Paul Horsley Acoustics Ltd
Acoustics & Noise Control Consultancy

Acoustic Report

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Environmental Noise Survey for Development of the Former Dewsbury Fire Station Huddersfield Road, Dewsbury, WF13 3RN

Our Reference – J2590-R1

Survey Dates – 15th – 16th March 2017

Survey and Report by – Paul Horsley MIOA

Report compiled by: Paul Horsley MIOA

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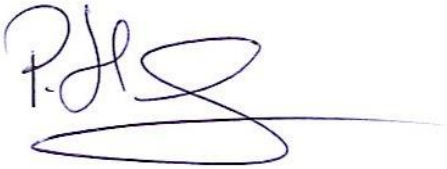

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1.0 Agent

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2.0 Subject

Proposed Redevelopment of the Former Dewsbury Fire Station
For 4 No Residential Apartments and 4 No Warehouse Units
Huddersfield Road
Dewsbury
WF13 3RN

3.0 Aims

The aim of this report is to determine the existing baseline background noise environment levels, over a typical weekday daytime and nighttime period, affecting the proposed development location in support of Planning Application No 2017/91047 relating to noise.

Provide an assessment of the results in accordance with the recommendations laid down in the National Planning Policy Framework, NPPF, for the proposed residential development site with respect to noise.

Provide mitigating noise control advice relating to the achievement of an acceptable internal environment for the development as recommended within World Health Organization's 1999 "Guidance for Community Noise, 1999", BS8233:2014 and BS4142:2014.

4.0 Location and Description of Existing Noise Sources

The proposed development site is the location of the former Dewsbury Fire Station positioned along A644, Huddersfield Road approximately 1.5Km south west of Dewsbury town centre.

The site is positioned on level ground and occupies an area approximately 72m x 60m.

The northern site boundary is formed by the A644 Huddersfield Road, a primary link road between Ravensthorpe leading to Huddersfield and Dewsbury town centres. Beyond the A644 are residential semi-detached premises.

The eastern site boundary is formed by a single width road at the rear of Thornville Mount, a parade of terraced residential houses.

The southern site boundary is formed by Broad Street containing a parade of residential premises directly opposite the site, with industrial units further along the road to the south west and north east at the end of the residential parade of terraced houses.

The western site boundary is formed by a site containing residential garages, several retail shops with residential terraced houses beyond at Stoney Bank Street.

The former Dewsbury Fire Station has been decommissioned for several years and as such any noise associated with a typical fire station no longer exist. The site is currently used for HGV trailer storage by the owner with minimal noise output.

The primary noise levels in the vicinity of the site is due to heavy traffic flow along the A644, Huddersfield Road. At peak traffic periods the traffic movement past the site is very slow or stationary due to sheer volume of traffic. This is resulting in elevated engine noise from the stationary or slow moving traffic.

Other noise sources of influence are due to industrial activity and plant noise from the nearby industrial unit located to the south west of the site along Broad Street and beyond.

5.0 Guidance on the Assessment of Noise Levels

The purpose of any criterion or standard for environmental noise should be to safeguard against unacceptable levels of community response, deemed as a feeling of annoyance during daytime or disturbance at night. WHO defines annoyance as "a feeling of displeasure evoked by noise"

The main source of information relating to noise and the community response are field studies including noise measurements and social surveys. These surveys attempt to establish a correlation between the two sets of results.

In the absence of any definitive guidance and in order to establish suitable noise criteria, it is necessary to rely on general guidance and assessment methods used for community noise sources. Discussions on the current methods are given below.

5.1 BS4142:2014 'Method for Rating and Assessing Industrial and Commercial Sound'

This recently revised standard provides a method for rating and assessing sound of an industrial and/or commercial nature. The method uses outdoor sound levels to assess the likely effect of sound on people who might be inside or outside a dwelling or premises used for residential purposes. It is limited to applicable sounds and is not intended for noise amounting to nuisance or rating noise outside the scope of the Standard.

Unlike the previous version of the Standard, rating levels are not prescriptive, but more context based, with the following applicable to rating values:

- Typically, the greater this difference (variance between impact of background and rating level), the greater the magnitude of impact.
- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending upon the context.
- A difference of around +5 dB is an indication of an adverse impact, depending upon the context.
- The lower the rating level is relative to the measured sound level, the less it is that the specific sound source will have an adverse impact or a significant impact. Where the rating does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending upon context.

The Standard introduces additional rating elements, these being subject assessments of tonality, and impulsivity of a sound source, with weighted rating values accordingly applied at the judgment of the assessor.

The introduction of Uncertainty has been applied to the measured values; again, consideration of this is left to the professional executing the survey and assessment. However, steps are provided within the Standard for the reduction of uncertainty in both measurement and calculations of the sound source and rating value.

Actual meteorological conditions are now required to be recorded and reported upon for the survey and report.

5.2 National Planning Policy Framework, NPPF.

The newly incumbent National Planning Policy Framework, NPPF, provides advice to planning authorities in England on how they must seek to minimise the adverse impact of noisy activities on noise sensitive receptors. This NPPF, replacing PPG 24, and is not prescriptive with respect to specific noise levels, and is mainly concerned with the advising on good practice for environmental noise assessment.

In the absence of definitive noise criterion within the NPPF most Local Authorities in England default to the daytime noise levels inside dwellings not to exceed NR 35; and NR 25, to be achieved inside dwellings at night to avoid sleep disturbance, based upon ingress of external noise sources.

5.3 World Health Organization 1999 "Guidance for Community Noise"

This document provides a review of the effects of noise and a description of the principles of the WHO health criteria and guidelines for Community Noise.

The effects of noise in dwellings are identified as sleep disturbance, annoyance and speech interference. For bedrooms, the critical effect is sleep disturbance. Indoor guideline values for bedrooms are 30 dB LAeq for continuous noise and 45 dB LAmax for sound events. At night time, outside sound levels about 1 metre from facades of living spaces should not exceed 45 dB LAeq, so that people may sleep with bedroom windows open. This value is equivalent to that specifies in the Criteria 12 document; however it is now assumed that the noise reduction from outside to inside with the window open is 15 dB.

To enable casual conversation indoors during the daytime, the sound level of the interfering noise should not exceed 35 dB LAeq.

To protect the majority of people from being **seriously** annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed 55dB LAeq on balconies, terraces and in outdoor living areas. To protect the majority of people from being **moderately** annoyed during the daytime, the outdoor sound level should not exceed 50 dB LAeq.

Table 1 of the document summarises the guideline values for community noise in specific environments and includes the noise indices to be adopted. Significantly, the corresponding time base to be used for the assessment is also included.

