



United Utilities

WOODGATE HILL WATER TREATMENT WORKS CHEMICAL BUILDING

Noise Assessment





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Noise Assessment

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SUMMARY

WSP has been appointed by Eric Wright Construction Ltd to undertake an environmental noise assessment for a chemical building at the United Utilities Woodgate Hill Water Treatment Works (WTW) site.

The proposed chemical building comprises a main building and control room annex. The main building houses two pumps and associated pipework. The control room annex houses control equipment.

The Proposed Development is located in the centre of the Woodgate Hill WTW site. There are a number of existing dwellings located nearby, including an isolated farm property to the north west; dwellings on Chaffinch Drive, Goldfinch Drive and Inglewood Close to the west; dwellings on Sixth Avenue and Fourth Avenue to the south east. These properties, and the Proposed Development site itself, are all located within the Bury Council area.

A noise survey has established existing background noise levels at noise sensitive receptors nearby the Proposed Development. The survey results have been analysed and representative background sound levels established.

A detailed 3D noise modelling and prediction exercise has been undertaken to determine the noise levels expected to result from the Proposed Development. The predictions have been compared to the noise limits defined at the nearest noise sensitive receptors to identify potential noise impacts.

The potential impact of noise from the Proposed Development on nearby receptors has been determined, based on the guidance contained in BS 4142¹.

¹ British Standard 4142:2014+A1:2019: *Methods for rating and assessing industrial and commercial sound*

