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2019-09-27

Planning & Building Control Service
Development Management
Westgate Plaza
PO Box 603,
Barnsley,
S70 9FE

Ref: Barnsley Fire Station
Planning Portal Ref No: **PP-08001345v1**

Dear Sirs,

Barnsley Fire Station – Supporting Information

Please find enclosed the following supporting information in relation to the above planning application;

'Barnsley Fire Station REP-1011589-05-AM-20190904-Noise Impact Assessment'. Revision 1 dated 27.09.2019.

This concludes the outstanding documents to be submitted via post.

Kind Regards

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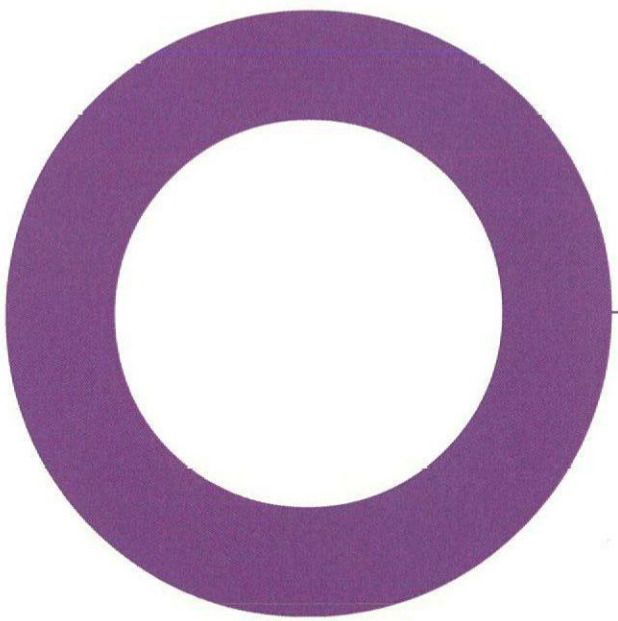
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Barnsley Fire Station.
Barnsley.
South Yorkshire Fire & Rescue.

ACOUSTICS
PROPOSED NEW FIRE STATION
NOISE IMPACT ASSESSMENT
REVISION 1 – 27 SEPTEMBER 2019



Audit sheet.

Rev.	Date	Description of change / purpose of issue	Prepared	Reviewed	Authorised
0	28/08/2019	Draft Report	AM		
1	27/09/2019	Issued Report	AM	DM	DM

This document has been prepared for South Yorkshire Fire & Rescue only and solely for the purposes expressly defined herein. We owe no duty of care to any third parties in respect of its content. Therefore, unless expressly agreed by us in signed writing, we hereby exclude all liability to third parties, including liability for negligence, save only for liabilities that cannot be so excluded by operation of applicable law. The consequences of climate change and the effects of future changes in climatic conditions cannot be accurately predicted. This report has been based solely on the specific design assumptions and criteria stated herein.

Project number: 10/11589
Document reference: Barnsley Fire Station REP-1011589-05-AM-20190904-Noise Impact Assessment-Rev1.DOCX

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1. Introduction.

Assessment has been made of the existing noise climate at the existing Barnsley Fire Station located off the A6133, Barnsley. It is proposed that the existing on-site buildings be demolished to enable construction of a new Fire Station building.

This report details the results of all site measurements and reviews this data with respect to applicable guidance and standards for office and residential development. The report also establishes noise limit criteria for new plant installations associated with the development.

2. Site Description.

The Barnsley Fire Station site is located on the western side of Barnsley Town centre adjacent to the A6133 Broadway.

The A6133 forms the south western site boundary and provides a principal by-pass route to the south of the town centre and linking with the A628 and the M1 Junction 37 in the north west and Doncaster Road in the east. The section of road adjacent to the site is dual carriageway with traffic speeds limited to 40mph and carries high volumes of traffic throughout the day. Traffic flow is controlled by traffic lights on the road junction with Keresforth Close and Assembly Way, located 40 metres to the south east. There are frequent buses using this stretch of road.

Beyond the A6133 to the south west are established residential properties.

Immediately to the north west of the site is a large Co Op distribution warehouse. Access to the warehouse is via the A6133 with the majority of activity occurring to the north east of the building but with car parking adjacent to the boundary closest to the fire station site.

To the north east of site is a large aerial tower and, beyond this, a large area of open fields beyond including sports pitches which are associated with the Shaw Lane Sports Club.

To the east and south east of the site are office buildings and residential properties associated with the NHS Keresforth Centre which are accessed from Keresforth Close.

An aerial view of the site and surrounding area is given below.



3. Development proposals.

Current development proposals comprise construction of a new building on two storeys to provide the following facilities:

Ground Floor:

- Barnsley Fire Station Main Office and Admin Area
- Station Managers Office (SMO)
- Districts HRs Office (DHR)
- General Managers Office (GMO)
- Plant Room
- Gym
- Watch Room
- Watch Managers Office (WMO)
- Toilets

First Floor:

- Rest Rooms 1 to 5
- TV / Training Room
- Kitchen / Dining
- WC / Showers
- Day lockers
- Medical / Dignity Room

The appliance bay will be located to the rear of the building with a single-story building housing the following facilities:

- Equipment maintenance
- Drying room
- Fire Kit Room
- Breathing Apparatus (BA) Room
- Compressor
- Store

The general footprint of the building will be similar to that of the existing Fire Station.