The relevant extracts of Table 1 are reproduced thus:

Specific Environment	Critical health effect (s)	LAeq dB	Time Base hours	LAMax dB
Outdoor living area	Serious annoyance, daytime and evening	55	16	-
	Moderate Annoyance, Daytime and evening	50	16	-
Dwelling, Indoors	Speech intelligibility & moderate annoyance daytime & evening.	35	16	-
	Sleep Disturbance, night-time	30	8	45
Outside Bedroom	Sleep disturbance, window open (Outdoor Values)	45	8	60

5.4 BS 8233:2014, 'Guidance on sound insulation and noise reduction for buildings'

This revised British Standard relates to the requirements necessary to allow for design of new building or refurbished buildings undergoing a change of use. It provides guidance on acoustic criteria appropriate for various types of internal spaces. The criteria as noted within 7.7.2, internal ambient noise levels for dwellings; are reproduced below:

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

These criteria are based upon average data and exclude occasional event noise.

The external noise criterion is noted as 50 dB LAeq,T with the upper guidance value of 55 dB LAeq,T which would be acceptable for noisier environments. It is also noted that these criteria may not be achievable in noisier environments where developments are desirable, such as city centres or urban areas adjoining strategic transport networks. Where this is the case, the development should be designed to achieve the lowest practicable levels for external amenity spaces, but should not be prohibited.

5.5 Subjective Impression of Noise Changes

The following Table provides a semantic scale that may be used to "subjectively" rate changes in sound pressure level.

Table 1: Subjective effect of changes in sound pressure level

Change in sound level dB	Change in Power		Change in apparent loudness
	Decrease	Increase	
3	1/2	2	Just perceptible
5	1/3	3	Clearly noticeable
10	1/10	10	Half / Twice as loud
20	1/100	100	Much quieter / louder

After Bies and Hansen

This table is taken from Professor Colin H Hansen's publication "Fundamentals of Acoustics" page 41, for the Department of Mechanical Engineering, University of Adelaide.

This table also appears in "Engineering Noise Control" by Colin Hansen and David Bies, a comprehensive reference book, amongst others.

6.0 Survey Equipment

Integrating Sound Level Meter, RION NA-27, Type 1, Serial No 431986
RION UC-53A Microphone Serial No 35771
RION NC-74 Calibrator Serial No 530712
Windshield
Tripod

7.0 Survey Method

An attended pre-development environmental noise assessment survey was carried out encompassing daytime and nighttime periods between 15th and 16th March 2017 by the author.

LA_{eq}, $LA_{90,}$ $LA_{10,}$ and LA_{max} sound measurements were taken using the sound analyser.

The measurement indices noted above are defined as follows:

LA_{eq}, T	the "A" weighted equivalent continuous noise level of sample period T
LA_{10}, T	the "A" weighted level exceeded for 10% of sample period T
LA_{90}, T	the "A" weighted level exceeded for 90% of sample period T
LA_{max}	The "A" weighted maximum level during the sample period T

Various sound measurements were taken using the sound analyser. The meter was calibrated before and after the measurements using the calibrator to ensure accuracy of the results. No fluctuations were noted between calibrations and the results obtained can be deemed to be an accurate representation of the levels recorded.

In order to ascertain the existing typical background noise climate, sound recordings were taken over 1-hour sample periods during daytime and 15-minute sample periods at night. The meter was mounted on the tripod at a height of 1.5m above ground and at least 3m from any reflective plain during the monitoring sessions. Refer to Appendix A for a marked up locational sketch for the survey location.

8.0 Prevailing Weather Conditions

15th March 2017 - Daytime – 13°C, Clear Sky, Wind SW 0-2m/s, 58% rh, 1030 mb

15th – 16th March - Nighttime – 8°C, 20% cloudy Sky, Wind W 0-1m/s, 85% rh, 1026 mb

9.0 Pre-Development Noise Survey Results

During the monitoring period separate noise samples were recorded, using a 1/1 Octave Centre Band analysis. These monitoring samples were collected from outside the premises at the northern corner of the site close to the A644, Huddersfield Road and to the eastern site boundary along Broad Street, generally, at the same location for daytime and nighttime periods. This was to establish the general noise levels experienced externally by the site at the most exposed position available and therefore likely to experience the worst case noise climate.

The table of results on the following page indicates the noise levels recorded for the site location selected during the monitoring period, with a brief description of the noise sources contributing to the individually monitored noise levels recorded.

The above monitoring locations should be read in conjunction with the site layout appearing in Appendix A of this report.

Refer to Appendix B for the survey results frequency analysis table.

10.0 Noise Survey Results Table

FORMER FIRE STATION, HUDDERSFIELD RD, DEWSBURY - NOISE SURVEY RESULTS TABLE

Map Location	Survey Period	Description of Location	Data ID	LAmax dB	LAeq dB	LA10 dB	LA90 dB	Survey Duration	Survey Date	Start Time	Source Description
1	DAYTIME	North west corner of site	1	97.9	72.6	69.8	58.8	01:00:00.00	15-03-2017	08:10:44	Slow moving traffic along A644 dominant. Police siren
			2	76.4	67.1	70.5	59.9	01:00:00.00	15-03-2017	09:10:44	Slow moving traffic along A644 dominant.
			3	79.2	66.6	69.2	60.2	01:00:00.00	15-03-2017	10:10:44	Slow moving traffic along A644 dominant.
			7	80.3	66.1	69.1	58.3	01:00:00.00	15-03-2017	14:36:02	Free flowing traffic along A644 dominant
			8	80.3	68.2	71.2	58.3	01:00:00.00	15-03-2017	15:36:02	Free flowing traffic along A644 dominant
			9	73.7	65.5	68.6	59.4	01:00:00.00	15-03-2017	16:36:02	Free flowing traffic along A644 dominant
1	NIGHTTIME	North west corner of site	13	78.4	65.1	68.5	42.3	00:15:00.00	15-03-2017	23:30:04	Free flowing traffic along A644 dominant
			14	77.2	63.7	69.6	39.6	00:15:00.00	15-03-2017	23:45:04	Free flowing traffic along A644 dominant
			15	79.0	63.0	68.1	39.8	00:15:00.00	16-03-2017	00:00:04	Free flowing traffic along A644 dominant
			19	75.7	52.6	49.0	42.0	00:15:00.00	16-03-2017	02:04:46	Low volume of traffci free flowing along A644
			20	61.0	45.8	47.9	41.8	00:15:00.00	16-03-2017	02:19:46	Low volume of traffci free flowing along A644
			21	52.0	42.1	44.2	39.2	00:15:00.00	16-03-2017	02:34:46	Low volume of traffci free flowing along A644
2	DAYTIME	South east site boundary	4	87.2	65.9	68.4	47.7	01:00:00.00	15-03-2017	11:13:40	Traffic flow along Broad Street dominant. Distant traffic audible.
			5	83.4	65.4	69.0	50.7	01:00:00.00	15-03-2017	12:13:40	Traffic flow along Broad Street dominant. Distant traffic audible.
			6	74.3	62.9	67.9	49.3	01:00:00.00	15-03-2017	13:13:40	Traffic flow along Broad Street dominant. Distant traffic audible.
			10	79.0	62.2	66.5	47.4	01:00:00.00	15-03-2017	17:42:55	Traffic flow along Broad Street dominant. Distant traffic audible.
			11	77.5	63.9	68.6	48.7	01:00:00.00	15-03-2017	18:42:55	Traffic flow along Broad Street dominant. Distant traffic audible.
			12	75.9	63.9	69.0	48.4	01:00:00.00	15-03-2017	19:42:55	Traffic flow along Broad Street dominant. Distant traffic audible.
2	NIGHTTIME	South east site boundary	16	78.4	62.4	65.9	38.8	00:15:00.00	16-03-2017	00:21:25	Passing traffic noise dominant. Background industrial noise from SW of Broad St
			17	79.8	63.4	67.3	37.9	00:15:00.00	16-03-2017	00:36:25	Passing traffic noise dominant. Background industrial noise from SW of Broad St
			18	77.9	62.4	64.7	37.1	00:15:00.00	16-03-2017	00:51:25	Passing traffic noise dominant. Background industrial noise from SW of Broad St
			22	50.7	43.3	46.7	39.9	00:15:00.00	16-03-2017	02:55:12	Distant traffic noise. Industrial plant SW of Broad St.
			23	52.3	45.0	48.1	41.3	00:15:00.00	16-03-2017	03:10:12	Distant traffic noise. Industrial plant SW of Broad St.
			24	53.1	45.6	48.6	41.9	00:15:00.00	16-03-2017	03:25:12	Distant traffic noise. Industrial plant SW of Broad St.