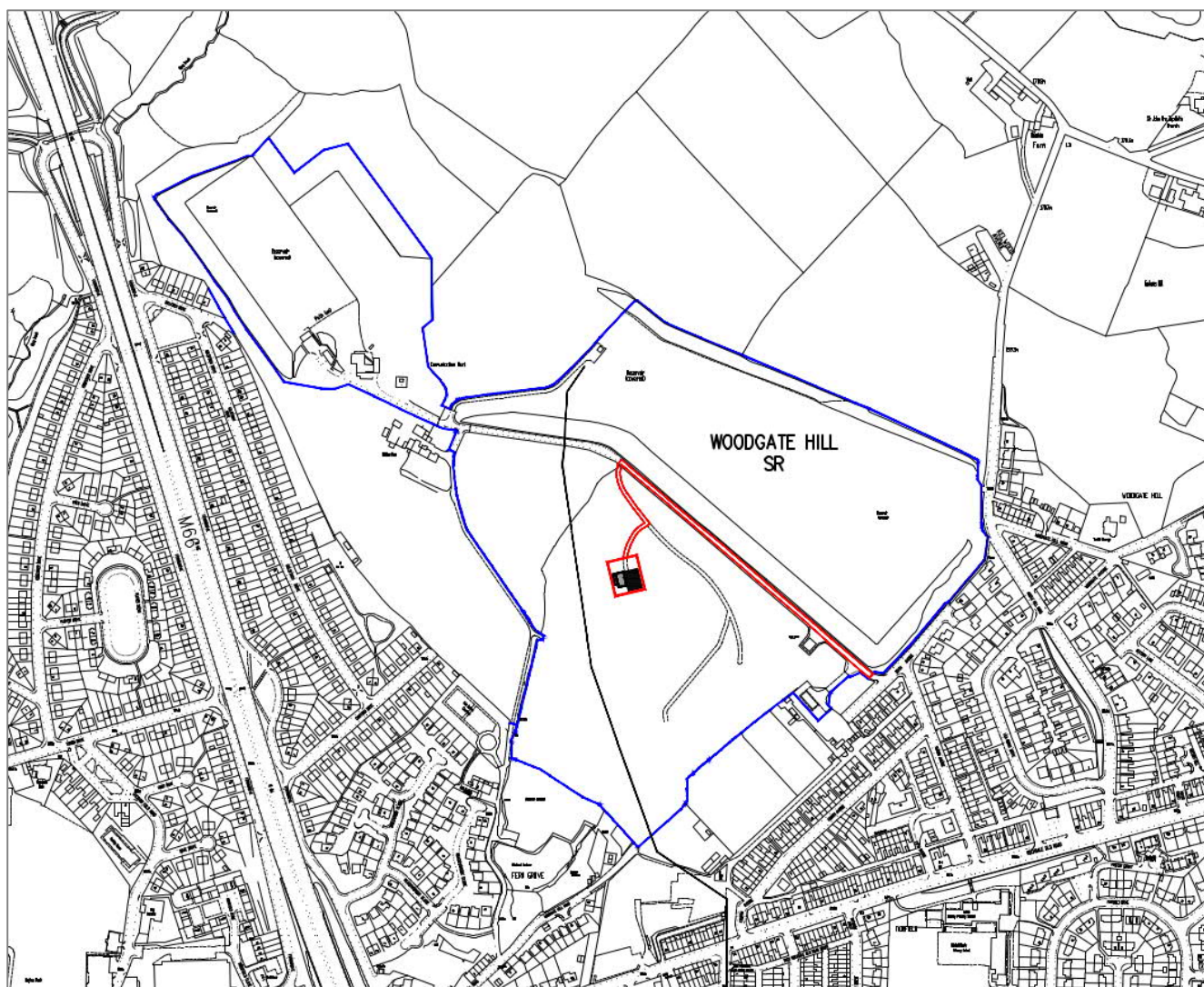
SITE DESCRIPTION AND PROPOSED DEVELOPMENT

SITE DESCRIPTION

Woodgate Hill WTW site is located to the north east of Bury, the M66 motorway is approximately 350 m to the west of the site. The Proposed Development is located in the centre of the Woodgate Hill WTW site to the south of the covered reservoir. Figure 1 shows the location plan, the red outline shows the application boundary, and the blue outline identifies land owned by United Utilities.

There are a number of existing dwellings located within 200 m of the Proposed Development, including an isolated farm property to the north west; dwellings on Chaffinch Drive, Goldfinch Drive and Inglewood Close to the west; dwellings on Sixth Avenue and Fourth Avenue to the south east. The closest properties are on Chaffinch Drive, approximately 180 m from the Proposed Development.

