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Tony Hopson
BARTON AND REDMAN
Strawberry House
New Smithfield Market
Whitworth Street East
Manchester
M11 2WJ

BY Email

Dear Tony,

NOISE IMPACT STATEMENT ON ERECTION OF STORAGE BUILDING STRAWBERRY HOUSE, MANCHESTER

1. BACKGROUND & OBJECTIVES

E3P have been commissioned to provide a Noise Impact Statement to accompany an application for the erection of a storage building ancillary to existing commercial operations at Barton and Redman's premises in Openshaw, Manchester.

The proposed storage building is required as a short-term storage facility whilst new warehouse premises are constructed nearby (Ref: 127742/FO/2020). In relation to that application, E3P produced a Noise Impact Assessment (50-110-R1-4 dated February 2022).

This will be used to give protection to fresh produce from inclement weather for the loading and unloading of stock. The area chosen to site this building is currently an unused yard area. The proposed storage building will ensure a more optimal use of the land until the nearby warehouse facility is operational. The proposals are ancillary to the existing business operations on site which includes the wholesale storage and distribution of fruit and vegetables.

This Technical Note been undertaken by Lee Faulkner, Associate Director at E3P, who holds the Post Graduate Diploma in Acoustics and Noise Control and is a full member of the Institute of Acoustics (MIOA). I have over 10 years' experience in the measurement and assessment of noise and vibration for various clients, sites, and applications.



2. GUIDANCE

2.1. BS 4142: 2014+A1:2019 'METHODS FOR RATING AND ASSESSING INDUSTRIAL AND COMMERCIAL SOUND'

This standard describes methods for rating and assessing sound of an industrial or commercial nature which includes:

- ✳ Sound from industrial and manufacturing processes.
- ✳ Sound from fixed installations which comprise mechanical and electrical plant and equipment.
- ✳ Sound from the loading and unloading of goods and materials at industrial and / or commercial premises; and
- ✳ Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from processes or premises, such as that from forklift trucks, or that from train or ship movements on or around an industrial or commercial Site.

The procedure detailed in the standard compares the measured or predicted specific noise level from any of the above with the background sound level at a residential dwelling. The measured background sound level at a receptor should be reliable and should not necessarily ascertain a lowest measured background sound level, but rather to quantify what is typical.

The specific noise level also acknowledges the reference time intervals depending upon whether the noise source operates during daytime (1-hour) or night-time (15-minute) periods. There are several 'penalties' which can be attributed to the specific sound level depending upon the 'acoustic features' of the sound level under investigation as follows:

Tonality

- ✳ +2 dB: where the tonality is just perceptible.
- ✳ +4 dB: where the tonality is clearly perceptible; and
- ✳ +6 dB: where the tonality is highly perceptible.

Impulsivity

- ✳ +3 dB: where the impulsivity is just perceptible.
- ✳ +6 dB: where the impulsivity is clearly perceptible; and
- ✳ +9 dB: where the impulsivity is highly perceptible.

Intermittency

- ✳ +3 dB: where the intermittency is readily distinctive against the acoustic environment.

In addition to the above, there is a penalty for 'other sound characteristics' of +3 dB where a sound exhibits characteristics that are neither tonal nor impulsive, though are readily distinctive against the acoustic environment. BS 4142 goes on to state that the rating level is equal to the specific sound level if there are no such features present or expected to be present.



Assessment of the rating level relative to the background sound level can yield the following commentary:

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

Manchester City Council have their own criteria for new commercial developments which is $L_{A,r} = L_{A90} - 5$ dB. As such, this criterion will take precedence over a simple comparison of the rating level against the background sound level.

3. NOISE MODELLING AND ASSESSMENT

3.1. CALCULATION OF SOUND POWER LEVELS

This assessment has used previously measured noise level data and information provided by Barton and Redman to predict likely noise levels from the Site upon the closest receptors. Furthermore, the following equipment has been assessed:

- ✿ HGV movements.
- ✿ Forklift truck movements; and
- ✿ Unloading of HGVs via trolleys and/or forklift trucks.