11.0 Results Analysis – Residential Development

The above noise survey, carried out between 15th and 16th March 2017, was chosen as a representative period to reflect the noise climate for the area surrounding the proposed development site.

The noise survey results obtained for the site can, therefore, be deemed to be representative of the activities for the area and will be used as the basis for analysis and assessment purposes below.

Assessments of the individual results indicate that the monitoring position selected is affected primarily by traffic noise, from vehicles passing along Huddersfield Road, Broad Street, and street activity noise itself during all periods. Plant noise emanting from the industrial estate to the south west of the site were audible but low in volume.

From the data acquired during the various assessment periods the following exposure noise levels have been established for the external area of the site, irrespective of elevation due to the varied noise climate.

Table of Calculated Total External Exposure Levels for the Site

Period	**Noise Level**
Daytime (0700 – 2300 Hrs)	LAeq, 16 Hours – 66 dB
Night-time (2300 – 0700 Hrs)	LAeq, 8 Hours – 60 dB LAmax - 80 dB

The above values have been derived by log averaging the daytime (excluding evening periods for robustness) and nighttime LAeq dB levels recorded and taking the worst case nighttime LAmax dB value for the nighttime period, using the following:

Day time - 10 Log_{ave} LAeq 16 hr = 10* Log ((10^(Value 1/10)) + (10^(Value2/10)) ….. / n)
Night time - 10 Log_{ave} LAeq 8 hr = 10* Log ((10^(Value 1/10)) + (10^(Value2/10)) ….. / n)

12.0 Mitigating Circumstances – Residential Premises

The proposal for the development site is for the demolition of the majority of the existing fire station and replacement with 4 No warehouse units, with a change of use of the existing fire station facilities building and conversion into 4 No residential flats over the 1st and 2nd floor levels of the building, with the ground level converted to a retail unit for the primary warehouse on site.

The existing building envelope is of a robust construction, brickwork cavity brick build, and should provide adequate attenuation against the external noise sources, identified in the vicinity, to achieve comfortable internal noise levels. Being of brickwork construction this is likely to be the case, with the internal noise levels recorded indicating that the noise ingress was through the glazing not the structure.

There are 3 main areas to consider within the development to ensure that the building provides adequate attenuation against the ingress of external noise sources that are likely to affect the comfort and amenity of the residents.

- Building Fabric Construction
- Glazing Units
- External Recreational Areas

12.1 Building Fabric Construction

The Building Regulation Approved Document E, relating to the minimum acoustic requirements for the various areas of the development, must under normal circumstance be met.

Actual verification of the acoustic properties of the buildings fabric will need to be executed by pre-completion sound testing prior to occupation.

Based upon the external baseline noise levels recorded, primarily due to traffic noise, the minimum weighted sound reduction, Rw, of the external façades will need to be Rw 45 dB to ensure that an internal specification of 30 $L_{Aeq,\ 8hours}$ dB, (equivalent to NR 25), is met within the noise sensitive dwelling areas during nighttime periods, as determined within the WHO recommendations. The LAMax of 88 dB will be attenuated such that the internal level will be 35 LAMax dB, below the specific requirements of WHO, however, in context for a primary road location.

Given a typical modern wall construction comprising an internal leaf of concrete block, lined externally with brick and a cavity between of at least 75mm, the following performance would be expected from the external façade construction:

Frequency in Hz	125	250	500	1000	2000
R_W of Facade	41	45	45	54	58

The external façade walls, including the party wall between the residences and the warehouse parts of the development, could be acoustically lined using a 50mm batten system with the void filled with 45 Kg/m^3 mineral wool and faced with 2 layers of 12.5mm sound block plasterboard having staggered joints and a finish plaster skim of 3mm thick. This would provide additional acoustic insulation against the noise ingress through the structure, estimated at an extra 20 dB reduction from external noise sources, therefore, ensuring best practical means and compliance with the WHO requirements.

Any internal wall and access corridors construction will need to provide the minimum acoustic requirements necessary to meet with the Building Regulations of $D_{nT,w}$ + C_{tr} 43 dB for airborne. All floors will need to achieve a minimum $D_{nT,w}$ + C_{tr} 43 dB for airborne and L'_{nTw} 64 dB for impact noise transmission, when considered between all party residential dwelling floor levels. Since there are several possible mitigation solutions to achieve these noise criteria, the recommendation will depend on the finish required and should be considered under separate issue outwith this report, however, compliance with the above is a minimum consideration that must be attained where possible.

The proposal includes for each floor level to be developed into 2 No individual 2 bedroomed flats. The common access will be via a formed side entrance off the rear slip road Thornville Mount to the eastern side of the ground floor area. A new access lift will be installed for use by residents only.

The floor / ceiling between the ground/1st floor retail/office unit will need to be acoustically treated to ensure that the minimum sound insulation properties are being achieved between the retail and formed residential premises are being met.

The existing roof of the building should provide the necessary sound insulation to meet the Building Regulations with respect to the passage of sound, however, to guarantee that the roof performs it is recommended that 2 x 15mm sound block platerboard is installed on resilient hangers or idependently supported using an MF frame fitted to the supporting wall having a 100mm void above filled with 33 kg/m^3

density mineral wool. Inclusion of this additional ceiling treatment will provide a calculated increase in sound isulation of up to 20 dB. Since the primary noise source in the area is due to traffic at ground level this level of increased sound insulation will ensure that there is no ingress into the formed habitable rooms from above.

