58
<b>Equivalent L<sub>Aeq,1hr</sub> / Average L<sub>A90,T</sub>*</b>		<b>66</b>	<b>56</b>

\*The arithmetic average of the 15 minute L<sub>A90</sub> values is provided.

**Note:** the L<sub>Aeq,1hr</sub> and average L<sub>A90</sub> values are based on the measured data to 1 decimal place.

During the survey noise from fixed plant within the building on site was not audible at any time at the monitoring location. The only audible sources from the site were from lorry manoeuvres and MHE movements.

Based on the results from the daytime noise survey and site shut down, the daytime background sound level used in the BS 4142:2014+A1:2019 assessment is 50dB  $L_{A90,T}$ .

A summary of the night time results is provided in Table 5.2 below.

**Table 5.2 – Summary of Measured Night-time Noise Levels 13-14 December 2023**

Start status	Start time	Measured noise level dB (T = 15 minutes)					
		Western boundary 4m height			South eastern boundary 1.5m height		
		$L_{Aeq}$	$L_{A90}$	$L_{A95}$	$L_{Aeq}$	$L_{A90}$	$L_{A95}$
Site operating	23:45	54	48	47	58*	50*	50*
Site operating	00:00	54	47	47	57	49	49
Site operating / site shut down at 00:23	00:15	52	46	45	54	45	44
Site shut down	00:30	52	46	45	55	45	44
Site shut down	00:45	53	45	45	56	44	43
Site shut down / site operating at 01:12	01:00	53	45	44	56	44	44
Site operating	01:15	49	46	45	51	49	49
Site operating	01:30	54	46	45	58**	49**	49**

\* The measurement start time was 23:48

\*\* The measurement period (T) was 7 minutes.

At both locations the overall measured noise level ( $L_{Aeq}$ ) was dictated by local and distant road traffic noise. At the western boundary monitoring location, noise from the site was not audible. At the south eastern boundary monitoring location, plant noise was audible in lulls of road traffic and consisted of broadband plant noise. MHE movements (within the building) were noted on three occasions but were only just audible. The background sound level at the south eastern boundary location ( $L_{A90}$  and  $L_{A95}$ ) was dictated by the plant noise from the site.

Based on the results from the periods of site shut down, the night time background sound level used in the BS 4142:2014+A1:2019 assessment for both locations is 45dB  $L_{A90,T}$ .

## 6 Noise Assessment

### 6.1 Daytime

Site noise levels have been calculated based on measured source levels obtained on site and for three scenarios, which replicate the minimum, typical and worst case site activity observed on site on 06 December 2023. Each scenario is considered as an hour assessment period.

- Scenario 1 – minimum activity  
2 x lorries along western boundary of site, over weighbridge (unloading)
- Scenario 2 – typical activity  
2 x lorries along western boundary of site, over weighbridge (unloading)  
1 x lorry to front yard (manoeuvre)  
1 x lorry to the front yard (loading)  
1 x MHE loading lorry
- Scenario 3 – worst case activity  
1 x lorry along western boundary of site, over weighbridge (unloading)  
1 x lorry to the front yard (loading)  
1 x MHE loading lorry  
1 x lorry to the front yard (unloading)  
3 x MHE unloading lorry

During the site visit on 06 December 2023, when unloading lorries at the front of the site (and in the absence of a lorry in the northwestern area of the site) MHEs travelled along the south and west of the site (to reach the rear of the site). This was identified as a key noise source for 169 Fengate and to reduce noise impact at this dwelling, rerouting the MHEs along the eastern boundary of the site was discussed with the site and recommended. It is understood that these changes have now been made permanently. As such, this MHE routing has been used in the calculations of site noise. A plan showing the typical noise sources and locations / routes within the site is provided in Appendix B.

The assumptions used in the spreadsheet calculations are presented in Appendix F. A table summarising the BS4142:2014+A1:2019 assessment at each location is provided below.

169 Fengate

**Table 6.1 – Summary of BS4142:2014+A1:2019 Assessment at 169 Fengate – Daytime**

Results				Comment
	Scenario 1	Scenario 2	Scenario 3	
Specific Sound Level	50 dB $L_{Aeq,1hr}$	53 dB $L_{Aeq,1hr}$	55 dB $L_{Aeq,1hr}$	The specific sound level has been calculated based on measurements undertaken on site.
Background Sound Level	50 dB $L_{A90,T}$	50 dB $L_{A90,T}$	50 dB $L_{A90,T}$	Background sound levels were measured during the site shut down.
Acoustic Character Correction	+3 dB to +7 dB	+3 dB to +7 dB	+3 dB to +7 dB	The site noise was intermittent (+3dB). Some mobile plant had tonal reverse alarms (+4dB for clearly perceptible tonality)
Rating Level	53 to 57 dB $L_{Ar,T}$	56 to 63 dB $L_{Ar,T}$	58 to 65 dB $L_{Ar,T}$	A range of values is provided to cover an intermittent penalty only (+3dB) and a combined intermittent and tonal penalty of +7dB.
Excess of rating level over background sound level	+3 to +7 dB	+6 to +10 dB	+8 to +12 dB	The rating level is +3 to +12 above the background sound level.
Initial Assessment of Impact	The initial assessment of impact ranges from below adverse impact to above adverse impact and up to and above significant adverse impact. However, this is dependent on the context.			

2 Fengate Park

**Table 6.2 – Summary of BS4142:2014+A1:2019 Assessment at 2 Fengate Park – Daytime**

Results	Comment			
	Scenario 1	Scenario 2	Scenario 3	
Specific Sound Level $L_{Aeq,1hr}$	34 dB $L_{Aeq,1hr}$	42 dB $L_{Aeq,1hr}$	46 dB $L_{Aeq,1hr}$	The specific sound level has been calculated based on measurements undertaken on site.
Background Sound Level $L_{A90,T}$	50 dB $L_{A90,T}$	50 dB $L_{A90,T}$	50 dB $L_{A90,T}$	Background sound levels were measured during the site shut down.
Acoustic Character Correction	+3 dB to +7 dB	+3 dB to +7 dB	+3 dB to +7 dB	The site noise was intermittent (+3dB). Some mobile plant had tonal reverse alarms (+4dB for clearly perceptible tonality)
Rating Level $L_{Ar,T}$	37 to 41 dB $L_{Ar,T}$	45 to 49 dB $L_{Ar,T}$	49 to 53 dB $L_{Ar,T}$	A range of values is provided to cover an intermittent penalty only (+3dB) and a combined intermittent and tonal penalty of +7dB.
Excess of rating level over background sound level	-13 to -9 dB	-5 to -1 dB	-1 to +3 dB	The rating level is -13 below to +3 above the background sound level.
Initial Assessment of Impact	The initial assessment of impact ranges from a low level of impact (rating levels are below the background sound level) to below the point at which an adverse impact might be expected to arise. However, this is dependent on the context.			

Context

BS4142:2014+A1:2019 states:

*“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. 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.”*

The initial assessment of impact at 2 Fengate Park indicates a low level of impact, with a worst case scenario still below the point at which adverse impact might be expected to arise, depending on the context. Contextual factors are relevant, but are only expected to further lower the initial assessment of the impacts. As the noise at 2 Fengate Park is already at a point where pollution is not expected, the specific contextual factors for this receptor have not been considered further.