Figure 1 - Location plan

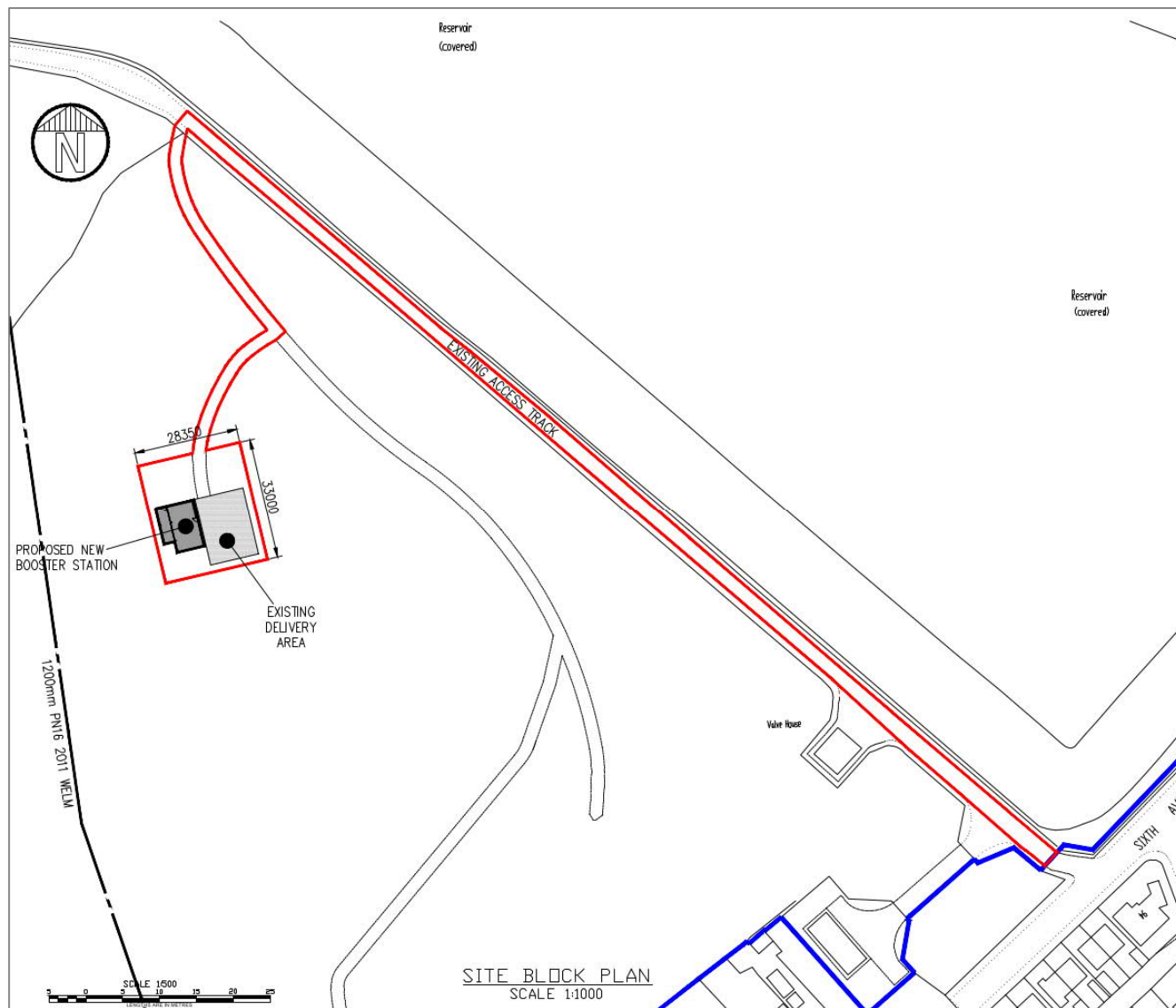


Source: Eric Wright Construction Ltd drawing no.: 80062068-02-EW-WOODG-99-DR-C-10005 P03

PROPOSED DEVELOPMENT

A site plan of the Proposed Development is presented in Figure 2 below. The red outline shows the application boundary, and the blue outline indicates land owned by United Utilities.

Figure 2 - Site plan



Source: Eric Wright Construction Ltd drawing no.: 80062068-02-EW-WOODG-99-DR-C-10006 P03

CONSULTATION

In April and May 2021, WSP consulted with Bury Council Public Protection to agree the noise survey location and time periods, as well as the assessment methodology.

NOISE SURVEY

It was agreed that existing ambient sound levels ($L_{Aeq,T}$) and background sound levels ($L_{A90,T}$) would be measured at one location, representative of the nearby residential properties. The approximate measurement location is adjacent to Holebottom Cemetery Memorial Garden (grid reference: 382262, 411702).

That attended noise measurements will be recorded during the quietest periods of the day and night during a weekday and weekend period, including 3-hours 19:00-23:00, and 1-hour between 02:00-04:00. The survey results will be used to determine typical background sound levels.

ASSESSMENT METHODOLOGY

It was agreed that noise impact from new plant and equipment will be assessed using BS 4142:2014+A1:2019 *'Methods for rating and assessing industrial and commercial sound'*. Based on manufacturers data, the noise level (specific sound level, $L_{Aeq,Tr}$) from the operational new building will be predicted at nearby sensitive receptors. The subjective method will be used to add acoustic feature corrections, where present at the assessment locations, to the specific sound level to generate rating levels ($L_{Ar,Tr}$). The difference between the rating level and background sound level will be used to assess the noise impact, taking context into account.

Table 1 - Measurement equipment

ID	Equipment	Manufacturer & Type	Serial Number
Solo 20	Sound level meter	01dB-METRAVIB Black Solo	65811
	Pre-amplifier	01dB-Metravib PRE 21 S	16554
	Microphone	01dB Metravib MCE 212	166394
	Calibrator	01dB-METRAVIB CAL21	34634224

The weather conditions during the survey were appropriate for sound level measurements. Wind speeds did not exceed 5 m/s and temperatures were between 6°C and 18°C, and conditions were dry.

A summary of the measured sound levels is presented in Table 2.

Table 2 - Measured sound levels

Date	Start	End	Period	L _{Aeq,T} (dB)	L _{A90} (dB)
Wed 4 May 2022	19:22	22:22	Weekday evening	54	50
Thu 5 May 2022	02:00	03:00	Weekday night-time	43	37
Sun 8 May 2022	19:02	22:02	Weekend evening	56	51
Mon 9 May 2022	02:00	03:00	Weekend night-time	42	38

BACKGROUND SOUND LEVEL ANALYSIS

The measured sound levels have been analysed to determine representative day and night-time background sound levels, as presented in Table 3. The methodology used follows the statistical approach presented in BS 4142.

Table 3 - Background sound levels, dB(A)

Noise Index/Indicator	Weekday		Weekend	
	Evening	Night-time	Evening	Night-time
Log average of all $L_{A90,15min}$ measurements	52	37	52	38
Linear average of all $L_{A90,15min}$ measurements	51	37	51	38
Most commonly occurring $L_{A90,15min}$	52	37	52	38
Maximum $L_{A90,15min}$	55	38	53	39
Minimum $L_{A90,15min}$	47	35	48	38
Selected representative value	51	37	52	38