The main access doors to the dwellings should be installed acoustically rated door sets having a minimum rating of Rw 35 dB to ensure the internal noise climate within the dwellings is maintained against ingress of common area and thoroughfare noise sources.

12.2 Glazing & Ventilation Units

The primary weakness in any building envelope is usually due to windows, ventilation louvres and other apertures.

The development will not have air conditioning installed within the noise sensitive residential areas of this development, other than extraction from bathrooms which are not within the noise sensitive bedroom areas and therefore the only area of concern are the proposed window systems.

In order to provide adequate attenuation against the sound levels in the area and achieve the Building Regulations and WHO criteria, it is recommended that the existing windows are replaced with formed suitable acoustic glazing units.

Using the sound exposure levels assessed for the site the minimum recommended Rw dB rating for the glazing systems for the site should be as follows.

Glazing Assessment for All Elevations

Period	Noise Exposure Level	Internal Living Space / Bedroom Target Level	Minimum Rw Values Required
Daytime (0700 – 2300 Hrs)	LAeq, 16 Hours – 66 dB	LAeq, 16 Hours – 35 dB	**Rw 31 dB**
Night-time (2300 – 0700 Hrs)	LAeq, 8 Hours – 60 dB LAmax - 80 dB	LAeq, 8 Hours – 30 dB LAmax - 45 dB	**Rw 30 dB** **Rw 35 dB**

Based upon data provided by Saint Gobain for their specialist SGG Climalit Enhansed Acoustic Double-Glazing systems, it is possible to provide the necessary sound insulation a 8mm Glass – 20mm wide Argon

Filled Airspace – 8.8A Glass glazing system. This system has certified acoustic values of Rw 40 dB, with an R_A 39 dB and $R_{A,tr}$ 35 dB. This is the recommendation for all elevations of the development.
The acoustic properties of this type of glazing is provided below for reference.

Glazing type	Frequency in Hz	125	250	500	1000	2000
8/20/8.8A	R_W of Facade	30	27	34	41	47

This is the recommended minimum combination and acoustic properties necessary to achieve the requirements for the proposed development.

The glazing also accounts for the low frequency noise associated with both the sub-station and music generated by the nearby venues.

If we consider an opening a window within a bedroom to provide additional room ventilation, the accepted attenuation value of the open window is -15 dB, this would allow for an internal noise level within a bedroom of up to 45 LAeq dB. This level of ingress is deemed as likely to result in sleep disturbance due to external sources, set at 30 LAeq dB within WHO.

In order to ensure disturbance due to external noise sources is not experienced and still provide adequate ventilation within bedroom areas, an alternative to opening a window would be to consider installation of an acoustic trickle ventilation system.

The ventilation system that provides both adequate background ventilation in accordance with Approved Document F1 and the minimum acoustic properties to maintain the internal noise characteristics of a closed window using a through ventilator. The Rw values quoted above for the glazing do not include for the trickle vent combination within their values and as such inclusion of a standard trickle vent will diminish the Rw values quoted.

The combined acoustic properties of the acoustic trickle vent system proposed for use on this site, Rytons AAC125 HPCWL or Greenwood Airvac MA3051, achieve a specified sound reduction of **45 Dn,e,w dB** through the ventilator in the open position, assuming it is fitted through a 300mm thick wall. This level of attenuation is achieving the minimum requirements necessary to ensure that the internal noise levels inside the bedrooms and habitable rooms are maintained for all elevations of this project. Other manufacturers could be considered provided that the Dn,e,w dB minimum value is maintained.

An alternative to a trickle vent system would be the use of a forced ventilation system, either attending to the dwelling spaces only or a "Whole House" system that would remove the need for opening windows during nighttime periods. This type of system is ususally located within the roof space of the dwelling and as such not likley to give rise to noise issues from its own operation, when considered either for the internal residents or the external amenity of the the nearby noise sensitive residential premises. An acceptable system would be the Seigenia-Aubi EUROPAC which is a forced vent specifically designed for this purpose.

Another alternative to passive "background" ventilation or whole house ventilation would be rapid ventilation via wall mounted acoustic extract fans positioned within the individual bedrooms and living spaces of the dwellings. In the case of this site this includes all the bedrooms and living spaces with facades overlooking the noisiest southern elevation. The fan assembly should provide at least a 43 dBA acoustic performance. This type of extraction allows for the windows of the property to remain closed whilst still providing adequate forced ventilation during the summer periods. These acoustic ventilation systems are available from various suppliers, an example being the Greenwood Airvac AAF/S Acoustic Extract Ventilator unit, providing manual control of the fan operation.

The forced ventilation system, either individual or whole house systems are the recommended method provided within Kirklees Council's "Noise Design Advise" guidelines for new build residential premises section 2.1 paragraph 4 dated May 2007.

12.3 External Recreational Areas

There will be no external recreational areas forming part of this development, therefore no further consideration is necessary.

12.4 Ground Floor Showroom / Office Space

The ground floor of the site will be converted into a showroom / office for the primary formed warehouse unit following the development of the property for residential use on the 1st and 2nd levels.

In order that this ground floor use does not provide any disturbance to the proposed 1st floor dwellings it is necessary for any internally generated noise to be considered.

BS4142:2014 recommends that industrial noise output 10 dB below an existing sound level is likely to be inaudible and as such not result in any loss of amenity.

As noted above within section 12.1, the dividing internal floor construction will need to provide the minimum acoustic requirements necessary to meet with the Building Regulations of $D_{nT,w}$ + C_{tr} 45 dB for airborne and L'_{nTw} 62 dB for impact sound transmission, when considered between all party residential dwellings.

This would normally be applicable to the division between the retail unit and the 1st floor dwelling space, however, since the final occupants of the ground floor shop units are not yet known, the noise produced by these occupants cannot be fully established.

In the absence of the finalized retail unit occupants, it is therefore recommended that the minimum acoustic properties are increased by approximately +10 dB to account for the uncertainty of the occupants activities below. This would require the dividing internal floor construction to provide the minimum acoustic requirements of $D_{nT,w}$ + C_{tr} 55 dB for airborne sound transmission between the areas.

It has been noted that no mitigation works have been completed below the floor level of the 1st floor space. If we assume that the maximum internal noise within the retail unit is up to 80 LAeq dB, above the Noise at Works limits, therefore not likely to be exceeded. This would allow for a maximum noise level of 25 LAeq dB inside the 1st floor dwelling space, below the level at which noise is considered to be detrimental to a loss of amenity and 5 dB below the limit set within WHO for nighttime periods. This would result in the noise source being inaudible inside the dwelling space irrespective of assessment period, day or night, eliminating trading hour's restrictions for the retail units.