The initial assessment of impact at 169 Fengate ranges from below adverse impact to above adverse impact and up to and above significant adverse impact. However, this is dependent on the context, which is a key consideration for this site and receptor as discussed below.

#### *Context - Tonality*

The BS4142:2014+A1:2019 assessment set out in Table 6.1 has included an acoustic feature correction of +4dB for tonality as well as a correction of +3dB for intermittency. The acoustic feature correction for tonality has been included as some MHEs and lorries arriving on site have tonal reverse alarms. The alarms are only short lived, lasting for a matter of seconds at a time. This could arguably be included as an intermittent noise source.

EA guidance on the use of BS4142:2014+A1:2019 (MID for BS4142) states that when applying a tonal correction it should be considered whether the character of the tone is masked by, or similar to, other sources and whether it has distinguishing features. Tonal reverse alarms are a common feature of the sound environment in the locality due to various other sites using MHEs and receiving lorry deliveries all using tonal reverse alarms. In this respect, the tonal reverse alarms at the RFF site are not a novel source in the locality and will not attract attention specifically to the RFF site given that this noise is common to several other nearby sites.

It is recommended that the site replaces the tonal reverse alarms on MHEs with broadband / white noise reverse alarms (it is noted that many used on site already have these type of alarms). This has been discussed with the site and agreed as a practical noise reduction method moving forward. Without the tonality from MHE reverse alarms, the only source of tonality would be from lorries reversing in to the site. As noted above, this would last for a matter of seconds, with up to 3-4 lorries visiting the site in a worst case hour period. The source is not novel or new to the area and given the limited on-time it could be reasonably included within the 'intermittent' acoustic feature correction.



Eliminating the need for a tonal acoustic feature correction, the initial assessment of impact at 169 Fengate reduces to +3 to +8dB, i.e. below to just above the point at which adverse impact might be expected to arise, but below the point at which significant adverse impact might be expected to arise. This is still dependent on the context, discussed further below.

#### *Context - Character of the Locality*

EA guidance on the use of BS4142:2014+A1:2019 states that factors such as 'where the sound occurs', 'the residual acoustic environment', 'new industry or new residences' should be considered as part of the context, with less sensitive contexts including 'more industry', 'long standing industry' and 'polluted soundscape' (see MID for BS4142).

The calculated site noise levels at 169 Fengate range from 50-55dB  $L_{Aeq,1hr}$ . The measured residual sound levels during the site shut down period ranged from 59-65dB  $L_{Aeq,15min}$ . The residual sound levels were controlled by local road traffic noise.

The site is located in a well established commercial / industrial area in Peterborough and nearby residential receptors are surrounded by other similar uses with noise sources common to the RFF site (lorries, MHEs). The use of Fengate by regular cars, vans, commercial vehicles and HGVs means that lorry arrivals on site are not readily distinct from road traffic along Fengate and deliveries at other nearby sites. There is an expectation of this type of noise during the daytime soundscape and much of the time RFF site noise will be masked by local road traffic noise.

The character of the locality and well established commercial / industrial uses in the area indicates that the context reduces the initial assessment of impact of the site noise.

#### *Context - Time of Day*

EA guidance on the use of BS4142:2014+A1:2019 states that factors such as 'weekdays versus weekends' and 'time of day' should be considered as part of the context, with less sensitive contexts including '9am to 5pm' and 'weekdays only' (see MID for BS4142).

The site is currently operating 24/7 during weekdays only and weekend amenity is protected. Noise mitigation measures are already in place such that lorries are only allowed on site between 0700 and 1900, with a priority to make sure all lorries are unloaded by 1700, thus protecting the more noise sensitive periods of the day. Given the heavily commercial / industrial character of the area, noise sources associated with such uses would be expected from around 0700 until 1700-1900.

A night time assessment has been presented and is discussed below and indicates a low level of impact and likely inaudibility at nearby residential receptors. There is not expected to be any noise impact from the site at night time.

Thus, the time of the day that the noise occurs is a further contextual factor that could be considered to reduce the initial assessment of impact of noise from the site at nearby residential receptors.

#### *Conclusions on Context*

The initial assessment of impact at 169 Fengate ranges from below adverse impact to above adverse impact and up to and above significant adverse impact. After considering context it is concluded that the initial assessment of impact could be reduced to +3 to +8dB, i.e. below the point at which adverse impact might be expected to arise to above this point, but below the point at which significant adverse impact might be expected to arise.

Considering the character of the locality and the time of the day that the noise occurs, it is highly unlikely that a significant adverse impact would arise. Whilst during worst case periods of activity there may be noise at a level where there is some adverse impact, this is not at a level where there is significant pollution. At times, noise will be audible from the site, but will also be masked by other local sources for much of the time.

Where noise is audible or detectable (i.e. where there may be some adverse impact) the duty of the operator is to use appropriate measures to prevent, or where that is not practicable, minimise noise. A number of appropriate measures have been adopted at the site to minimise and prevent noise impact and are set out in Section 7 of this report.

## 6.2 Night time

### 169 Fengate

The noise monitoring location at the western boundary of the site was used to represent first floor amenity at 169 Fengate (i.e. night time impact on bedroom windows). The measured average ambient and residual noise levels were controlled by local and distant road traffic noise. With the site operating the ambient noise level ranged from 49-54dB  $L_{Aeq,15min}$  and without the site operating the residual noise level ranged from 52-53dB  $L_{Aeq,15min}$ .

The background sound levels were also influenced by distant road traffic noise. The  $L_{A90}$  index was influenced by the presence or absence of lulls in distant road traffic and as such the  $L_{A95}$  index has also been provided for additional information on background sound levels with and without the site operating. With the site operating the  $L_{A95}$  ranged from 45-47dB  $L_{Aeq,15min}$  and without the site operating the  $L_{A95}$  ranged from 44-45dB  $L_{Aeq,15min}$ .

Noise from the site was not audible at the monitoring location and there was no discernible difference in measured average ( $L_{Aeq}$ ) or background ( $L_{A90}$  /  $L_{A95}$ ) levels with and without the site operating.

As such it is concluded that at night time there is no impact / no discernible noise from the site operations at this location.

### 2 Fengate Park

The noise monitoring location in the south eastern boundary of the site was used to represent ground floor amenity in the direction of dwellings at Fengate Park. Plant noise from the RFF site was audible in lulls of road traffic and consisted of broadband plant noise. The background sound level at the south eastern boundary location ( $L_{A90}$  and  $L_{A95}$ ) was dictated by the plant noise from the site and can be used to estimate the breakout noise level from the building as 49-50dB  $L_{Aeq,15min}$  (at the monitoring location).

A table summarising the BS4142:2014+A1:2019 assessment at 2 Fengate Park is provided below.