Vehicle access with be via the existing junction with the A6133 to the south west with staff and visitor parking facilities located at the front of the building overlooking the A6133. Fire trucks will follow the north western access road to the appliance bay beyond.

The Drill Yard is located on the eastern half of the site with the road traffic collision (RTC) area located towards the eastern corner. The existing tower, electrical sub-station and Ambulance Station will be retained as part of the redevelopment.

Use of the existing Drill Yard has been confirmed by the Barnsley Fire Station Manager as follows:

The Drill Yard is used on a daily basis, 7 days a week, normally between the hours of 10:30 and 13:00. but also occasionally in the evenings during the summer months between 19:00 and 21:00.

Training exercises can take up to 2½ hours to complete but will take on average 1 hour with noisy elements of the exercise taking around 20-30 minutes.

Generally, training takes place around the tower and water tank with all RTC training conducted using battery operated equipment. On this basis, it is pumping drills which generate the most noise.

Figures 1 and 2 show the current proposed site layout and floor plans.

4. Basis of Assessment.

4.1 National Planning Policy Framework.

The National Planning Policy Framework (NPPF): February 2019 sets out the Government's planning policies for England and how these are expected to be applied. The document seeks to encourage sustainable development subject to all relevant factors.

Section 15: 'Conserving and enhancing the natural environment', paragraph 170, states the following:

'*Planning policies and decisions should contribute to and enhance the natural and local environment by:*

- *preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability'.*

Furthermore, paragraph 180 states that:

'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:

- *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;*
- *identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason'*

Paragraph 183, additionally, states *'The focus of planning policies and decisions should be on whether a proposed development is an acceptable use of land, rather than control of processes or emissions (where these are subject to separate pollution control regimes)'.*

The NPPF also makes reference to the DEFRA Noise Policy Statement for England (NPSfE) 2010.

4.2 BS8233: 2014.

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

The BS 8233 recommended baseline design criteria for internal background sound levels in offices are as follows:

- Meeting Rooms L_{Aeq} 35-45dB
- Private Offices L_{Aeq} 35-40dB
- Open plan offices L_{Aeq} 45-50dB

The BS8233 internal design criteria for dwellings are as follows:

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

Section G1 of BS8233 advises that the typical sound reduction that is achievable through open windows is limited to 15 dB. The Standard does, however, acknowledge that additional sound reduction will result from room furnishings. Available test data indicates that, for mid-frequencies typical of road traffic noise, the overall sound reduction from outside to inside is approximately 20dB for a window open by approximately 100mm. This finding is substantiated by extensive test data given in Napier University report NANR116:2007 which was prepared on behalf of DEFRA.

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

4.3 BS4142: 2014 + A1:2019.

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

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

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

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

4.4 BS 5228:2009.

BS 5228 provides guidance on a range of considerations relating to construction noise including the legislative framework, general control measures, example methods for estimating construction noise levels, and example criteria which may be considered when assessing the significance of any effects. This standard has been adopted as the relevant method to predict and assess the effects of construction noise.

Annex E of this standard provides example criteria for the assessment of the significance of construction noise effects which includes an Example Method 1 - the ABC method, as summarised below:

Table E.1 below shows an example of the threshold of significant effect at dwellings when the total noise level, rounded to the nearest decibel, exceeds the listed value. The table can be used as follows: for the appropriate period (night, evening/weekends or day), the ambient noise level is determined and rounded to the nearest 5dB. This is then compared with the total noise level, including construction. If the total noise level exceeds the appropriate category value, then a significant effect is deemed to occur.

BS 5228 Table E.1

Assessment category and threshold value period (L_{Aeq})	Threshold value, in decibels (dB)		
	Category A [A]	Category B [B]	Category C [C]
Night-time (23.00-07.00)	45	50	55
Evenings and weekends [D]	55	60	65
Daytime (07.00-19.00) and Saturdays (07.00-13.00)	65	70	75

Assessment category and threshold value period (L_{Aeq})	Threshold value, in decibels (dB)		
	Category A [A]	Category B [B]	Category C [C]
NOTE 1 A significant effect has been deemed to occur if the total L_{Aeq} noise level, including construction, exceeds the threshold level for the Category appropriate to the ambient noise level. *NOTE 2 If the ambient noise level exceeds the threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a significant effect is deemed to occur if the total LAeq noise level for the period increases by more than 3 dB due to construction activity.* *NOTE 3 Applied to residential receptors only.*			
[A] Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values. [B] Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values. [C] Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values. [D] 19.00-23.00 weekdays, 13.00-23.00 Saturdays and 07.00-23.00 Sundays.			