13.0 Warehouse Development Considerations

There is a proposal for the demolish the majority of the former Dewsbury Fire Station building and erect 4 No warehouse (B8) and retail units (A1). The units are proposed for the western side of the residential block of the site with the ground floor of the residential premises used as office (B1) / showroom (A1) space for the primary warehouse, Unit 1. For further details refer to the supporting proposal drawings appearing within Planning Application Reference No 2017/91047.

The commercial units are seeking planning permission for daytime use only from 07.00 to 20.00 Mon to Saturday and 10.00 to 16.30 Sunday and Public Holidays.

In order to accommodate the development proposal, it will be necessary to consider the noise associated with the warehouse and retail units as this is the part of the development that will introduce specific noise sources to the site, where none presently exist. These sources will need to be considered at the existing nearby noise sensitive premises to the site to ensure that the amenity of the premises is not compromised as a result of the introduction of the facilities.

13.1 Proposed Warehouse Units

The 4 No proposed units will occupy the following floor space;

- Unit 1 Warehouse 569m^2, Showroom 77m^2, Offices 120m^2.
- Unit 2 Warehouse 131m^2, Showroom 39m^2.
- Unit 3 Warehouse 53m^2, Showroom 40m^2.
- Unit 4 Warehouse 54m^2, Showroom 42m^2.

13.1.1 Internal Noise Levels

The warehouse Unit No 1 is to be used for the storage and sale of carpets by the proprietor, with Unit 2 to 4 being let to complimentary trades such as kitchens, tiles and bathrooms. However, these unit sare still to be let and actual details are not known at this stage.

The noise levels generated by such trades will be low when considered internally within the warehouse spaces. The primary noise being generated by potential use of a forklift truck for movement of stock.

Based upon generic data for a forklift truck, these vehicles range between 65 dBA to 70 dBA output levels, dependent upon type and propultion used. This value in itself is not much use for assessing a buildings

sound insulation properties, therefore, if the NR dB rating is used, this will provide a limiting sound spectrum to work with.

The equivalent NR value to 70 dBA is NR 65 dB and possesses the following sound spectrum:

Frequency Hz	63	125	250	500	1K	2K	4K
Worst Case Value Assuming NR 70 at the Internal Façade of Building, dB	87	78	72	68	65	62	61

This sound spectrum will be utilized in the absence of any finalized data for the following building sound insulation assessment.

13.1.2 Determination of Building Fabric Acoustic Properties

In order to determine the likely effect the worst case internal reverberant noise levels are going to have on the local environment around the site, the acoustic properties of the proposed building fabric will need to be established.

The internal noise produced can only be "contained" within the building, provided that the sound insulation, SRI, of the building fabric is high enough to provide a sufficient barrier against the transmission of the sound through the structure.

Based upon the proposed construction the outer material will be a Kingspan KS1000 range composite panel system. The manufacturer's data for the SRI value of a Kingspan KS1000 panel system is provided below.

The acoustic performance of the KS1000 RW wall and roof panel provides a Weighted Sound Reduction Index of Rw = 25 dB. The frequency band reduction of the composite panel is as follows:

Sound Reduction Index (SRI)

Freq Hz	63	125	250	500	1000	2000	4000
SRI dB	20	18	20	24	20	29	39

13.1.3 Calculated Resultant

The purpose behind the above scenarios is so that an assessment of the likely noise levels at the closest noise sensitive dwelling can be made in advance of the actual development.

The appropriate model for the assessment of noise breakout from a building is given by considering the internal noise level within the room, the area of the wall likely to generate noise and the distance to the recipient. Additional to this is the consideration of the topography of the intervening land between source and recipient.

The calculation encompassing all these factors is given by:

$$\mathbf{L_2 = L_1 - R + 10Log\ S - 20\ log\ r - 14 - AS,\ dB}$$

Where $\mathbf{L_2}$ is the sound pressure level in dB at distance **r** metres from the wall under consideration;
$\mathbf{L_1}$ is the sound pressure level inside the pressroom adjacent to the wall where the breakout will occur;
S is the area of wall, m2;
R is the Sound Reductive Index, SRI, of the wall, dB.
AS is the barrier effect of the intervening topography, dB

Frequency, Hz	**63**	**125**	**250**	**500**	**1K**	**2K**	**4K**
L_1 within Industrial Unit, dB	87	78	72	68	65	62	61
KS1000 Wall System SRI, dB	-20	-18	-20	-24	-20	-29	-39
South Eastern Wall Area, 30m x 8m = 240m^2	24	24	24	24	24	24	24
Distance to recipient at 81 Broad Street, 31m	-30	-30	-30	-30	-30	-30	-30
Constant - 14	-14	-14	-14	-14	-14	-14	-14
Existing Boundary Wall Barrier Effect, dB	-15	-15	-15	-15	-15	-15	-15
Resultant, dB	**31**	**28**	**17**	**9**	**10**	**0**	**0**

The above calculated noise contribution to the background level equates to **NR 10 dB, or 16 dBA**.

This level of contribution is **-50 dB below** the baseline background value recorded when considered at the Broad Street side of the site.

If we take account of BS4142 rating a level of -10 below background is a clear indicator that noise is not likely to give rise to justifiable complaints, therefore a value of -50 dB below is a good indicator that noise is not an issue.

It should be noted that the above assessment is based upon worst case scenario of a limiting 70 dBA or NR 65 for the internal industrial unit noise criteria. Until the actual use of the internal space has been finalized actual calculated data cannot be determined, however, it should be noted that an internal noise level of up to 120 dBA can be achieved whilst still maintaining a value of 66 dBA outside the residential premises. This level of internal noise is not likely and as such the amenity of the nearby residential premises will be maintained following development.

13.1.4 Roller Shutter Doors

The above calculations have assumed that the building will be constructed using a composite panel construction throughout, however, it has not included the proposed roller shutter doors.

In order to provide attenuation against the internal noise produced within the building escaping out through the closed doors, the roller shutter doors will need to possess a similar sound reduction index, SRI, to the building as a whole.

Standard roller shutter doors only provide approximately 15 dB noise reduction when closed. This will be inadequate when considered against the internal noise produced.

It is therefore recommended the roller shutter doors are manufactured using a composite construction with tested and independently certified insertion loss characteristics.

A product that features noise reduction can be supplied by Crawford Doors and is their 542 composite acoustic panel type construction.

The door type 542 has a certified sound reductive index of 23 Rw, meeting the minimum requirements for the construction as a whole and as such maintaining the acoustic performance of the installation when the roller shutter doors are included.