**Table 6.3 – Summary of BS4142:2014+A1:2019 Assessment at 2 Fengate Park – Night-time**

Results		Comment
Specific Sound Level	33-34 dB $L_{Aeq,15min}$	The specific sound level has been calculated based on the measurements to the south east of the site, giving a plant noise level of 49-50dB(A) at the measurement location. The nearest dwelling at Fengate Park is approximately 105m from the roller shutter doors on site, giving a distance attenuation between the measurement location and the receiver location of approximately 16dB. .
Background Sound Level	45 dB $L_{A90,15min}$	Background sound levels measured during the site shut down.
Acoustic Character Correction	0 dB	There were no specific acoustic features audible, the site noise was constant and broadband in nature.
Rating Level	33 to 34 dB $L_{Ar,T}$	No acoustic feature correction is applicable and so the rating level is the same as the specific level.
Excess of rating level over background sound level	-12 to -11 dB	The rating level is significantly below the background sound level.
Initial Assessment of Impact	Low level of impact.	Where the rating level is below background level, this is a positive indication of a low level of impact from the site.

The initial assessment of impact indicates that there is a low level of impact. Consideration of uncertainty and context does not change the outcome of the assessment. A lower background sound level of 43-44dB  $L_{A90,15min}$  could be considered for use in the assessment, but would not change the outcome, i.e. of the rating level significantly below the background sound level.

Noise from the site is unlikely to be audible at Fengate Park and it is concluded that at night time there is no impact / no discernible noise from the site operations at this location.

## **7 Summary and Conclusions**

Recycle For Future (RFF) are submitting an application for an Environment Agency permit at their site in Fengate, Peterborough. WBM has been retained to provide a noise impact assessment for the site. This report sets out the measured and calculated noise levels arising from the operation of the site for use in a BS 4142:2014+A1:2019 assessment at the nearest dwellings to the site.

Daytime noise levels were measured on site on 06 December 2023 between approximately 11:10 and 15:00. Night time noise levels were measured on site on 13-14 December 2023 between 23:40 and 01:50.

The nearest residential receptor to the site is No. 169 Fengate. The next nearest residential receptors to the site are dwellings within Fengate Park.

The night time assessment found that at 169 Fengate, noise from the site was not audible and it was concluded that there is no impact / no discernible noise from the site operations at this location. At 2 Fengate Park, the calculated site noise levels indicated a low level of impact. It was concluded that noise from the site is unlikely to be audible at Fengate Park and that there is no impact / no discernible noise from the site operations at this location.

The daytime assessment found that at 2 Fengate Park, the calculated site noise levels indicated a low level of impact with a worst case scenario still below the point at which adverse impact might be expected to arise. It was concluded that daytime noise at 2 Fengate Park is at a point where pollution is not expected to arise.

After considering context, the daytime assessment at 169 Fengate indicates site noise levels ranging from below to above the point at which adverse impact might be expected to arise, but below the point at which significant adverse impact might be expected to arise.

Considering the character of the locality and the time of the day that the noise occurs, it is highly unlikely that a significant adverse impact would arise at 169 Fengate. Whilst during worst case periods of activity there may be noise at a level where there is some adverse impact, this is not considered to be at a level where there is significant pollution. At times, noise will be audible from the site, but site noise will also be masked by other local sources for much of the time.

Where noise is audible or detectable (i.e. where there may be some adverse impact) the duty of the operator is to use appropriate measures to prevent, or where that is not practicable, minimise noise. A number of appropriate measures have been adopted at the site to prevent and minimise noise impact and are set out below:

- The shredder and granulator are to be moved to another site thus reducing the overall noise footprint of the site (accordingly these sources have not been included in this assessment).

- Lorries are only permitted to arrive on site between 0700 and 1900 with loading / unloading prioritised so that only limited operations occur after 1700.
- A concrete block wall will be erected along the eastern boundary of the site, approximately 4m in height (finishing approximately 50m north of the road Fengate, in line with the rear garden of 169 Fengate). This will reduce noise from activity in north western area of the yard and from lorries reversing along the western boundary of the site. This additional screening has not been included in this assessment.
- A site speed limit is in place to reduce noise from MHE movements and is monitored by CCTV.
- When unloading lorries at the front of the site, MHEs will travel to the rear of the site along the eastern boundary (rather than the western boundary as used historically), thus increasing the separation distance between MHE movements and 169 Fengate.
- There will be a programme of works whereby all MHE tonal reverse alarms will be replaced with broadband / white noise reverse alarms.
- Toolbox talks are scheduled to remind employees of their duties to minimise noise on site, including adhering to site noise limits, maintaining equipment and machinery, not shouting or using raised voices other than in cases where warnings of danger must be given.

Based on this assessment and providing that the above measures are implemented and maintained, it is concluded that the site can be operated while keeping noise levels to within environmentally acceptable limits.

**Sarah Large** MA (Cantab) MSc Dip (IoA) MIOA  
Senior Consultant

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## **Appendix A – Glossary of Acoustic Terms**

### **General Noise and Acoustics**

The following section describes some of the parameters that are used to quantify noise.

#### **Decibels dB**

Noise levels are measured in decibels. The decibel is the logarithmic ratio of the sound pressure to a reference pressure ( $2 \times 10^{-5}$  Pascals). The decibel scale gives a reasonable approximation to the human perception of relative loudness. In terms of human hearing, audible sounds range from the threshold of hearing (0 dB) to the threshold of pain (140 dB).

#### **A-weighted Decibels dB(A)**

The 'A'-weighting filter emulates human hearing response for low levels of sound. The filter network is incorporated electronically into sound level meters. Sound pressure levels measured using an 'A'-weighting filter have units of dB(A) which is a single figure value to represent the overall noise level for the entire frequency range.

A change of 3 dB(A) is the smallest change in noise level that is perceptible under normal listening conditions. A change of 10 dB(A) corresponds to a doubling or halving of loudness of the sound. The background noise level in a quiet bedroom may be around 20 –30 dB(A); normal speech conversation around 60 dB(A) at 1 m; noise from a very busy road around 70-80 dB(A) at 10m; the level near a pneumatic drill around 100 dB(A).

#### **Façade Noise Level**

Façade noise measurements are those undertaken near to reflective surfaces such as walls, usually at a distance of 1m from the surface. Façade noise levels at 1m from a reflective surface are normally around 3 dB greater than those obtained under freefield conditions.

#### **Freefield Noise Level**

Freefield noise measurements are those undertaken away from any reflective surfaces other than the ground

#### **Frequency Hz**

The frequency of a noise is the number of pressure variations per second, and relates to the "pitch" of the sound. Hertz (Hz) is the unit of frequency and is the same as cycles per second. Normal, healthy human hearing can detect sounds from around 20 Hz to 20 kHz.

#### **Octave and Third-Octave Bands**

Two frequencies are said to be an octave apart if the frequency of one is twice the frequency of the other. The octave bandwidth increases as the centre frequency increases. Each bandwidth is 70% of the band centre frequency.

Two frequencies are said to be a third-octave apart if the frequency of one is 1.26 times the other. The third octave bandwidth is 23% of the band centre frequency.

There are recognised octave band and third octave band centre frequencies. The octave or third-octave band sound pressure level is determined from the energy of the sound which falls within the boundaries of that particular octave of third octave band.