Figure 4 - Weekday evening $L_{A90,15min}$ histogram

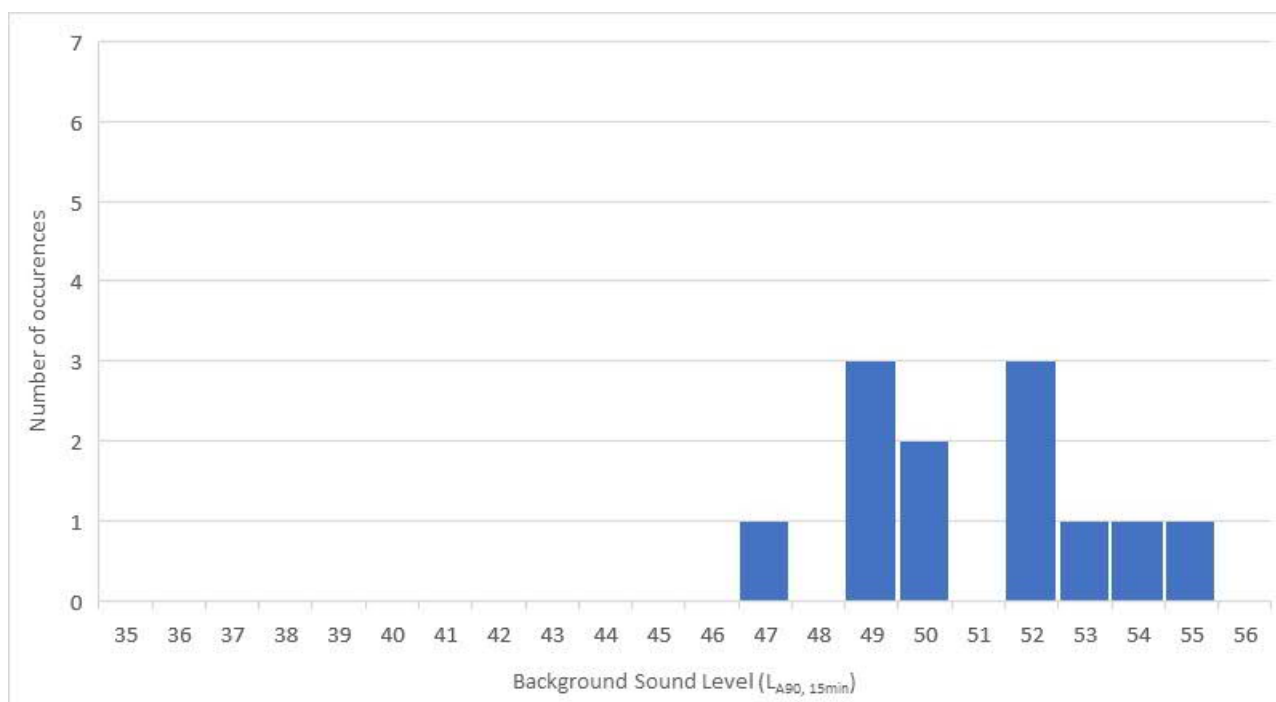


Figure 5 - Weekday night-time $L_{A90,15min}$ histogram