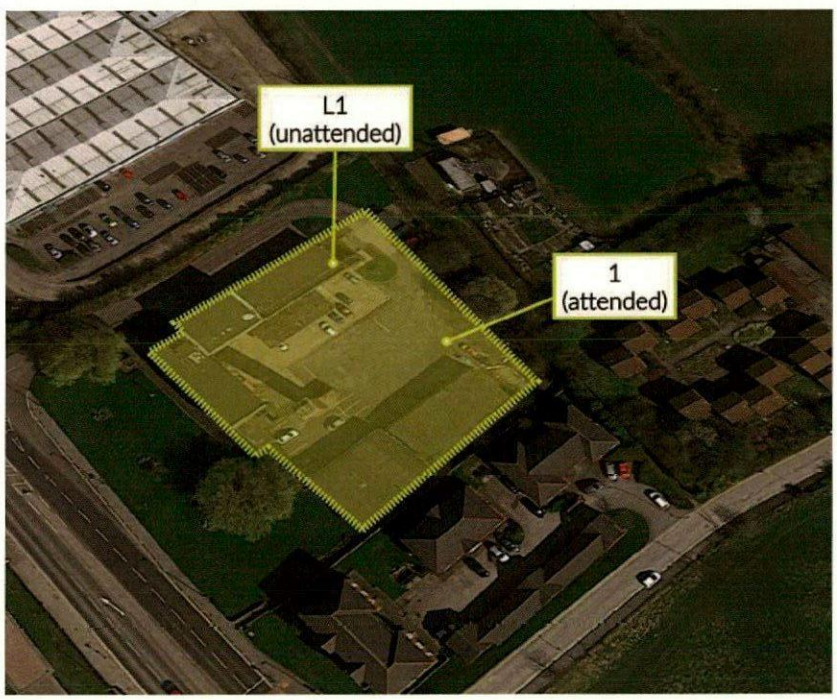
5. Measurements.

Monitoring was undertaken at two positions on the site over three days between Thursday 8th and Saturday 10th August 2019. The measurement positions are detailed below:

- Position 1 – automated noise logging meter located at roof top level on the eastern corner of the site overlooking the service yard at a distance approximately 80 metres from the A6133. Background noise levels measured at this position are expected to be representative of those at the residential dwellings to the east on Keresforth Close, and to the south west beyond the A6133.

- Position 2 – attended measurements in the existing fire station service yard.

The measurement positions are indicated below.



Levels were recorded continuously in 5-minute samples to determine the equivalent continuous sound level, L_{Aeq}, the short duration level L_{Amax} and also the percentiles L_{A10} and L_{A90}. It is considered that the measurement data obtained is representative of the overall noise climate around the proposed site.

Weather conditions over the survey period were dry and approximately 12-22 degrees Celsius. There was little to no wind during this time.

All measurements were made with calibrated, precision grade sound level meters in accordance with BS EN 60651 and BS 7445:1993. Details of the equipment used are provided in Appendix 3 – List of Measurement Equipment. All equipment was calibration-checked before and after the survey with no significant drift observed.

6. Results.

The results of all diurnal measurements are shown in Appendix 1. Levels are shown as hourly values derived from the 5-minute data and are considered to be a free-field measurement.

Position L1: Rooftop level towards the north of the site

The following table shows the average measured ambient sound levels (L_{Aeq}), the measured background sound levels (L_{A90}) and the measured maximum sound levels (L_{Amax}) during the survey:

Period	$L_{Aeq,T}$	L_{Amax}	$L_{A90,T}$
Thursday (11:00 - 23:00)	54.9	63 - 82	40.3
Thursday night	47.9	57 - 85	36.0
Friday	52.9	62 - 82	43.2
Friday night (23:00 - 03:00)	44.8	57 - 61	35.6

The daytime average noise level was $L_{Aeq,16hr}$ 53.8dB.

The night time average noise level was $L_{Aeq,8hr}$ 47.1dB.

Maximum noise levels for the night time measurement period were reasonably consistent at L_{Amax} 55-73dB with only two peaks over the 2-day period higher than this, attributed to emergency vehicle sirens.

Noise levels were measured towards the rear of the site at a distance of 80 metres from the nearest kerb of the A6133. Rooms at the front of the building nearest the road are at a distance of approximately 40 metres from the nearest kerb. As a result, average noise levels at the front of the building overlooking the A6133 are expected to be in the order of 3dB higher. Maximum noise levels are expected to be 6dB higher as summarised below.

Period	$L_{Aeq,T}$ dB	$L_{Amax,T}$ dB
Daytime	57	-
Night time	50	<79

The typical lowest measured background level during the day was $L_{A90(1\text{-hour})}$ 40dB, measured in the late evening on each day of the monitoring survey.

The typical lowest measured background level during times when use of the drill yard is most likely to occur (10:30 to 13:00 and 19:00 to 21:00) was $L_{A90(1\text{-hour})}$ 44dB.

The lowest typical measured background level during the night was $L_{A90(15\text{-min})}$ 39dB, measured between 00:00 and 02:00 on each night of the monitoring survey.

Position 1: Attended monitoring

Attended monitoring was carried out for various fire drills taking place in the main Drill Yard on the morning of Thursday 8th August 2019. During this time, highest levels of noise were reported to be as a result of the diesel pumps (fire truck pump and separate diesel pump), used to pump water from the mains supply into the on-site reservoir, and then from the reservoir through the hoses.