## Appendix A (continued)

### Day Evening Night Level $L_{den}$

The day evening night level is the average A-weighted sound level over a 24 hour period, determined from the  $L_{day}$  ( $L_{Aeq,12hr}$  7am-7pm),  $L_{evening}$  ( $L_{Aeq,4hr}$  7pm-11pm) and  $L_{night}$  ( $L_{Aeq,8hr}$  11pm-7am), with a 5 dB penalty added to the  $L_{evening}$  and a 10 dB penalty added to the  $L_{night}$ .

### Equivalent Continuous Sound Pressure Level $L_{Aeq,T}$

The 'A'-weighted equivalent continuous sound pressure level  $L_{Aeq,T}$ , is a notional steady level which has the same acoustic energy as the actual fluctuating noise over the same time period T. The  $L_{Aeq,T}$  unit is dominated by higher noise levels, for example, the  $L_{Aeq,T}$  average of two equal time periods at, for example, 70 dB(A) and 50 dB(A) is not 60 dB(A) but 67 dB(A).

The  $L_{Aeq}$  is the chosen unit of BS 7445-1:2003 "Description and Measurement of Environmental noise".

### Maximum Sound Pressure Level $L_{Amax}$

The  $L_{Amax}$  value describes the overall maximum 'A'-weighted sound pressure level over the measurement interval. Maximum levels are measured with either a fast or slow time weighted, denoted as  $L_{Amax,f}$  or  $L_{Amax,s}$  respectively.

### Noise Rating NR

The noise rating level is a single figure index obtained from an octave band analysis of a noise. The NR level is obtained by comparing the octave band sound pressure levels to a set of reference curves and the highest NR curve that is intersected by the sound pressure levels gives the NR level.

### Sound Exposure Level $L_{AE}$ or SEL

The sound exposure level is a notional level which contains the same acoustic energy in 1 second as a varying 'A'-weighted noise level over a given period of time. It is normally used to quantify short duration noise events such as aircraft flyover or train passes.

### Statistical Parameters $L_N$

In order to cover the time variability aspects, noise can be analysed into various statistical parameters, i.e. the sound level which is exceeded for N% of the time. The most commonly used are the  $L_{A01,T}$ ,  $L_{A10,T}$  and the  $L_{A90,T}$ .

$L_{A01,T}$  is the 'A'-weighted level exceeded for 1% of the time interval T and is often used to give an indication of the upper maximum level of a fluctuating noise signal.

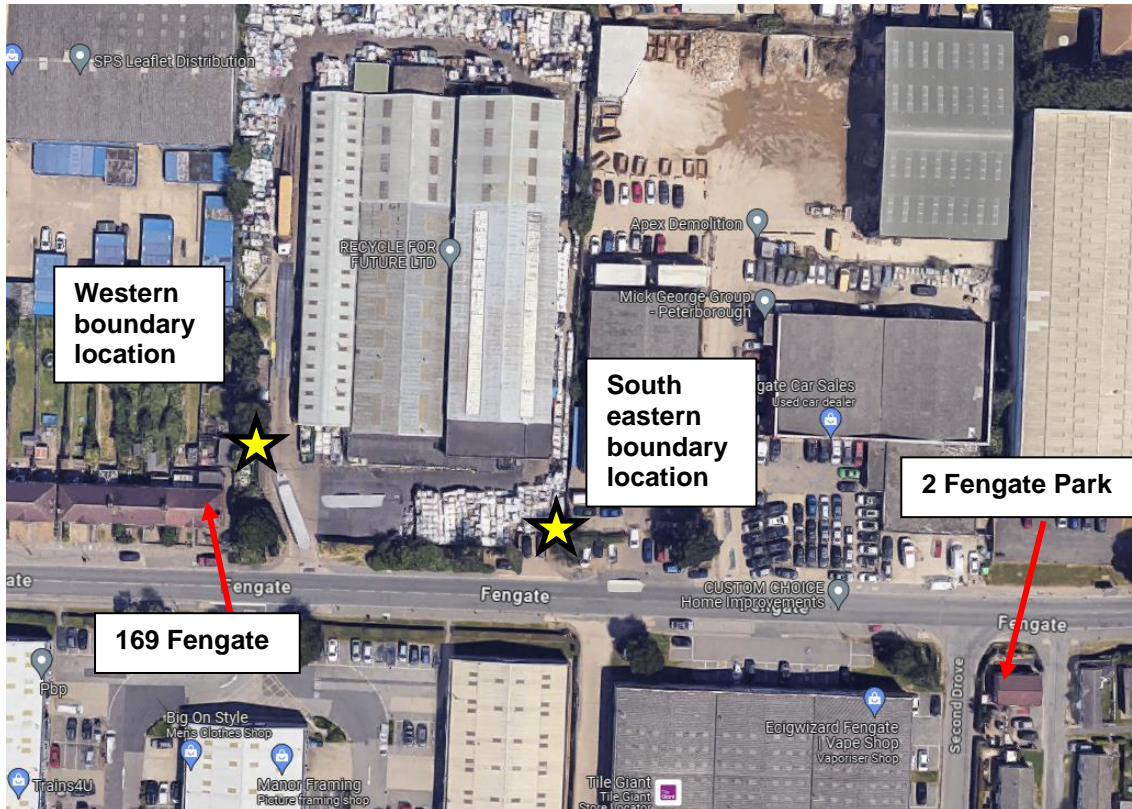
$L_{A10,T}$  is the 'A'-weighted level exceeded for 10% of the time interval T and is often used to describe road traffic noise. It gives an indication of the upper level of a fluctuating noise signal. For high volumes of continuous traffic, the  $L_{A10,T}$  unit is typically 2–3 dB(A) above the  $L_{Aeq,T}$  value over the same period.

$L_{A90,T}$  is the 'A'-weighted level exceeded for 90% of the time interval T, and is often used to describe the underlying background noise level.



## Appendix B – Site Plan and Noise Monitoring Locations

Plan B.1: Noise Monitoring Locations



Location	Receptor	Description
Western boundary	169 Fengate	Measurements were undertaken at 1.5m height during daytime and 3.5-4m height at night time. The location was free field, whilst at the boundary of the site, the fence was open metal mesh.
South eastern boundary	2 Fengate Park	Measurements were undertaken during night time only at 1.5m height. Some bags of material were in situ between the monitoring location and the roller shutter doors, but not to the extent shown on the image above. A clear line of site was afforded between the microphone and the roller shutter doors.

**Appendix B (continued)**

Plan B.2: Site Plan and Noise Source Locations

The locations of the noise sources used in the daytime calculations are shown below.



Symbol on Plan	Description
	Lorry along western boundary of site, over weighbridge (unloading)
	Lorry to the front yard (loading / unloading)
	MHE loading lorry / MHE unloading lorry
	MHE unloading lorry
	Clatters (MHE unloading lorry)

## Appendix C – Daytime Survey Details and Results

### Date and Locations of Survey

Wednesday 06 December 2023, between 11:10 and 15:00.

Noise measurements undertaken on site, see plan in Appendix B.