The other area of concern relating to the roller shutter door sets, relates to the actual noise produced by the roller mechanism when operated. The 542 roller shutter door has the benefit of several seals to prevent

noise during operation of the doors. There are three areas that benefit from seals, these include a Top Seal, ensuring that the door panel once closed does not rattle or allow noise to bypass the panel; Bottom Seal, this seal ensure that the panel fits tightly to the floor once closed avoiding both wind induced rattling and ensuring that noise does not bypass the panel at the base; Side Seals, these seals ensure that the panel is sealed into position when closed and provides a positive location seal and guide when the door is in operation, again ensuring that the door does not vibrate during operation or due to wind induced movement. These seals also provide an acoustic seal against the egress of sound from within. Refer to Appendix C for brochure details.

The door operating mechanism can be via an electrically operated drive motor located within the building.

The above is a recommendation only and other manufacturer's products are available and possess similar acoustic performance and seals. Provided that the above minimum Rw value is achieved by the roller shutter doors supplied for this development, with appropriate seals, then specific manufacturers are irrelevant.

The other primary recommendation is that the doors remain closed at all times when not in use in order to minimize internal noise from emanating towards the noise sensitive residential premises. Any noisy operations taking place within the building should not commence whilst the doors are open. Doors should only be opened to allow access and egress of vehicles and should become a condition of the site operations.

13.2 Service Yard Activities

The site will include for external parking of 30 No cars and 3 No service vehicle within the yard area. The potential impact from these noise sources will need to be assessed, when considered outside the closest noise sensitive external residential premises, deemed as 81 Broad Street, south east of the site and 48 Huddersfield Road to the north west.

13.2.1 Impact Assessment from Car Park Noise

Noise from the car parking area will be assessed as commercial sources for the purpose of this assessment, and the activity associated with the noise will be restricted to the confines of the site only.

The impact of the car park activities will be assessed to demonstrate that no adverse effect to the amenity of the local residents will result.

The main car parking area is proposed to lie to the east of the site. The activities of concern centre on arrival and departure of vehicles, together with associated events such as engine start-up, door slamming etc. In order to make predictions of the noise level at some distance from the car park, it is first necessary to establish reference noise levels. The results are based upon noise readings taken at a distance of 1m, for ease of comparison.

Activity	Duration, s	LAeq,T	LAmax
Open door, get in, close door, start engine, reverse out of parking space, drive away to distance	30	73 dB	85 dB
Drive towards bay, park, switch-off engine, open door, get out and slam door shut	30	69 dB	88 dB

Calculations have been carried out to determine resultant noise levels at the nearest affected existing residential dwellings, these being considered as the premises north west of the site car park at 48 Huddersfield Road.

Predicted LAeq, 1h and LAmax façade noise levels are set out in the table below. The car parking spaces at the west of the site have been used as the datum for the predictions; these are deemed as an average of 45m from the façade of the residences considered. For the purposes of this exercise, consideration of all 10 No car parking bays in simultaneous use will be used to predict the likely noise levels at the residential premises.

Receiver	Floor	Car Park Activity	Predicted Noise Levels	
			LAeq.1h	LAmax
No 48 Huddersfield Road Residents	Rooms at Ground Floor Level	Vehicles arrive and park at bays	32 dB	55 dB
		Vehicles depart from bay	28 dB	
		Cumulative	**33 dB**	

Comparison of the above calculated noise levels due to car park usage of 33 LAeq.1h; with the design target noise levels for the area of 66 LAeq dB, for daytime periods at the residential premises, indicates that there will be no cumulative increase due to the car parking activities. The predicted noise levels fall

within the design target limits and as such the car parking activities should not give rise to complaints relating to noise from existing residents.

The residents located further to the south east of the site are positioned behind the proposed warehouse building at greater distances from the above and as such will be subject to lower exposure values than those calculated.

13.2.2 Impact Assessment for Service Vehicle Noise

It is considered appropriate to assess noise from delivery vehicles arriving on site, unloading or loading of goods. The methodology underpinning the assessment of these noise sources is discussed below.

If we consider the delivery vehicle, assumed to be an articulated HGV lorry, making a visit to site we must model the activity in full to determine if the noise generated is acceptable.

For the purposes of calculations, it is taken that the delivery vehicle will approach the site along Huddersfield Road and drive into the yard, turn through 180 degrees and then reverse up to the loading area to the south east of the building. Upon completion of the process the vehicle drives away from the loading area in a forward direction, turning on to Broad Street in a southerly direction and away to the major road network.

The complete operation will be assessed as taking approximately 35 minutes.

A period of 25 minutes being considered appropriate for loading / off-loading activities. In addition to the above, the assessment allows for a certain time of general off-loading activities, such as moving movement of goods, etc. A period of 10 minutes within the 1 hour assessment period has been used.

The delivery process can therefore be modelled as a number of elements, vehicle arrival, unloading and vehicle departure and general off-loading activities. Considering arrivals and departures, the likely path taken by the delivery vehicle has been modelled as a series of straight-line segments to approximate the path travelled by the vehicle. HGV noise emissions have been assumed as constant and independent of vehicle speed, since tyre noise is not significant in comparison to noise from the engine and exhaust. Calculations assume point source radiation as the vehicle travels along each segment, with a correction then applied to account for the time of traverse. This approach has been derived from observations of vehicle manoeuvring operations. Source and receiver heights of 1.5 metres and 4.5 metres respectively

have been used, with the latter corresponding to the most exposed windows of the nearest noise sensitive receptor, NSR, to the service yard.

With regard to unloading, fixed source positions have been taken for both the unloading and the transfer of goods. Point source attenuation has been assumed throughout. Noise levels have been assumed as continuous throughout the entire unloading operation.

A summary of a typical unloading process for a goods vehicle, together with the corresponding activity noise levels, is provided in the table below.

Summary of noise levels for typical service dock activities (dB re: 20uPa)

Activity	Typical Event Duration	Mean Distance	LAeq	LAmax
HGV arrives and reverses to unloading area	1 minutes	2 metres	71 dB	88 dB
Unloading of goods by fork truck at the loading area	25 minutes	2 metres	58 dB	84 dB
General off-loading activities	10 minutes	2 metres	56 dB	86 dB
HGV departs loading dock	1 minutes	2 metres	70 dB	88 dB

Using the table of data above noise predictions have been carried out for closest noise receptor position from this activity, deemed as No 81 Broad Street, south east of the site.

The following façade noise levels are predicted taking account of the "on-Time" of the activity defaulted to 1 hour and the natural attenuation due to distance to the recipient, assuming 20Log r (-3) dB.

(-3 dB used due to reflections off the building façade for robustness purposes)

This has been taken as a ground floor window of the residence, since we are only dealing with daytime periods, and sleep disturbance is not an issue with respect to noise, assessed at a distance of 30m.

The following façade noise levels are predicted taking account of the "on-Time" of the activity defaulted to 1 hour and the natural attenuation due to distance to the recipients will be :-

81 Broad Street premises at 30m from the Service Area = -26 dB

Since the site has a 3m high solid wall boundary at this location there will not be a line of sight between the yard and the residence. It has been assessed that there will be a -15 dB reduction due to the barrier effect of the intervening wall.