3D Noise Modelling Software, CadnaA, has been used to predict the specific noise level at the receptor. Regarding assumptions for the assessment, the following has been considered:



Noise Impact Statement on Erection of Storage Building

Barton and Redman

March 2022

- ✿ The daytime period has been assessed between the hours of 07:00 to 23:00. BS4142:2014 has been used to determine the likelihood of adverse impact within the garden areas over a reference period of 1 hour.
- ✿ The night-time period has been assessed between the hours of 23:00 and 07:00 for a reference period of 15 minutes.
- ✿ A reflection order to 2 has been applied in the model.
- ✿ Site elevations have been taken as existing by way of a 1 m grid Digital Terrain Model (DTM) which contains public sector information licensed under the Open Government Licence v3.0.
- ✿ It is assumed that 1 forklift truck will operate externally in any given 1 hour or 15-minute period, with 2 operating internally.
- ✿ 5 HGVs are assumed in any given 1 hour and 2 HGVs in any given 15-minute period.
- ✿ A building evaluation calculation has been undertaken for the closest dwellings on Cornwall Street in order to predict noise levels at ground to 2nd floor heights.
- ✿ Calculations are based on the guidance given in ISO 9613-1 and ISO 9613-2 "Acoustics – Attenuation of sound during propagation outdoors" as incorporated into CadnaA software; and
- ✿ The following noise levels and information have been used for each plant/operation. From this the sound power level for each plant/operation was calculated and inputted into the model:

TABLE 3.1 NOISE LEVELS AND ON-TIME FOR EACH PLANT/OPERATION

OPERATION/ PLANT	MEASURED SOUND LEVEL, L _{Aeq,T} (dB)	MEASUREMENT DISTANCE (m)	NUMBER OF UNITS	ON-TIME IN 1-HOUR PERIOD (DAYTIME) (mm:ss)	ON-TIME IN 15- MINUTE PERIOD (NIGHT- TIME) (mm:ss)	HEIGHT (m)
Internal Areas						
Forklift Truck 1	92 L _W	-	1	20:00	12:30	1
Forklift Truck 2	92 L _W	-	1	20:00	12:30	1
External Areas						
Trolleys Removed	64.1	10	1	15:00	15:00	1
Forklift Truck	92 L _W	-	1	20:00	12:30	1

The above sources have inputted into the noise model as line sources (mobile plant) using calculated sound power levels based on the above information. Side unloading of HGVs are inputted as point sources.

With regards the storage building, internal to external calculations have been undertaken below. Therefore, the noise levels of the facades of the buildings have been calculated as follows.

The direct sound pressure levels (Direct SPL) within the reception building have been calculated based on the following formula:



$$\text{Direct SPL} = L_W + (10 \times \log (1 / ((4 \times 3.14) \times D^2)))$$

Where: L_W is the sound power level of the source
 D is the distance of the source from the facade

Each Direct SPL of each item of plant on each facade have been logarithmically added together to provide the Direct SPL for each facade.

The reverberant sound pressure level (Reverb SPL) has been calculated as follows:

$$\text{Reverb SPL} = L_W + (10 \times \log (4 / R_C))$$

Where: L_W is the sound power level of the source
 R_C is the room constant

These have again been logarithmically added together to provide the Reverb SPL for each facade for all sources. The Reverb SPL has then been logarithmically added to the Direct SPL for each facade.

Assuming a Sound Reduction Index of 23 dB for a single steel skin for the building, the following equation has been used to determine the sound power level of each facade:

$$L_W = L_P + (10 \times \log (S))$$

Where: L_P is the sound pressure level of the facade assuming -6 directivity
 S is the surface area of the facade

The building has been inputted into the model as an industrial building with area sources applied to each facade and roof.

For the BS4142:2014 assessments, penalties are applied to the specific sound level in order to provide the rating level. These penalties relate to the acoustic features of the sound source. However, there will be no material change in the type of sound produced and, as such, no acoustic penalties are required.

3.2. BS 4142 DAYTIME ASSESSMENT

The Noise Model has been used to predict the specific noise level at the receptors during the daytime period. Figure 1 shows the output.

Table 3.23 details the calculated specific noise levels at the receptors and compares the rating level with the typical background sound level. The criterion specified by MCC has been used to inform the assessment, i.e. $L_{A,r} = L_{A90} - 5\text{dB}$. The lowest median measured background sound level was found to be 46 dB during the day. This is taken from the NIA for application 127742/FO/2020.