### Survey carried out by

Sarah Large

### Weather Conditions

Weather conditions remained consistent throughout the monitoring period as: dry, clear sky, sunny. No wind, 0m/s, (forecast with a southerly direction), cold, 3°C.

### Instrumentation and Calibration

The instrumentation used (including serial number in brackets) is tabulated below. The sensitivity of the meter was verified on site immediately before and after the survey using the field calibrator. The measured calibration levels were as follows:

Instrumentation	Start Cal	End Cal
Norsonic 140 Sound Level Meter (1403136)	113.9 dB(A)	114.0 dB(A)
Norsonic 1251 Calibrator (31992)		

The meter and calibrator are tested monthly against Norsonic Calibrators, type 1253 (serial number 22906) and type 1256 (serial number 125626100) both with UKAS approved laboratory certificates of calibration. In addition, the meter and calibrator undergo traceable calibration at an external laboratory every two years.

### Survey Details

Attended sample measurements of 15 minute duration were taken at the western boundary of the site (in line with the rear of the nearest dwelling), see plan in Appendix B. The microphone was at a height of between 1.2 and 1.5 metres above local ground level, with a windshield used throughout.

A single shorter duration measurement was undertaken on the western doorway of the building on site to ascertain typical plant noise break out levels. As the noise was steady and continuous a short measurement period was considered representative.

### Observations

In general the sound environment was dominated by road traffic noise from Fengate. Site activity was audible and dominant at times. A description of the main noise sources during each measurement period is presented in the results table below.

### Appendix C (continued)

#### Survey Results

Location	Start Time	Results dB (T = 15 minutes)				Comments / Observations
		L <sub>Aeq,T</sub>	L <sub>Amax,f</sub>	L <sub>A10,T</sub>	L <sub>A90,T</sub>	
On site: western boundary, in line with rear of 169 Fengate.	11:09	59*	70*	62*	51*	MHEs and lorries on site, ~11:00 lorry arrives on site, reverses over weighbridge, unloading to west rear of site.
	11:15	60	74	63	51	MHEs, lorry manoeuvres around weighbridge, MHEs in eastern yard. Road traffic noise from Fengate, industrial noise and reverse alarms from other nearby sites, birds.
	11:30	62	80	62	51	MHEs, lorry manoeuvres around weighbridge. Road traffic noise from Fengate (including loud horn beep and clatters from road), industrial noise and reverse alarms from other nearby sites, birds, rumble of military jets.
	11:45	65	82	68	52	MHEs, lorry manoeuvres out of site (brake hiss), lorry arrives on site and manoeuvres around weighbridge, MHEs in eastern yard. Road traffic noise from Fengate, industrial noise and reverse alarms from other nearby sites, birds, rumble of military jets.
	12:00	60	76	63	52	MHEs to rear of site, lorry static. Road traffic noise from Fengate, industrial noise and reverse alarms from other nearby sites, birds, rumble of military jets.
	12:15	59	78	63	51	Site shut down. Road traffic noise from Fengate, tonal reverse alarms, general industrial noise from other sites, birds.
	12:30	65	88	65	51	Site shut down. Road traffic noise from Fengate (including noisy motorbike), tonal reverse alarms, general industrial noise from other sites, birds, rumble of military jets, light aircraft.
	12:45	59	72	63	50	Site shut down. Road traffic noise from Fengate, tonal reverse alarms, general industrial noise from other sites, birds, rumble of military jets.
	13:00	62	82	64	50	Site shut down. Road traffic noise from Fengate (including emergency sirens), tonal reverse alarms, general industrial noise from other sites, birds.
	13:15	60*	72*	63*	53*	Site shut down. Road traffic noise from Fengate, tonal reverse alarms, general industrial noise from other sites, birds.

\*T= 5 minutes

### Appendix C (continued)

#### Survey Results (continued)

Location	Start Time	Results dB (T = 15 minutes)				Comments / Observations
		L <sub>Aeq,T</sub>	L <sub>Amax,f</sub>	L <sub>A10,T</sub>	L <sub>A90,T</sub>	
On site: western boundary, in line with rear of 169 Fengate.	13:19	65	78	68	55	Lorry A manoeuvres into front of site, lorry B drives into front of site and engine idles at site entrance, reverses out of site, lorry C manoeuvres from weighbridge out of site, MHE loading lorry at front of site. Road traffic noise from Fengate, tonal reverse alarms, general industrial noise from other sites, birds.
	13:37	62	86	65	56	MHEs unloading lorry at front of site. Road traffic noise from Fengate, tonal reverse alarms, general industrial noise from other sites, birds.
	13:54	66	85	69	55	Lorry at front of site starts, brake hiss, reverses, leaves site. Lorry drives into front of site, MHE manoeuvres around site, 3 x MHEs unloading lorry. Road traffic noise from Fengate, tonal reverse alarms, general industrial noise from other sites, birds.
	14:10	69	93	71	58	MHE manoeuvres around site, 3 x MHEs unloading lorry. Road traffic noise from Fengate, tonal reverse alarms, general industrial noise from other sites, birds.
	14:25	65	88	67	54	MHE manoeuvres around site. Lorry reverses into site to weighbridge. Road traffic noise from Fengate, tonal reverse alarms, general industrial noise from other sites, birds, rumble of military jets.
	14:40	66	90	69	53	MHE manoeuvres at western rear of site. Road traffic noise from Fengate, tonal reverse alarms, general industrial noise from other sites, birds.
Western yard area	14:48	62*	65*	63*	61*	In doorway to main building at southwestern entrance. Fixed plant noise, some distant road traffic noise just audible.

\*T = 50 seconds

## Appendix D – Night time Survey Details and Results

### Date and Locations of Survey

Wednesday 13 December to Thursday 14 December 2023 between 23:40 and 01:50.

Noise measurements undertaken on site, see plan in Appendix B.

### Survey carried out by

Sarah Large

### Weather Conditions

Dry, clear sky, still (no wind) increasing to 0-1m/s (NW direction), 3°C.

### Instrumentation and Calibration

The instrumentation used (including serial number in brackets) is tabulated below. The sensitivity of the meters was verified on site immediately before and after the survey using the field calibrator. The measured calibration levels were as follows:

Instrumentation		Start Cal	End Cal
Western boundary location	Norsonic 140 Sound Level Meter (1403136)	113.9 dB(A)	113.9 dB(A)
	Norsonic 1251 Calibrator (31992)		
South eastern boundary location	Norsonic 140 Sound Level Meter (1402998)	114.1 dB(A)	114.0 dB(A)
	Norsonic 1251 Calibrator (32466)		

The meters and calibrators are tested monthly against Norsonic Calibrators, type 1253 (serial number 22906) and type 1256 (serial number 125626100) both with UKAS approved laboratory certificates of calibration. In addition, the meters and calibrators undergo traceable calibration at an external laboratory every two years.

### Survey Details

Attended sample measurements of 15 minute duration were taken at the western boundary of the site (in line with the rear of the nearest dwelling) and in the south eastern corner of the site, see plan in Appendix B. The microphone was at a height of between 3.5 and 4 metres above local ground level at the western boundary location and at a height of between 1.2 and 1.5 metres above local ground level at the south eastern corner of the site. Windshields were used throughout.