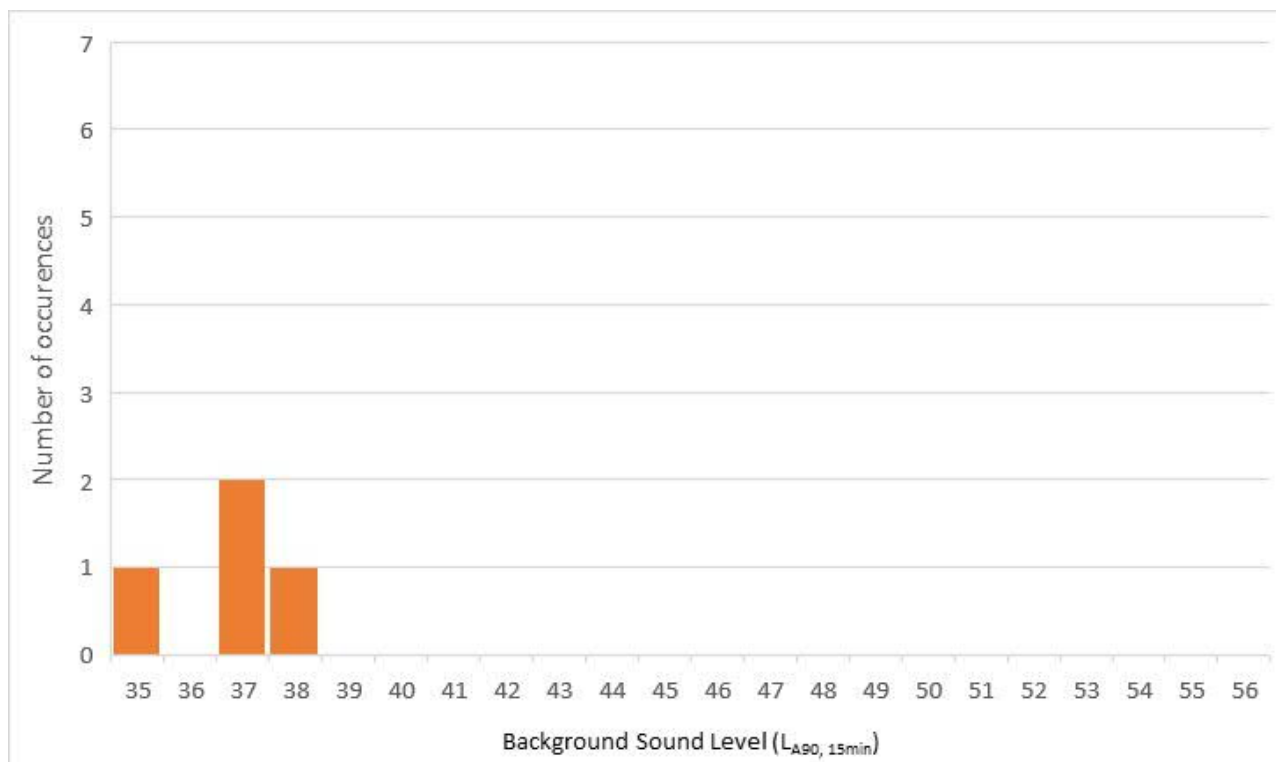


Figure 6 - Weekend evening $L_{A90,15min}$ histogram

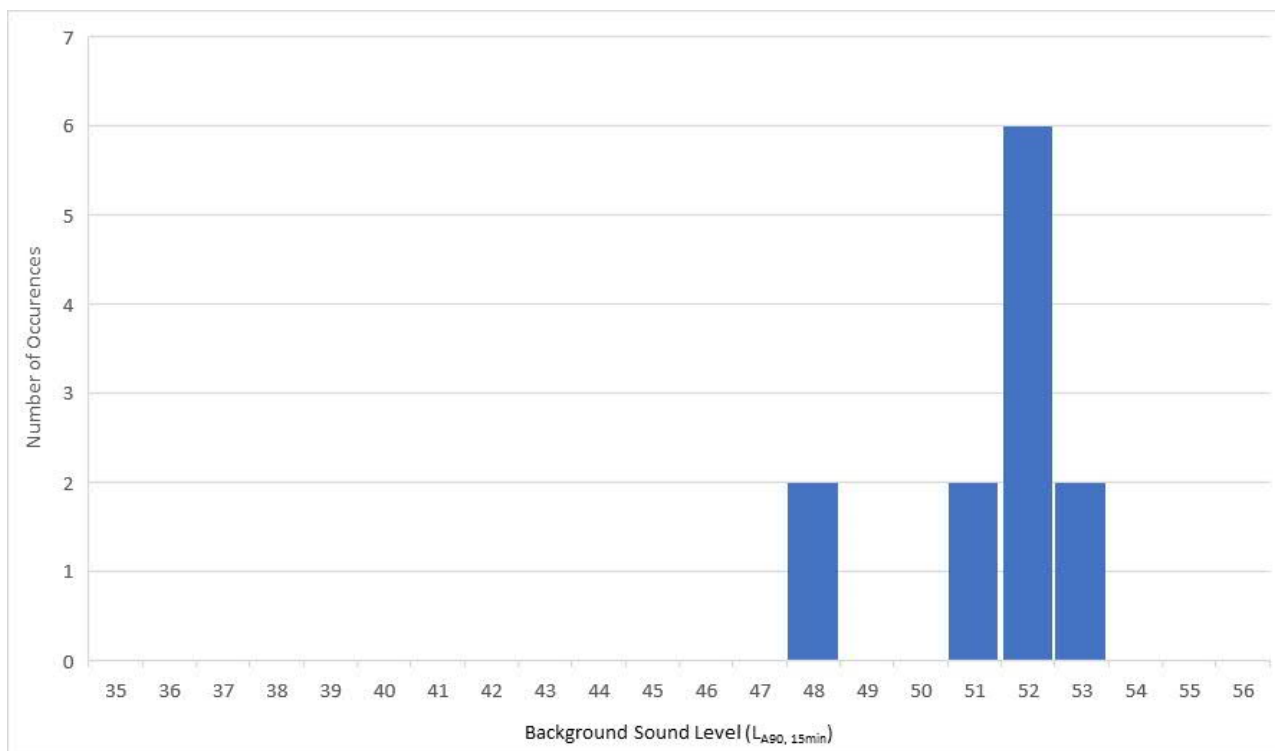
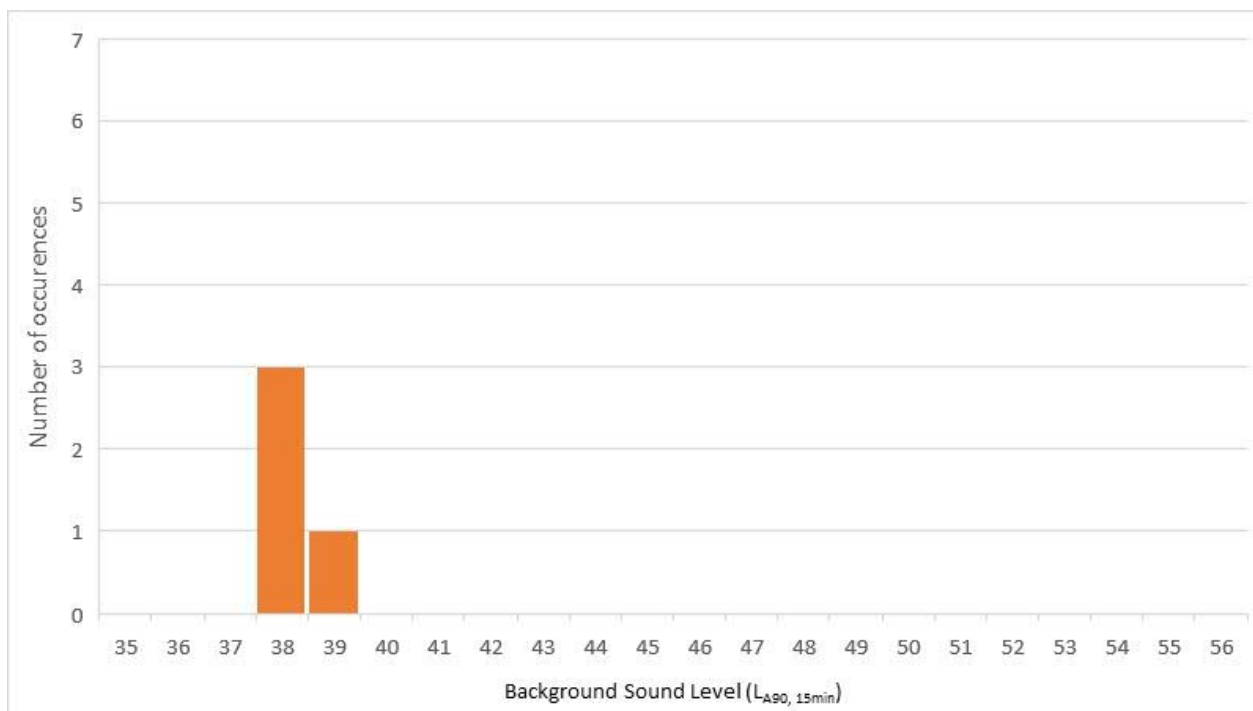