Typical sample levels at Position 1 measured at a typical distance of 10m from the centre of activity were as follows:

Start time	L_{Aeq}	L_{Amax}	L_{A90}	Notes
08/08/2019 11:12	70.2	79.8	62.7	Fire truck pump only
08/08/2019 11:13	71.3	78.2	67.0	Fire truck pump only
08/08/2019 11:17	79.2	85.0	78.3	Fire truck pump and diesel pump
08/08/2019 11:23	79.2	83.5	78.7	Fire truck pump and diesel pump

The diesel pumps in this exercise were operated at full power for 6 minutes and so an 10% on-time is considered appropriate, resulting in a typical hourly noise level of $L_{Aeq(1hr)}$ 60 to 70dB.

7. Discussion.

7.1 Existing Noise Climate.

The general noise climate around the site is attributable to traffic flows on the A6133 and other smaller roads in the local vicinity. The A6133 is a busy traffic route during daytime and night time as it provides a cross-city link around the town centre.

To the rear of the site, traffic noise levels are significantly lower due to increased distance from the roads and the screening effect of the existing building. The rear of the site is, however, subject to noise from activities at the existing Fire Station.

7.2 BS8233 Assessment – Office and Meeting Rooms.

The building envelope is required to provide adequate sound reduction of external noise levels to achieve an appropriate internal design criteria to office and meeting rooms.

From the external noise data and the internal design requirements, it may be extrapolated that the building fabric for office and meeting rooms overlooking the A6133 will need to provide a minimum sound reduction of the order of 22dB for traffic noise in order to achieve internal noise levels below 35dB.

The Watch Managers Office on the western elevation will benefit from distance and shielding from the building and noise reduction requirements are expected to be in the order of 5dB lower.

The structural components of the building envelope can be expected to provide a sound reduction in excess of 45dB and will not represent a significant pathway for noise break-in; greatest sound break in will occur via windows.

Data given in BRE IP 12/89 and BS8233 indicates that, for road traffic noise, standard thermal double glazing provides a typical sound reduction of 33dB(A). This order of reduction would be adequate to enable the internal design criteria to be achieved in all office and administrative areas of the new building.

7.3 BS8233 Assessment – Rest Rooms.

It is anticipated that the Rest Rooms 1 to 5 will be used at all times of day and night to provide sleeping arrangements for on-site staff.

The Rest Rooms are located at first floor level on the north western elevation with windows overlooking the access road. It is anticipated that noise levels on this façade will be at least 5dB lower than those measured at Position 1 due to shielding of road traffic noise from all sides provided by the building itself.

From the temporal site measurement data it may be extrapolated that, in order to achieve the minimum BS 8233 indoor requirements for bedrooms, the building fabric to the rest room would need to provide a minimum composite sound reduction of 27dB in order to enable sleeping during either the day or night time period.

As noted above, standard thermal double glazing can be expected to provide a typical sound reduction of 33dB for general traffic noise.

Where windows are open for ventilation, sound reduction across a partially open window will be limited to approximately 20dB. Under these conditions the BS 8233 internal criteria will be exceeded for habitable rooms and it will be necessary for these rooms to be provided with alternative means of ventilation. Background ventilation in accordance with Building Regulations requirements can be achieved with proprietary window or wall mounted trickle vents.

7.4 BS4142 Assessment for Building Services.

Plant selections have not yet been finalised for any of the on-site plant rooms and consequently, it is not possible to determine the specific plant noise impact. It will be necessary, therefore, to determine a noise limit criterion in accordance with BS 41412 which may be used for the selection and installation of new plant during construction.

The maximum allowable total cumulative plant noise level associated with the development has been determined in accordance with BS4142 and based upon daytime and night-time criteria given in BREEAM Office which requires a Rating Level of noise no greater than the background noise level. This is equivalent to a BS 4142 assessment of 'low impact'.

The lowest L_{A90} values measured over the survey have been used as the basis of the assessment and the total cumulative plant noise limits are derived as follows:

Parameter	Day	Night
Lowest typical L_{A90} level (day:1-hour; night:15min)	40	39
Character correction (tonal and impulsive)	-5	-5
Plant noise limit at dwelling - L_{Aeq}	35	34

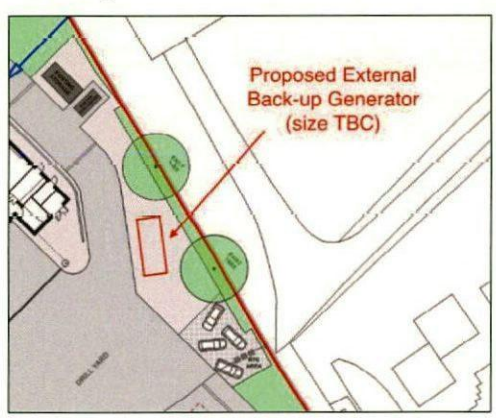
It can be seen from the table above that, in order for the Rating Level of new plant noise associated with the development to be equal to the minimum background noise levels, the maximum total cumulative plant noise levels at the façade of the nearest dwellings must be no greater than L_{Aeq} 35dB during the day-time and L_{Aeq} 34dB during the night time. Noise control measures may be required to achieve these levels and it will be necessary to review plant selections and locations during the construction phase.

7.5 Emergency Generator Plant Noise Assessment.

In addition to the plant noise limits above, an emergency backup generator is proposed to be installed at the station. The diesel generator will provide electricity to the station in the event of a power-cut. On the basis that the generator will only run in the event of an emergency, or for very short periods for occasional daytime testing, a plant noise limit of 10dB above that of daytime background noise is deemed appropriate for this item of plant.