### Observations

In general the sound environment was dominated by local and distant road traffic noise. from Fengate. Site activity was audible and dominant at times. At the western boundary monitoring location, noise from the site was not audible. At the south eastern boundary monitoring location, plant noise was audible in lulls of road traffic and consisted of broadband plant noise..

## Appendix D (continued)

### Survey Results

#### Western boundary location (4m height)

Start Time	Results dB (T = 15 minutes)					Comments / Observations
	L <sub>Aeq,T</sub>	L <sub>Amax,f</sub>	L <sub>A10,T</sub>	L <sub>A90,T</sub>	L <sub>A95,T</sub>	
23:45	54	73	53	48	47	Site operating but not audible at monitoring location. Local and distant road traffic noise.
00:00	54	73	54	47	47	Site operating but not audible at monitoring location. Local and distant road traffic noise.
00:15	52	74	52	46	45	Site operating / site shut down at 00:23. Local and distant road traffic noise.
00:30	52	73	52	46	45	Site shut down. Local and distant road traffic noise.
00:45	53	76	52	45	45	Site shut down. Local and distant road traffic noise.
01:00	53	71	53	45	44	Site shut down / site operating at 01:12 (not audible at monitoring location). Local and distant road traffic noise.
01:15	49	64	51	46	45	Site operating but not audible at monitoring location. Local and distant road traffic noise.
01:30	54	74	54	46	45	Site operating but not audible at monitoring location. Local and distant road traffic noise.

#### South eastern boundary location (1.5m height)

Start Time	Results dB (T = 15 minutes)					Comments / Observations
	L <sub>Aeq,T</sub>	L <sub>Amax,f</sub>	L <sub>A10,T</sub>	L <sub>A90,T</sub>	L <sub>A95,T</sub>	
23:48	58*	78*	55*	50*	50*	Site operating, broadband plant noise from roller shutter doors (open) audible. Local and distant road traffic noise.
00:00	57	76	53	49	49	Site operating, broadband plant noise from roller shutter doors (open) audible. Local and distant road traffic noise.
00:15	54	75	50	45	44	Site operating / site shut down at 00:23. Local and distant road traffic noise.
00:30	55	78	50	45	44	Site shut down. Local and distant road traffic noise.
00:45	56	81	48	44	43	Site shut down. Local and distant road traffic noise.
01:00	56	78	52	44	44	Site shut down / site operating at 01:12 (background sound levels around 47-48dB, increase to 50-51dB at 01:14). Local and distant road traffic noise.
01:15	51	69	51	49	49	Site operating, broadband plant noise from roller shutter doors (open) audible. Local and distant road traffic noise.
01:30	58**	79**	55**	49**	49**	Site operating, broadband plant noise from roller shutter doors (open) audible. Local and distant road traffic noise.

\* T= 12 minutes

\*\* T= 7 minutes

## Appendix E – BS 4142:2014+A1:2019 Information to be Reported

### (a) Statement of Qualifications

See details about The Author on page 2 of this report.

### (b) Source Being Assessed

#### 1) *Description of the main sound sources and of the specific sound*

See description in Section 2.1 'Site Operation'.

#### 2) *Hours of operation*

The normal hours of operation are Mondays – Fridays, 24 hours per day.

#### 3) *Mode of operation (e.g. continuous, twice a day, only in hot weather)*

The operations will only take place during the hours stipulated above.

#### 4) *Statement of operational rates of the main sound sources (e.g. maximum load setting, 50% max rate, low load setting)*

For daytime calculations, the main noise sources and their respective on times / operational rates are listed in Appendix F. Three scenarios have been considered based on operations observed whilst on site and to represent minimum, typical and worst case activity. See Section 6.1 'Daytime'.

At night time plant operates continuously and this has been assessed using measurements on site with the plant operating for 100% of the assessment period.

#### 5) *Description of premises in which the main sound sources are situated (if applicable).*

See detailed site description in Section 2.1 'Site operation'.

A plan showing the site layout is provided in Appendix B.

### (c) Subjective Impressions

#### 1) *Dominance or audibility of the specific sound*

Daytime: during daytime noise from the site was audible at the monitoring location. At times this was dominant (particularly during lorry arrivals) but for much of the time site noise was masked by / not distinguishable from local road traffic noise.

At night time, site noise was not audible at the western boundary of the site (169 Fengate). Site noise was audible in road traffic lulls at the south eastern boundary of the site (2 Fengate Park), though road traffic remained the dominant noise source at this location.

#### 2) *Main sources contributing to the residual sound.*

See Section 2.0 'Site Description'.

### (d) The Existing Context and Sensitivity of Receptor

With regard to sensitivity, the receptor locations are residential properties and are therefore considered to be of "High" sensitivity.

The RFF site is located in Fengate, a largely commercial / industrial area to the east of Peterborough City Centre. The site is surrounded by other commercial / industrial premises (to the north, east, south and west) with the road, Fengate, directly to the south.

Context has been considered in detail in Section 6.1.



## Appendix E (continued)

### (e) Measurement Locations and Justification

*Measurement locations, their distance from the specific sound source, the topography of the intervening ground and any reflecting surface other than the ground, including a photograph, or a dimensioned sketch with a north marker. A justification for the choice of measurement locations should also be included.*

The nearest residential housing is located to the south west of the site. No. 169 Fengate is the closest dwelling to the site. The eastern boundary of the dwelling and garden area neighbours the RFF site. The next nearest dwellings to the site are approximately 100m to the south east of the site and consist of a number of single storey dwellings within Fengate Park.

The measurement locations used were near to existing residential receptors close to the site. A plan showing the measurement and assessment locations is provided in Appendix B. Further description of the measurement locations is provided in Section 4 'Assessment Approach', Section 5 'Noise Surveys'.

The topography between the site and receptors is flat and no ground screening effects are included in the assessment.

### (f) Sound Measuring Systems, Including Calibrator / Pistonphone

1) *Type*

See Appendix C and D

2) *Manufacturer*

See Appendix C and D

3) *Serial number*

See Appendix C and D

4) *Details of the latest verification test including dates*

See Appendix C and D

### (g) Operational Test

1) *Reference level(s) of calibrator, multi-function calibrator or pistonphone;*

See Appendix C and D

2) *Meter reading(s) before and after measurements with calibrator, multi-function calibrator or pistonphone applied.*

See Appendix C and D

### (h) Weather Conditions

1) *Wind speed(s) and direction(s)*

See Appendix C and D.

2) *Presence of conditions likely to lead to temperature inversion (e.g. calm nights with little cloud cover)*

None.

## Appendix E (continued)

3)	<i>Precipitation</i>	None.
4)	<i>Fog</i>	None.
5)	<i>Wet ground</i>	None.
6)	<i>Frozen ground or snow coverage</i>	None.
7)	<i>Temperature:</i>	See Appendix C and D.
8)	<i>Cloud Cover</i>	See Appendix C and D.