Figure 7 - Weekend night-time $L_{A90,15min}$ histogram



ASSESSMENT

NOISE MODEL

A 3D noise model has been developed using CadnaA software to predict operational noise levels generated by the proposed chemical building.

All noise generating plant and equipment will be internal. The main building will house two Grundfos dosing pumps which will have an operating pattern of duty and standby. Duty is taken to be 100% on, and standby is off, so only one pump operates at any one time.

The manufacturer's datasheet for the dosing pump specifies that the maximum sound pressure level is 80 dB(A). It is assumed that this is a sound pressure level of 80 dB L_{Aeq} at 1 m measured in hemispherical conditions.

The control room annex will house a motor control centre (MCC), manufacturer's noise data for this equipment is not available at this time. For the purposes of this assessment the MCC is assumed to operate at a sound pressure level of 80 dB L_{Aeq} at 1 m measured in hemispherical conditions. The value of 80 dB(A) is based on United Utilities' maximum noise emission for plant and equipment.

The following methodology was adopted in the production of the noise model:

- Standard / guidance: ISO 9613.
- Ground absorption: 1.0 (100% acoustically absorbent ground).
- Order of reflection: 3.
- Building absorption coefficient: 0.1.
- Receivers: 4 m above ground, 1 m from the building facade.
- Building height: based on scheme drawings for application buildings; 6.0 m above ground for existing residential; 3.0 m for garages and existing buildings with equivalent footprints within the WTW boundary.
- A georeferenced site layout of the development, including Proposed Development buildings was imported into the noise model using ArcGIS.
- Ground height: Open source LIDAR 1m posting DTM topographic data was converted to contour lines and incorporated into the noise model for the existing site and surrounding area.
- Contour lines under the chemical building footprint were set to 138 m above sea level.
- Existing buildings were incorporated into the model based on Ordnance Survey OpenMap Local data.
- Internal noise sources:
 - o Main building: one pump, 80 dB L_{Aeq} at 1 m;
 - o Control annex: one motor control centre, 80 dB L_{Aeq} at 1 m .
- An octave band noise spectrum (63 Hz to 8000 Hz) for a generic pump is applied to all noise sources, data taken from the WSP in-house database. The spectrum is corrected to give a broadband noise level of 80 dB L_{Aeq} at 1m, and then converted to a sound power level.
- Internal noise levels were calculated in the main building and control room based on the internal surface areas and an absorption coefficient of 0.1.
- Directivity for emitting facades: automatic.
- No louvres / openings are included in the model, as taken from the scheme elevation drawings.