This means that there will be a total reduction due to distance and topography of -41 dB.

Predicted delivery/servicing noise levels (dB re: 20µPa) – Existing residences

Receiver	**Activity**	**Predicted Noise Level**	
		L_{Aeq}.60min	L_{Amax}
No 81 Broad Street at 30m	HGV arrives and reverses to unloading dock	12 dB	47 dB
	Unloading of product	13 dB	43 dB
	General off-loading activities	7 dB	45 dB
	HGV departs loading dock	11 dB	47 dB
	Cumulative	**17 dB**	N/A

Comparison of the above calculated noise levels due to off-loading at the rear warehouse area is 17 LAeq.1h; with the design target noise levels for the area of 66 LA90 dB for daytime periods at the existing residential premises of No 81 Broad Street and this indicates that there will be no cumulative increase due to the off-loading activities.

13.3 Fixed Plant Noise

Fixed plant items associated with the development usually include heating and ventilation equipment.

There are no proposals finalized for the development at the time of writing, therefore, the only course of action available is to place limiting noise output levels on the site with respect to fixed plant items.

Since the site is likely to be occupied from 08.00 hours, generally classified as daytime periods, the limiting values will need to account for this period.

The assessment indicates that the lowest recorded background level for the area is 37.1 LA90 dB, recorded at 00.51 hours.

In order not to increase the background level it is recommended that the limiting output level for all plant located on site is set at NR30 dB, equivalent to 35 dBA, when considered at the closest noise sensitive residential premises to the site, deemed as No 81 Broad Street and the 1st floor and above formed residential premises on site.

By working to an NR value, this will ensure that there is no tonality present within the potential fixed plant noise source reducing the likelihood of unduly affecting the nearby residents during quieter nighttime periods, assuming 24 hour operation of the fixed plant items to maintain a constant internal environment.

The limiting sound spectrum for NR30 dB is provided below.

Frequency, Hz	**63**	**125**	**250**	**500**	**1K**	**2K**	**4K**	**8K**
NR 30 Limit, dB	59	48	40	34	30	27	25	23

The above limits will equate to an equivalent BS4142:2014 liming rating value of **+0 dB** for the total output of all cumulative operational plant and equipment when considered at the premises of No 81 Broad Street and the façade of the proposed residential premises at the 1st floor and above.

Provided that the limits are adhered to there will be no loss of existing amenity for the residents.

14.0 Report Summary

An attended pre-development acoustic assessment of the existing noise levels around the proposed development of the former Dewsbury Fire Station to include 4 No Warehouse and showroom units and change of use of the facilities building for residential purposes on the 1st and 2nd floor levels, with the ground floor used for office and showroom purposes has been undertaken in support of the planning application No 2017/91047 for the site.

The noise survey established the pre-existing noise climate and sources for the area; which are primarily due to traffic and street activities noise sources.

In order to achieve an acceptable and comfortable internal noise climate for the potential residents the WHO guidance community noise has been utilized for the acoustic target levels for the internal criteria of the dwelling areas of the development. The National Planning Policy Framework has been considered, with NR 35 daytime and NR 25 nighttime internal limits being utilized since the NPPF is not prescriptive in its noise limits.

Mandatory mitigating recommendations are necessary to provide adequate protection against intrusion from external noise sources and achieve the best practical means reduction of noise ingress for the internal noise climate of the residences.

Recommendations have been proposed for the glazing systems to be employed on this development, in order to achieve the internal dwelling room design target exposure levels as determined within WHO recommendations.

To provide background ventilation opening windows is not a possibility due to the high background noise climate, therefore, as an alternative, recommendations have been provided for the acoustic passive or forced ventilation to be used on the development throughout.

The development will not include any external recreational areas and as such no consideration is necessary.

Consideration has been made of the likely worst case internal noise environment within the formed warehouse units and calculations have indicated that the breakout and effect on the nearby residential premises will be of low or negligible significance with respect to noise or loss of amenity.

The external areas have also been considered for car parking and service vehicles use and the calculations indicate that there will be no increase in background as a consequence and there will be negligible significance with respect to noise or loss of amenity when considered at the nearby residential premises.

APPENDIX A **Locational Outline and Monitoring Location**

APPENDIX B Noise Survey Frequency Analysis Results Table

FORMER DEWSBURY FIRE STATION SITE - NOISE SURVEY FREQUENCY ANALYSIS RESULTS TABLE

					Linear Leq dB Sound Pressure Levels									
Map Location	Survey Period	Data ID	LAmax dB	LAeq dB	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	LA10 dB	LA90 dB
1	DAYTIME	1	97.9	72.6	73.6	66.8	65.1	63.1	68.0	68.7	53.5	43.2	69.8	58.8
		2	76.4	67.1	73.7	66.5	64.7	63.2	63.7	59.2	51.0	41.9	70.5	59.9
		3	79.2	66.6	74.8	66.9	65.5	63.1	63.0	57.8	49.7	40.7	69.2	60.2
		7	80.3	66.1	73.6	66.4	63.9	63.0	62.2	58.2	51.3	41.9	69.1	58.3
		8	80.3	68.2	74.8	69.0	66.2	64.7	64.5	60.3	52.6	42.2	71.2	58.3
		9	73.7	65.5	76.1	70.4	65.1	62.1	61.5	55.9	48.9	40.4	68.6	59.4
1	NIGHTTIME	13	78.4	65.1	63.2	59.0	60.0	59.2	63.3	55.9	43.3	31.9	68.5	42.3
		14	77.2	63.7	65.3	61.0	59.7	58.5	61.6	54.5	43.8	32.6	69.6	39.6
		15	79.0	63.0	60.9	56.8	58.8	58.0	61.1	53.7	42.7	31.6	68.1	39.8
		19	75.7	52.6	58.6	49.8	52.6	47.4	49.6	44.4	35.7	25.8	49.0	42.0
		20	61.0	45.8	56.4	48.3	49.8	41.8	41.7	35.4	26.6	16.0	47.9	41.8
		21	52.0	42.1	53.6	46.5	46.4	38.2	37.9	30.4	19.4	13.8	44.2	39.2
2	DAYTIME	4	87.2	65.9	69.0	66.7	62.9	62.1	62.7	57.8	50.3	42.4	68.4	47.7
		5	83.4	65.4	73.2	65.4	62.9	61.0	61.9	57.9	50.8	41.4	69.0	50.7
		6	74.3	62.9	69.2	63.8	58.9	57.7	60.0	55.2	46.7	38.3	67.9	49.3
		10	79.0	62.2	68.1	60.3	58.9	57.5	59.1	54.4	46.5	38.0	66.5	47.4
		11	77.5	63.9	72.2	62.2	60.3	58.8	60.5	56.7	48.6	42.2	68.6	48.7
		12	75.9	63.9	66.8	61.4	59.6	57.9	60.8	57.2	47.4	38.8	69.0	48.4
2	NIGHTTIME	16	78.4	62.4	68.3	57.8	59.3	58.7	59.9	53.0	41.8	32.9	65.9	38.8
		17	79.8	63.4	67.7	61.4	59.8	58.8	61.3	53.6	42.6	34.0	67.3	37.9
		18	77.9	62.4	63.6	64.8	61.2	57.6	60.0	52.0	41.3	33.0	64.7	37.1
		22	50.7	43.3	51.0	47.3	46.7	39.0	39.5	32.5	19.7	14.1	46.7	39.9
		23	52.3	45.0	53.4	47.7	47.5	42.0	41.5	33.1	18.8	13.2	48.1	41.3
		24	53.1	45.6	54.7	48.3	47.6	41.5	41.8	36.2	22.5	13.6	48.6	41.9