Current proposals are for the installation of a Cummins model C90D5 diesel generator which, in accordance with information from the manufacturers data sheet, will produce a sound level of 78dB(A) at a distance of 1 metre from the unit enclosure.

The location of the external generator is towards the northern perimeter of site at a distance approximately 38 metres from the nearest residential dwellings.



After allowance for distance attenuation, the noise level at the nearest dwellings will be 46dB(A) which is within 10dB of both the daytime and night time typical lowest background noise levels.

On the basis that the use of the generator will only run in the event of an emergency, or for very short periods for occasional daytime testing, noise levels from the proposed emergency standby generator are considered to be acceptable.

7.6 Training Yard Noise Assessment.

Typical noise levels for training yard activities have been measured at the existing facility as detailed in Section 5.

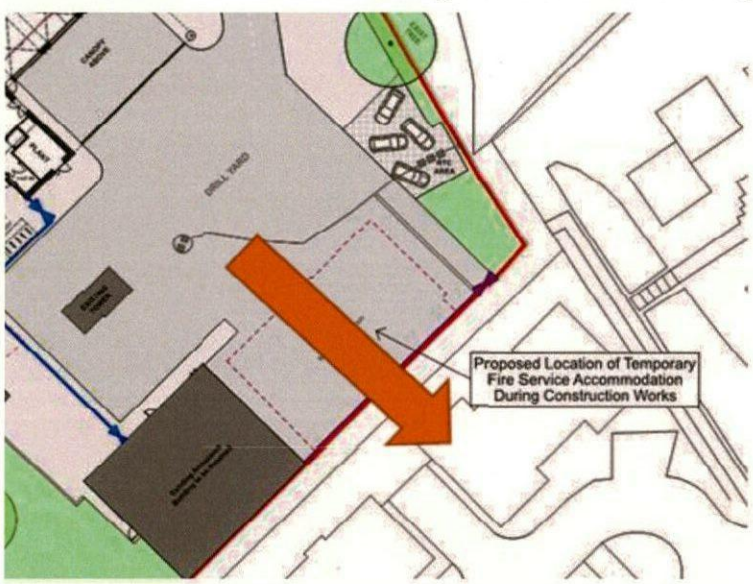
From the data provided, and assuming an on-time of 10%, it is estimated that the overall noise level would be of the order of $L_{Aeq(1hr)}$ 70 to 79dB as measured at a distance of 10m from the centre of activity with all other activities significantly (>10dB) quieter.

The BS 4142 assessment for training yard activity during the periods 10:30 to 13:00 and 19:00 to 21:00hrs is as follows:

Parameter	Barnsley Training Yard
Activity spl at 10m - L_{Aeq}	70 – 79 (ave 77)
On-time correction (10%)	-10
Distance correction (10m to 45m)	-13
Character correction	+3 (tonal)
Rating Level - L_{Aeq}	57
Typical background (10:30 to 13:00 and 19:00 to 21:00hrs)	47
Difference	+10
BS4142 Assessment	'Significant Adverse Impact'

The calculation is for open propagation and indicates that occurrence during the current daytime period may result in significant noise impact at the nearest dwelling unless mitigation measures are provided.

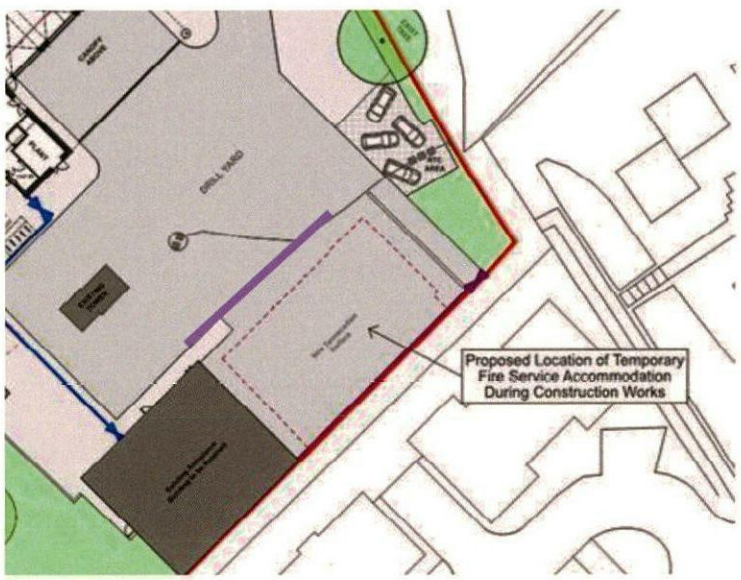
From the proposed site layout, it is noted that the training yard is screened from the dwellings to the east by the adjacent Ambulance Building and existing buildings, which provide a significant degree of sound reduction. However, demolition of these building will remove the screening effect.



These existing buildings are approximately 4 metres high and replacement by a solid acoustic barrier acoustic of equivalent height is not practicable. However, as the rear wall of the building lies directly on the site perimeter, perimeter fencing in some form will be required.

Based upon the supplied topological surveys for the site, it is calculated that a 2.4-metre-high perimeter fence will provide in the order of 8dB attenuation for the ground floor apartments but with negligible benefit (<1dB attenuation) at the upper floors.