- Operational noise levels are calculated at a sample of the closest noise sensitive receptors.

NOISE DATA

Sound power levels for the proposed plant are as follows:

Table 4 - Noise generating plant source data, dB

Item	Octave Band Centre Frequency (Hz)								L _{WA}
	63	125	250	500	1K	2K	4K	8K	
Dosing pump	87	85	83	79	69	69	68	63	88
Control room	87	85	83	79	69	69	68	63	88

The sound reduction indices for the proposed buildings are as follows:

Table 5 - Sound reduction indices, dB

Item	Octave Band Centre Frequency (Hz)								R _w
	63	125	250	500	1K	2K	4K	8K	
Wall cladding	15	16	19	23	26	22	39	39	24
Roof cladding	12	17	20	23	23	23	41	41	24
Roller shutter	17	18	21	19	17	20	21	23	19

CONSTRUCTION DETAILS

Typical constructions capable of meeting the sound reduction indices are presented in Table 6.

Table 6 - Construction details

Item	Typical Construction Details
Wall cladding	60 mm thick insulated wall panel
Roof cladding	30 mm thick insulated roof panel
Roller shutter	Standard roller shutter door

INITIAL ASSESSMENT

An initial assessment of the noise breakout from the chemical building based on the current proposals was completed. The current proposals include single skin profiled metal wall and roof cladding system. The assumed sound reduction indices (SRI) for the as proposed wall construction is 24 dB R_w, the roof panel construction is 24 dB R_w. The octave band SRI spectra for the wall and roof are given in Table 5, and typical construction details are given in Table 6.

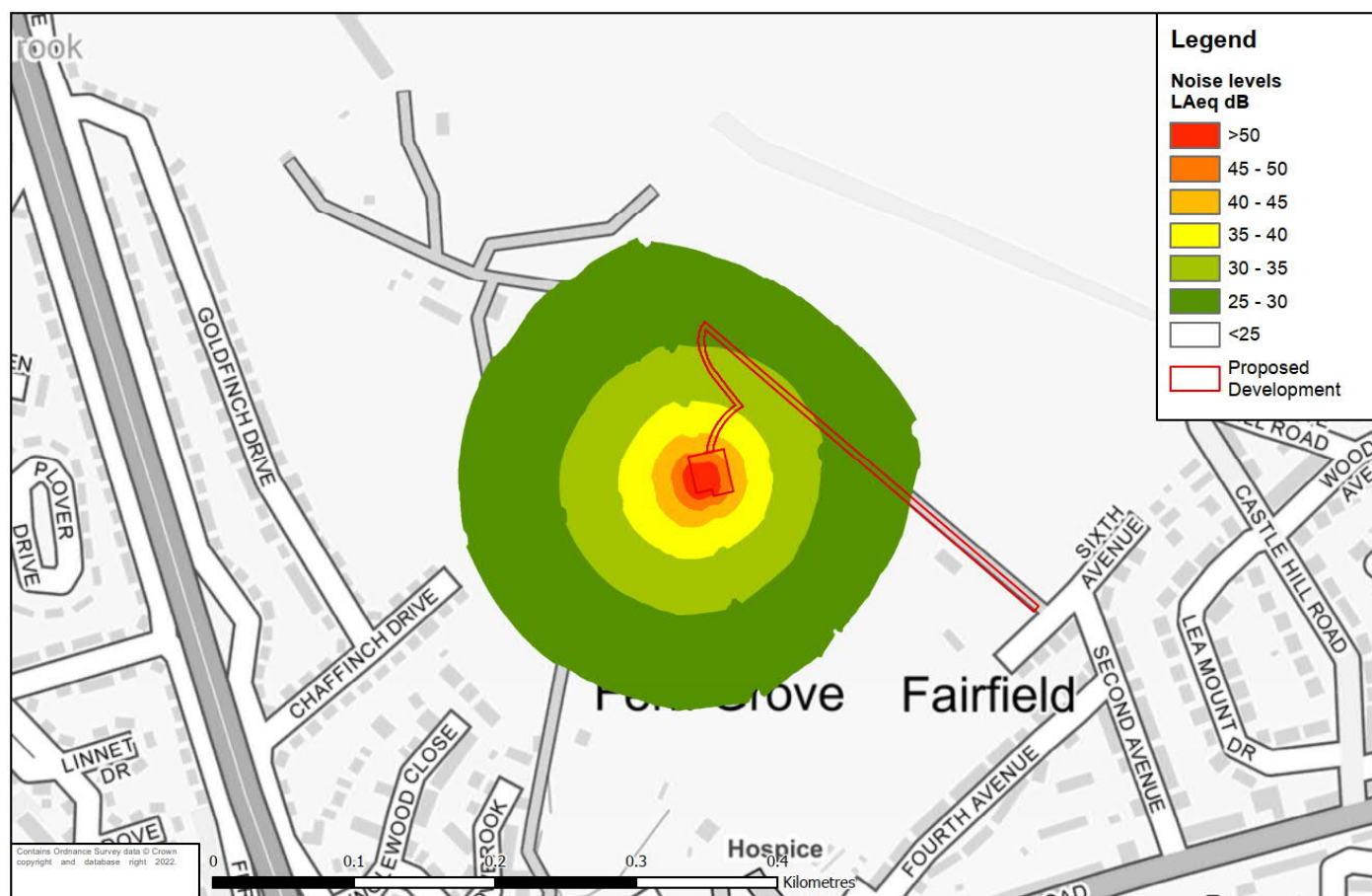
Operational noise levels are calculated at a sample of the closest noise sensitive receptors as presented in Table 7.