### (i) Date(s) and Time(s) of Measurements

See Appendix C and D

### (j) Measurement Time Intervals

15 minutes

### (k) Reference Time Interval(s)

The reference time interval is 1 hour for the daytime assessment between 07:00 to 23:00 hours and 15 minutes for the night time assessment between 23:00 and 07:00.

### (l) Specific Sound Level

#### 1) *Measured sound level(s)*

During the daytime there was significant contribution from local road traffic and as such there was uncertainty with estimating the specific sound level using the ambient and residual measured levels.

The specific sound levels for the sources on site were based on the measured noise levels on site and contemporaneous notes of noise levels at the measurement location when specific noise sources were dominant. These measurements have been used to determine sound power levels and are verified with measurements of similar items of plant measured at other sites and contained in the WBM plant noise database.

The sound power levels for the specific sound levels are presented in Appendix F.

During the night time the specific sound level was calculated for 2 Fengate Park based on measurements of the  $L_{A90} / L_{A95}$  at the monitoring location in the south eastern corner of the site. At 169 Fengate site noise was not audible.

The specific sound levels are set out in Section 6 'Noise Assessment'.

#### 2) *Residual sound level(s) and method of determination*

The residual sound levels were measured during periods of site shut down during both daytime and night time.

The residual sound levels are set out in Section 5 'Noise Surveys' and Section 6 'Noise Assessment' and are summarised below:

### Appendix E (continued)

	Western boundary location (169 Fengate)	South eastern boundary location (2 Fengate Park)
<b>Daytime</b>	59-65dB L <sub>Aeq,15min</sub>	N/A
<b>Night time</b>	52-53dB L <sub>Aeq,15min</sub>	55-56dB L <sub>Aeq,15min</sub>

3) *Ambient sound level(s) and method of determination*

The ambient sound levels were measured during periods of site operation during both daytime and night time.

The ambient sound levels are set out in Section 5 'Noise Surveys' and are summarised below:

	Western boundary location (169 Fengate)	South eastern boundary location (2 Fengate Park)
<b>Daytime</b>	60-69dB L <sub>Aeq,15min</sub>	N/A
<b>Night time</b>	49-54dB L <sub>Aeq,15min</sub>	51-58dB L <sub>Aeq,15min</sub>

4) *Specific sound level(s) and method of determination*

The specific sound levels are set out in Section 6 'Noise Assessment'.

The specific sound levels for the daytime were calculated as there was significant uncertainty using the simple method of subtracting the ambient and residual sound levels. The calculated specific daytime noise levels are as follows:

	Scenario 1	Scenario 2	Scenario 3
<b>169 Fengate</b>	50 dB L <sub>Aeq,15min</sub>	53 dB L <sub>Aeq,15min</sub>	55 dB L <sub>Aeq,15min</sub>
<b>2 Fengate Park</b>	34 dB L <sub>Aeq,15min</sub>	42 dB L <sub>Aeq,15min</sub>	46 dB L <sub>Aeq,15min</sub>

At night time noise from the site was not audible at 169 Fengate and as such no further assessment has been undertaken.

At 2 Fengate Park the specific sound level has been calculated based on the measurements to the south east of the site, giving a plant noise level of 49-50dB(A) at the measurement location. The nearest dwelling at Fengate Park is approximately 105m from the roller shutter doors on site, giving a distance attenuation between the measurement location and the receiver location of approximately 16dB and a specific sound level at the receptor of 33-34dB L<sub>Aeq,15min</sub>.

5) *Justification of methods*

See above.

## Appendix E (continued)

6) *Details of any corrections applied*

A correction for screening has been used in the daytime calculations for part of the MHE movement unloading the lorry in Scenario 3. A barrier attenuation of 16dB has been calculated and is appropriate as the MHE route is screened from the receptor location by large commercial buildings in the source to receiver path.

(m) **Background Sound Level(s)**

*Background sound level(s) and measurement time interval(s) and, in the case of measurements taken at an equivalent location, the reasons for presuming it to be equivalent.*

The background sound levels were measured during periods of site shut down during both daytime and night time.

The background sound levels are set out in Section 5 'Noise Surveys' and are summarised below:

	Western boundary location (169 Fengate)	South eastern boundary location (2 Fengate Park)
<b>Daytime</b>	50-51dB LA90,15min	N/A
<b>Night time</b>	45-46dB LA90,15min	44-45dB LA90,15min

(n) **Rating Level(s)**

1) *Specific sound level(s)*

The specific sound level(s) stated earlier are:

	Daytime		
	Scenario 1	Scenario 2	Scenario 3
<b>169 Fengate</b>	50 dB LAeq,15min	53 dB LAeq,15min	55 dB LAeq,15min
<b>2 Fengate Park</b>	34 dB LAeq,15min	42 dB LAeq,15min	46 dB LAeq,15min
	Night time		
<b>169 Fengate</b>	N/A (not audible)		
<b>2 Fengate Park</b>	33-34 dB LAeq,15min		

## Appendix E (continued)

### 2) Any acoustic features of the specific sound

During daytime two potential acoustic feature corrections have been accounted for, +3dB intermittency and +4dB tonality. As MHE tonal reverse alarms will be replaced with broadband reverse alarms, the only remaining tonal feature of the noise will be from lorries reversing into site. This is a common noise source in the area (tonal reverse alarms are not unique to the RFF site), is only present for a matter of seconds within the hour assessment period and so arguably an intermittent feature correction (and none for tonality) is sufficient. A range of values are presented to account for both features.

During night time there were no discernible acoustic features to the specific sound and as such no acoustic feature correction has been applied.

### 3) Rating level(s)

The rating sound levels are:

		Scenario 1	Scenario 2	Scenario 3
Daytime	169 Fengate	53-57 dB L <sub>Ar,T</sub>	56-60 dB L <sub>Ar,T</sub>	58-62 dB L <sub>Ar,T</sub>
	2 Fengate Park	37-41 dB L <sub>Ar,T</sub>	45-49 dB L <sub>Ar,T</sub>	49-53 dB L <sub>Ar,T</sub>
Night time	169 Fengate	N/A (not audible)		
	2 Fengate Park	33-34 dB L <sub>Ar,T</sub>		

### o) Excess of the level(s) over background sound level(s)

*Excess of the rating level(s) over the measured background sound level(s) and the initial estimate of the impacts*

The excess of the rating levels over the representative background sound levels are presented in the following table:

	Daytime		
	Scenario 1	Scenario 2	Scenario 3
169 Fengate	+3 to +7 dB	+6 to +10 dB	+8 to +12 dB
	The initial assessment of impact ranges from below adverse impact to above adverse impact and up to and above significant adverse impact. However, this is dependent on the context.		
2 Fengate Park	-13 to -9 dB	-5 to -1 dB	-1 to +3 dB
	The initial assessment of impact ranges from a low level of impact (rating levels are below the background sound level) to below the point at which an adverse impact might be expected to arise. However, this is dependent on the context.		
	Night time		
169 Fengate	N/A (not audible)		
2 Fengate Park	-12 to -11 dB		
	Where the rating level is below background level, this is a positive indication of a low level of impact from the site.		

## **Appendix E (continued)**

When the rating level is above the background sound level, a difference of around +5 dB is likely to indicate an adverse impact and a difference of around +10 dB or more is likely to indicate a significant adverse impact, depending on the context.