Alternatively, it has been proposed that localised barrier fencing could be installed within the Drill Yard as indicated in PURPLE below.



It is calculated that a 2.4 meter fence in this position will provide in the order of 10dB attenuation at 1st floor level for activities which occur in the centre of the Drill Yard with improved reduction at lower levels. This order of reduction would enable a level of 'low impact' at the nearest dwellings with no further mitigation measures required.

If the mitigation measures above are not feasible, temporary screening be introduced in the form of localised moveable barriers around the diesel pump. This could be achieved by building a moveable enclosure in the form of an acoustic composite fence or screen and an enclosure of appropriately dense material (minimum 10kg/m^2) with no gaps or holes that surrounds the unit on all three sides and lined with acoustic internal lining material of minimum height 0.5m above the top of the unit. Calculations indicate that a barrier of this nature will provide attenuation in the order of 15dB when positioned in proximity to the pumps.

This order of attenuation would reduce the level of noise of the diesel pump at the nearest residential dwellings to a level below the typical daytime background noise levels and on this basis, the impact of noise from the pump would be considered to achieve a BS4142 condition of 'low impact'.

During the site measurements, no other significant noise sources were identified with all battery powered tools considered to be at least 10dB quieter than the diesel pumps. The general use of these tools is expected to achieve the requirements of BS4142 without further mitigation.

7.7 BS 5228 Assessment.

Site construction activity is expected to be limited by planning condition to weekdays (07.00-18.00hrs) and Saturday morning (07.00-13.00hrs), thereby avoiding the more sensitive evening periods and Sundays.

The survey data for the periods above were as follows:

Construction Period	ambient level - L_{Aeq}
Thursday	56dB
Friday	53dB

From the data, it can be seen that ambient sound levels at the dwellings for the permitted construction period are in the range L_{Aeq} 53 - 56dB.

From BS 5228 Table E.1, the ambient levels are below the daytime Category A threshold value and, consequently, the derived limit level for construction noise at the dwellings is the Category B threshold value of L_{Aeq} 65dB.

The findings above indicate that construction noise levels from the development which occur at any dwelling would be deemed to have a significant effect where a level of L_{Aeq} 65dB is exceeded. It will be necessary to limit construction noise impact to below the threshold value wherever practicable.

The proposed development layout indicates that the buildings will be set back from the residential boundary and, consequently, there will be beneficial distance attenuation during the main construction works.

It is probable that the most significant construction noise activity for this type of development will be site preparation and groundworks, including foundations. For these activities, significant benefit can be achieved by providing solid hoarding to a minimum height of 2m along the site boundaries adjacent to residential properties.

Major groundworks are unlikely to occur at positions near to dwellings but where particularly noisy activities such as piling are scheduled to occur near to dwellings, specific control measures should be provided to minimise noise impact for the duration of these specific works.

Other than the measures noted above, the general operation of the site should adopt the 'good housekeeping' measures outlined in BS 5228 to minimise noise generation. All site plant should be specified and maintained in accordance with manufacturer's requirements.

8. Recommendations.

Based upon the measured noise levels and the requirements of BS8233, all Offices, Meeting Rooms and the Rest Rooms should be fitted with glazing with a minimum manufacturer's rating of R_w 33.

These reductions should be from the window units as a whole, including the frame and any associated furniture.

All rooms throughout the development should also be provided with proprietary wall or window mounted trickle vents to achieve background ventilation in accordance with the Building Regulations requirements. All such vents should, when open, have a minimum rated sound reduction equivalent to that of the glazing detailed above.

It is recommended that all fixed plant associated with the new building be selected and specified to achieve the noise limit criteria derived at section 7.4 of this report.

It is recommended that localised barrier fencing to a height of 2.4m be provided to the southern edge of the Training Yard as detailed in Section 7.6. Where this screening is not practicable, it is recommended that temporary moveable barriers be used within the Training Yard to screen the diesel pumps from the nearest residential dwellings as also detailed in Section 7.6.

It is recommended that, during the construction phase, a noise limit criterion of L_{Aeq} 65dB be adopted for all adjacent residential properties. Construction noise levels should be checked periodically by the Contractor and particularly during operations that are known to be noisy. Where exceedances are identified, temporary control measures should be implemented to enable the criterion to be achieved.

It is recommended that site boundaries adjacent to all residential properties be provided with solid hoarding to a minimum height of 2m for the duration of construction operations. All construction operations should adopt the measures outlined in BS 5228 to minimise noise generation wherever practicable including the siting of fixed plant away from residential boundaries.

Where it is necessary to carry out piling or other particularly noisy operations near to residential boundaries, specific control measures should be provided to minimise noise impact. Measures would also be required to minimise vibration impact from piling.

9. Conclusions.

Survey work carried out at this site indicates that the overall noise climate is determined by traffic noise from the A6133 which lies to the south west of the site.

Compliance with the requirements of BS8233 can be achieved for all offices, meeting rooms and the rest rooms within the new building can be achieved by use of appropriate acoustic rated glazing systems and vents to control external noise break-in.

External noise limit criteria have been established for all new plant installations. Compliance with the criteria will enable plant to achieve a BS 4142 condition of 'low impact' when measured at those dwellings on Keresforth Road which adjoin the site.