Table 7 - Predicted receiver noise levels, dB(A)

Noise Sensitive Receptor	Coordinates	Predicted Noise Level (dB L _{Aeq,T})
Chaffinch Drive	XY: 382196 411756	25
Riddings Farm	XY: 382192 411948	24
Sixth Avenue	XY: 382590 411707	20

Figure 8 presents the predicted noise contour plan for the chemical building, noise levels are calculated at a height of 4.0 m above ground.

Figure 8 - Noise contour plan



BS 4142 ASSESSMENT

The predicted noise levels have been assessed following BS 4142 guidance. The results for the noise sensitive receptor with the highest predicted noise level from the chemical building is assessed in Table 8 below.

Table 8 - BS 4142 Assessment

Assessment step	Day	Night	Commentary
Modelled Specific Sound Level [A]	25 dB $L_{Aeq,1hr}$	25 dB $L_{Aeq,15mins}$	Receiver height at 4.0 m above ground and 1.0 m in front of the property façade.
Tonality [B]	+0 dB		No correction is applied for tonality because the specific sound level is more than 10 dB below the background sound level.
Impulsivity [C]	+0 dB		No correction is applied for impulsivity. The pumps are considered to be a steady state noise source.
Intermittency [D]	+0 dB		No correction for intermittency is applied. The pump noise sources are not considered to have distinct on/off conditions during the assessment periods.
Rating level [E] = [A+B+C+D]	25 $L_{Ar,1hr}$	25 $L_{Ar,15mins}$	
Background sound level ($L_{A90,T}$) [F]	51 dB	37 dB	
Rating level verses background sound level [E-F]	-26 dB	-12 dB	The BS 4142 assessment shows that the rated sound level from the Proposed Development is at least 12 dB below the existing background sound level.
Final Assessment Result	Low impact		

CONCLUSION

WSP has been appointed by Eric Wright Construction Ltd to undertake an environmental noise assessment for a proposed chemical building at Woodgate Hill Water Treatment Works (WTW).

The Proposed Development comprises a main building and control room annex. The main building houses two dosing pumps and associated pipework. The control room annex houses control equipment.

The Proposed Development is located in the centre of the Woodgate Hill WTW. There are a number of existing dwellings located nearby, including an isolated farm property to the north west; dwellings on Chaffinch Drive, Goldfinch Drive and Inglewood Close to the west; dwellings on Sixth Avenue and Fourth Avenue to the south east. These properties are located within the Bury Council area.

A noise survey has established existing background noise levels at noise sensitive receptors nearby the Proposed Development. The survey results have been analysed and representative background sound levels established.

A detailed 3D noise modelling and prediction exercise has been undertaken to determine the noise levels resulting from the Proposed Development. The predictions have been compared to the background sound levels at the nearest noise sensitive receptors to identify potential noise impacts.

Noise impact from the Proposed Development on nearby receptors has been determined to be of low impact based on the guidance contained in BS 4142.



LIMITATIONS

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