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.

### **(p) Conclusions of the assessment after taking context into account**

Context has been considered in detail in Section 6 'Noise Assessment' of this report.

The initial assessment of impact at 2 Fengate Park, both during daytime and night time, indicates a low level of impact. Similarly, the night time assessment at 169 Fengate indicates a low level of impact. Contextual factors are relevant, but are only expected to further lower the initial assessment of the impacts. As the noise at 2 Fengate Park, and at night time for 169 Fengate, is already at a point where pollution is not expected, the specific contextual factors for this receptor have not been considered further.

During daytime at 169 Fengate the initial assessment of impact ranges from below adverse impact to above adverse impact and up to and above significant adverse impact. However, this is dependent on the context, which is a key consideration for this site and receptor as discussed below.

Several contextual factors are relevant, including the relevance of the tonal acoustic feature correction, character of the locality, existing residual noise levels and time of the day that the noise occurs. These are discussed in detail in Section 6.

After considering context it is concluded that the initial assessment of impact could be reduced to +3 to +8dB at 169 Fengate, i.e. below the point at which adverse impact might be expected to arise to above this point, but below the point at which significant adverse impact might be expected to arise.

Considering the character of the locality and the time of the day that the noise occurs, it is highly unlikely that a significant adverse impact would arise. Whilst during worst case periods of activity there may be noise at a level where there is some adverse impact, this is not at a level where there is significant pollution. At times, noise will be audible from the site, but will also be masked by other local sources for much of the time.

Where noise is audible or detectable (i.e. where there may be some adverse impact) the duty of the operator is to use appropriate measures to prevent, or where that is not practicable, minimise noise. A number of appropriate measures have been adopted at the site to minimise and prevent noise impact and are set out in Section 7 of this report.

## Appendix E (continued)

### (q) The potential impact of uncertainty

Section 10 of BS 4142:2014+A1:2019 states: “*Consider the level of uncertainty in the data and associated calculations. Where the level of uncertainty could affect the conclusion, take reasonably practicable steps to reduce the level of uncertainty. Report the level and potential effects of uncertainty.*”

One of the largest levels of uncertainty is whether the proposed activity gives rise to the calculated noise level at the receiver locations considered.

The measurements and assessment have been based on a realistic worst case scenario during the proposed daytime and night time operating periods.

The calculations assume 100% hard (reflective) ground, whereas in reality there will be some diffusion of the sound with areas of mixed ground cover rather than a perfectly reflecting surface.

The site noise calculations do not include any allowance for air absorption but this is unlikely to have any significant outcome on the calculated sites noise levels and conclusions on impact.

Consideration of uncertainty within the assessment therefore indicates that the conclusions regarding noise impact are unlikely to change significantly when accounting for uncertainty.

## Appendix F – Noise Calculation Assumptions

Spreadsheet calculations were undertaken following the methods contained in BS5228-1: 2009 “Code of practice for noise and vibration control on construction and open sites – Part 1: Noise” + A1: 2014, Annex F.

The calculation method for any plant which is relatively fixed in location is that set out in BS 5228-1: 2009 + A1: 2014, Annex F, and is the “Method for activity  $L_{Aeq}$ ” described in section F.2.2 or the “Method for plant sound power level” described in section F.2.3.

The calculation method for site mobile plant such as lorries and dump trucks is that set out in BS 5228-1: 2009 + A1: 2014, Annex F, and is the “Method for mobile plant using a regular well defined route (e. g. haul roads)” described in section F. 2. 5.

The nearest distances to the respective dwellings, from the various items of plant, have been used in the spreadsheet calculations for the site to calculate the reasonable worst case  $L_{Aeq,T}$  site noise levels.

Sound Power Level data has been included based on noise measurements obtained on site on 06 December 2023 and verified with measurements of the same type of plant contained within the WBM plant noise database (based on previous measurements of other similar plant items to those stated).

A summary of the data input into the spreadsheet calculations is presented below and in the following tables.

### Screening

The method of assessing screening is that attributed to Maekawa as used in BS 5228-1: 2009 + A1: 2014, Annex F and various other Government published documents. This method uses the calculated path difference and octave band noise data for each noise source over the frequency range stated in BS 5228-1: 2009 + A1: 2014, Annex F.

### Ground Absorption

Ground Absorption has been calculated using the technique set out in BS 5228-1: 2009 + A1: 2014, Annex F, assuming 100% hard ground on site and between the site and the receiver locations. The effects of ground absorption are not used in the calculations if screening has been assessed and offers a higher attenuation.

### Terrain

The effects of terrain have not been included in the calculations as there is no significant difference in ground height between the site and the nearest receptors. The ground height is therefore considered to be 0 for both receptors and sources (the receiver height and source heights are listed below).

### Receptors

Name	Assessment height	Grid reference	Sensitivity
169 Fengate (two storey dwelling)	1.5m (ground floor) 4m (first floor)	E: 520708 N: 298523	High
2 Fengate Park (single storey dwelling)	1.5 (ground floor)	E: 520871 N: 298486	High



### Appendix F (continued)

Note: daytime calculated noise levels have not been assessed separately at 4m height (first floor) for 169 Fengate as the calculated noise levels are the same as for 1.5m height. This is due to the lack of screening included in the calculations and the worst case assumption of 100% hard (reflective) ground.

#### Noise Source Levels

The locations of noise sources are shown on the plan in Appendix B.

Plant Item	BS5228 Method	Sound Power Level dB L <sub>WA</sub>	Source Height (m)	On time	2 way flow per hour / speed (km/h)	Range (m) 169 Fengate / 2 Fengate Park
<b>Scenario 1 (Daytime, Minimum Activity)</b>						
2 x lorries along western boundary of site, over weighbridge (unloading)	Haul Road	100	2	100%	4 / 8	N/A
<b>Scenario 2 (Daytime, Typical Activity)</b>						
2 x lorries along western boundary of site, over weighbridge (unloading)	Haul Road	100	2	100%	4 / 8	N/A
2 x lorries to the front yard (manoeuvre / loading)	Haul Road	100	2	100%	4 / 8	N/A
1 x MHE loading lorry	Defined Area	91	1	50%	N/A	37 / 35
<b>Scenario 3 (Daytime, Worst Case Activity)</b>						
1 x lorry along western boundary of site, over weighbridge (unloading)	Haul Road	100	2	100%	2 / 8	N/A
1 x lorry to the front yard (loading)	Haul Road	100	2	100%	2 / 8	N/A
1 x MHE loading lorry	Defined Area	91	1	50%	N/A	37 / 35
1 x lorry to the front yard (unloading)	Haul Road	100	2	100%	2 / 8	N/A
3 x MHE unloading lorry	Defined Area	91	1	100%	N/A	36 / 47
	Defined Area	91	1	50%	N/A	37 / 35
	Activity*	108	1	2%	N/A	N/A

\* On certain parts of the site the MHEs would clatter as moving over an uneven surface, this has been included as an activity source level with a higher sound power level but limited on time to reflect the transient and short lived nature of the noise.