Calculated sound levels for the emergency standby generator whilst operating at full load is within 10dB of the established day and night time criterion. Use of the generator will be limited to occasional brief daytime testing and emergency situations in the instance of a power cut and, therefore, the calculated levels are considered acceptable.

During training drills, a BS4142 condition of 'low impact' can be achieved at the nearest dwellings if consideration is made for localised barrier fencing on the Drill Yard, or else moveable screening located around the diesel pumps.

A limit sound level for construction noise impact at the dwellings has been derived in accordance with BS 5228.

Figure 1 – Site Location.

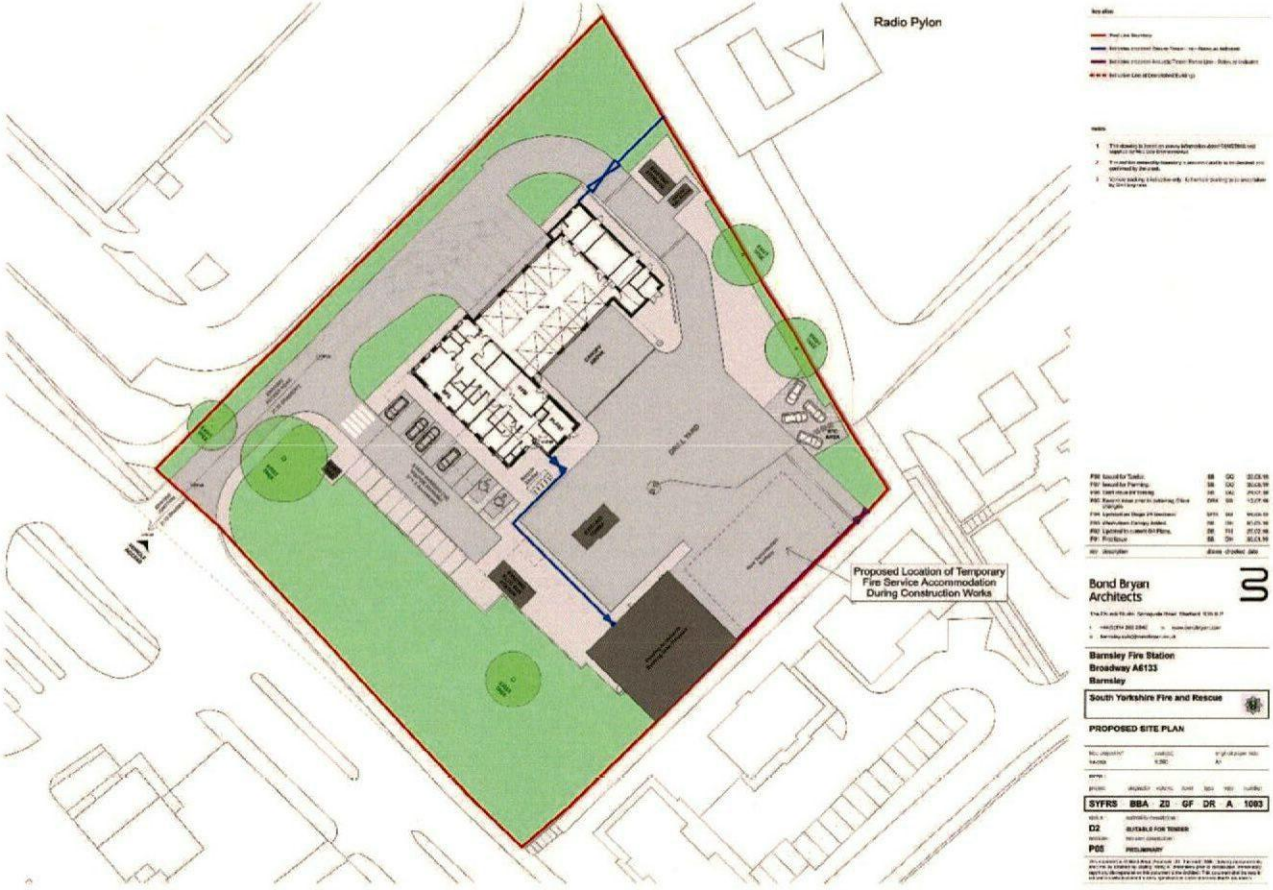


Figure 2 – Proposed Floor Layout.



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Broadway
Barnsley

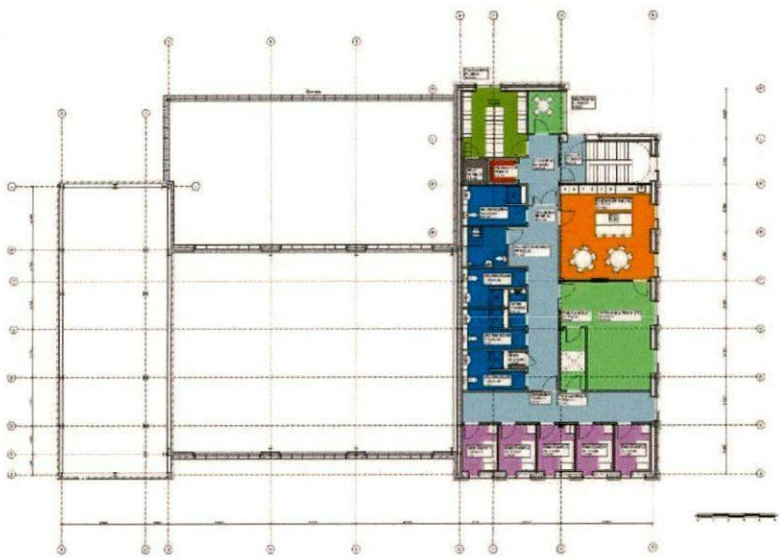
South Yorkshire Fire and Rescue

PROPOSED GF PLAN

SYFRS BBA ZS GF DR A 2001

D2

P11



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Barnsley Fire Station
Broadway
Barnsley