APPENDIX C Typical Noise Sources Guide

dBA	Example	Home & Garden Appliances	Workshop & Construction
0	threshold of hearing		
10	a pin dropping		
20	rustling leaves		
30	whisper		
40	babbling brook	computer	
50	low conversational speech	refrigerator	
60	normal conversational speech	air conditioner	
70	laughter	dishwasher	
75	city centre traffic	vacuum cleaner	
80	shouting	dustbin lorry	
85	passing diesel lorry	street cleaner	
90	motorway traffic	lawn mower	arc welder
95	inside underground carriage	food processor	belt sander
100	motorcycle (riding)		handheld drill
105	sporting event		table saw
110	rock concert		jackhammer
115	emergency vehicle siren at 1m		riveter
120	thunderclap		oxygen torch
125	threshold of pain (hearing)		
130			
135	air raid siren		
140	jet engine at take-off at 50m		

Appendix D Type 542 Roller Shutter Door Brochure

Crawford
542 Overhead sectional doors

2

Crawford

Crawford
542 Overhead sectional doors

Customer needs in focus

The Crawford 542 is an overhead sectional door designed to be used in applications like warehouses, logistics centres and all kinds of production plants. The design is optimal for customers who need robust, well-insulated and space-saving doors in the outer walls of industrial premises.
The sectional door slides up under the roof when opened, allowing free space around the door opening and leaving it completely free.
A high quality, 42 mm thick, sandwich panel provides good insulation values and corrosion protection. This, together with a number of operational options, means that the Crawford 542 meets practically every individual demand.
In addition, the Crawford 542 is designed to meet all operational and safety requirements in the European Directives and the standards issued by the European Standardization Committee, CEN.

Modern panel design

The Crawford 542 sandwich panel has a microrilled design, which in combination with a glossy colour finish gives the door a modern, attractive and unique appearance.

Colours

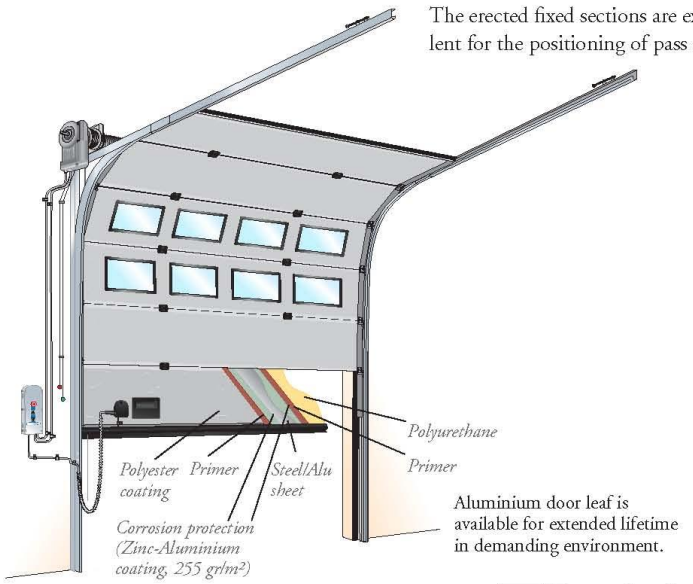
The Crawford 542 is available in 8 standard colours (see page 5).
The inside standard colour is off-white (RAL 9002). Optional colours are available on request.

Glazing

Glazing alternatives vary from full-vision panels to individual windows in a rectangular or oval shape. The windows are available in acrylic or hardened glass.

Fixed sections

Door openings are often changed to comply with new demands. Unnecessarily large door openings can advantageously be filled with fixed sandwich panels.
The erected fixed sections are excellent for the positioning of pass doors.



Aluminium door leaf is available for extended lifetime in demanding environment.

Crawford
Solutions that work

Pedestrian traffic

For safety reasons we recommend separating pedestrian and vehicle traffic by installing a pass door next to the overhead door.
Should building space not permit such a separation, an integrated pass door is available.

Technical facts

Max size[1] (W x H)
8000 x 6000

Panel thickness
42 mm

Colour outside, pre-coated
8 Standard
see page 5

Colour inside, pre-coated
RAL 9002

Windows, optional
See page 6

Pass door, optional
see page 6

Access and Automation, optional

Wind load[2], EN12 424
Class 3 < 4250 x 4500
Class 2 > 4250 x 4500

Thermal transmittance[3], EN12 428
Full panel door 0,8 W/(m²K)
With windows and pass door 1,25 W/(m²K)

Water penetration[3], EN12 425
Class 2

Air permeability[3], EN12426
Class 2

[1] Other sizes on request
[2] Higher wind load classification on request
[3] Door size 4000 x 4000

Crawford
542 Overhead sectional doors

Standard lift

Vertical lift

High lift

Low lift

Security
The Crawford 542 is equipped with a lock bolt, prepared for a padlock, as standard. Cylinder locks as well as various other security features are available as options.

Inside – no protruding parts
The inside of the Crawford 542 has no protruding parts where tools could be misplaced, causing injuries when the door is opened.
When inside reinforcements are required, e.g. when a pedestrian pass door is integrated in the main door, the design of the reinforcement is made in such a way that the risks above are reduced.

Finger pinch protection
The horizontal joints between the door sections are designed in such a way that fingers cannot be pinched during door movement.

Drop-down protection
Crawford 542 is equipped with two special anti-drop devices as standard. They prevent the door from coming down in case of a spring or cable break.

Hardware
Hardware is the collective name for the wall and roof tracks. Different types of hardware are available to accommodate the best installation at your site.
Standard lift is suitable for most buildings. Vertical and high lift designs utilise excess height of the wall above the door opening to save internal height in the building. Low lift is suitable for doors with limited headroom above the door opening.

Access and automation
Access to a building can be arranged in different ways: general or limited – permanent or temporary.
A number of manual and automatic control systems for opening and closing commands are manufactured and supplied by Crawford.
The safety level in these systems is determined by the environment in which they shall be installed.