South Yorkshire Fire and Rescue

PROPOSED FF PLAN

SYFRS	BBA	ZZ	01	DR	A	2002

D2 SUITABLE FOR TENDER

P10

Appendix 1 – Measured Sound Pressure Levels.

Position 1

	From:	To:	$L_{eq,1hr}$	$L_{max,1hr}$	$L_{10,1hr}$	$L_{90,1hr}$
Day 1	11:00	11:59	64.1	99.7	61.7	50.3
	12:00	12:59	50.6	69.6	53.4	43.8
	13:00	13:59	49.1	63.5	52.5	42.7
	14:00	14:59	53.2	81.5	52.5	42.9
	15:00	15:59	49.3	72.5	52.0	40.4
	16:00	16:59	49.5	73.0	52.2	40.6
	17:00	17:59	51.2	72.0	52.7	41.8
	18:00	18:59	50.9	72.3	52.8	42.7
	19:00	19:59	49.4	69.8	52.2	44.0
	20:00	20:59	48.6	63.4	50.8	44.5
	21:00	21:59	47.1	69.4	49.7	42.3
	22:00	22:59	44.6	71.6	47.1	40.3
	23:00	23:59	42.7	70.1	45.0	38.4
Day 2	00:00	00:59	42.5	65.5	43.6	36.0
	01:00	01:59	42.1	56.7	42.7	37.7
	02:00	02:59	48.8	67.0	49.5	45.1
	03:00	03:59	47.1	69.2	47.9	43.9
	04:00	04:59	47.8	84.5	48.0	42.5
	05:00	05:59	48.3	67.4	50.9	42.7
	06:00	06:59	52.7	79.9	54.0	45.9
	07:00	07:59	53.9	71.7	56.2	48.8
	08:00	08:59	53.4	81.8	55.1	47.4
	09:00	09:59	52.0	69.1	54.7	47.7
	10:00	10:59	52.7	64.9	55.4	48.5
	11:00	11:59	53.3	75.1	55.6	48.9
	12:00	12:59	53.4	71.8	56.1	48.3
	13:00	13:59	53.5	63.2	56.1	49.7
	14:00	14:59	52.6	64.9	55.4	48.4

	From:	To:	$L_{eq,1hr}$	$L_{max,1hr}$	$L_{10,1hr}$	$L_{90,1hr}$
	15:00	15:59	53.1	62.4	56.0	48.4
	16:00	16:59	53.3	70.2	56.1	48.7
	17:00	17:59	54.0	77.4	56.5	48.7
	18:00	18:59	52.9	67.6	55.7	48.4
	19:00	19:59	54.3	74.6	56.1	48.6
	20:00	20:59	52.2	75.9	54.1	46.6
	21:00	21:59	48.9	69.1	51.5	44.4
	22:00	22:59	48.3	71.6	50.6	43.2
	23:00	23:59	46.6	60.6	49.7	41.1
Day 3	00:00	00:59	46.3	60.9	48.7	41.0
	01:00	01:59	43.1	60.2	45.6	37.7
	02:00	02:59	41.1	56.8	44.7	35.6

Appendix 2 – Glossary of Terms.

Decibel (dB)

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

A-Weighting

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

$L_{Aeq,T}$

The A-Weighted equivalent continuous sound level – the sound level of a notionally steady sound having the same energy as a fluctuating sound over a specified measurement period (T). $L_{Aeq,T}$ is used to describe many types of noise and can be measured directly with an integrating sound level meter.

$L_{A90,T}$

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

L_{Amax}

The highest A-Weighted noise level recorded during a noise event.

Appendix 3 – List of Measurement Equipment.

Noise Monitoring Information Sheet						
Name	Location 1					
Description	The noise climate was dominated by road traffic from A6133 and other nearby roads.					
Equipment	**Type**		**Serial Number**			**Last Calibrated**
Sound Level Meter	NL-52		00832246			25/11/2017
Pre-amplifier	NH-25		32274			25/11/2017
Microphone	UC-59		05473			25/11/2017
Calibrator	NC-74		34172705			13/01/2019
SLM Range	20 – 100 dB(A)		**Serial Number**			**Last Calibrated**
Data Collected						
File	**Time Start [GMT]**	**Time End [GMT]**	**Cal Start**	**Cal End**	**Drift**	**Notes**
1	08/008/2019	10/08/2019	94.0	94.0	0	No drift

The above equipment fulfils IEC 61672 Class 1 and is traceable to calibration under BS7580:Part 1:1997.

The equipment was calibration-checked before and after measurement - no adverse deviation was observed.

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