TABLE 3.2 BS4142:2014 ASSESSMENT – DAYTIME

RECEPTOR	PREDICTED SPECIFIC NOISE LEVEL, $L_{Aeq,1hr}$ (dB)	ACOUSTIC PENALTIES (dB)	RATING LEVEL, $L_{A,r}$ (dB)	MCC CRITERION, $L_{A,r} = L_{A90} -$ 5dB	DIFFERENCE +/- (dB)
Ground Floor Living Room	34	0	34	41	-7
1 st Floor Bedroom	34	0	34	41	-7
2 nd Floor Bedroom	34	0	34	41	-7

Table 3.2 indicates that the predicted rating level falls below the MCC criterion, in relation to the lowest median Background Sound Level, at all floors of the closest receptor during the daytime period. As such, no consideration towards mitigation measures is required.

3.3. BS 4142 NIGHT-TIME ASSESSMENT

For the night-time period, it is assumed that only one HGV would be unloaded/loaded within any given 15-minute period, furthest from the receptors which is considered best practice.

The noise model, Figure 2, has been used to predict the specific noise level at the receptors during the night-time period. Table 3.3 details the calculated specific noise levels at the receptors, applies the penalties and compares the rating level with the MCC criterion. The lowest median background sound level was 38 dB during the night-time period.

TABLE 4.4 BS4142:2014 ASSESSMENT – NIGHT-TIME

RECEPTOR	PREDICTED SPECIFIC NOISE LEVEL, $L_{Aeq,1hr}$ (dB)	ACOUSTIC PENALTIES (dB)	RATING LEVEL, $L_{A,r}$ (dB)	MCC CRITERION, $L_{A,r} = L_{A90} -$ 5dB	DIFFERENCE +/- (dB)
1 st Floor Bedroom	33	0	33	33	0
2 nd Floor Bedroom	33	0	33	33	0

Table 4.5 indicates that the predicted rating level achieves the MCC criterion, in relation to the lowest median Background Sound Level, at all floors of the closest receptor during the night-time period.



4. CONCLUSION

E3P were commissioned to assess the potential impact of the proposed storage building at Barton and Redman.

It is assumed that the potential noise impact is likely to arise due to the movement of sources closer to receptors to the east with FLT, HGV and noise break-out all associated with the storage building.

In order to inform the assessment, E3P have drawn on noise survey and modelling information used for the nearby application for new premises for Barton and Redman.

The assessment determined that rating levels during daytime periods would fall comfortably below the MCC criterion and that night-time rating levels would equal the MCC criterion. As such, no adverse impact is expected at the closest receptors as a result of operation of the proposed building.

I trust the report is clear and concise but please do not hesitate to contact me should you require further information.

Yours sincerely,
For and on behalf of E3P Ltd

Lee Faulkner
Associate Director





LEE FAULKNER

Curriculum Vitae

POSITION

Associate Director

QUALIFICATIONS

BSc (Hons), PGDip

PROFESSIONAL MEMBERSHIPS

Member of the Institute of Acoustics (MIOA)

AREAS OF EXPERTISE

Environmental Noise Surveys and Assessment

Noise and Vibration Assessments in accordance with British Standards

3D Noise Modelling

Noise and Vibration Environmental Impact Assessments

Construction Noise and Vibration

Sound Verification Testing

PROFILE

Mr Lee Faulkner is an Associate Director at E3P. His current role involves management of the Acoustic Division at E3P including Noise and Vibration Assessments and Reporting for multiple projects. Lee has 10 years' experience in the industry and has worked on a multitude of differing projects and sites.

Lee has extensive experience of complex environmental noise assessments, providing detailed and tailored advice on a site by site basis that is not only in accordance with the relevant standards but also a cost-effective solution for the client.

Lee has extensive experience in the calculation of complex noise levels across various sites such as those constrained by transportation sources, commercial, industrial and entertainment noise. Noise Modelling of various projects, including residential developments and the Esso Refinery, using SoundPLAN and CadnaA.

SELECTED PROJECT EXPERIENCE

Residential Development, Kinross

Noise and Vibration Chapter for the wider EIA. Construction and Operational Noise and Vibration Impacts were assessed for existing and proposed receptors. Key noise sources consisted of existing road traffic and commercial premises and proposed skate park and sports fields. The proximity of the M8 was particularly constraining. The Chapter addressed construction noise and vibration impacts upon existing receptors and existing noise upon the proposed receptors. Mitigation measures included for acoustic barriers, higher spec glazing and alternative ventilation.

Residential Development, Longsight

Noise Impact Assessment in support of the planning application for a residential development on a parcel of land in a residential location near to a speedway track and sports centre. Included specification of acoustic glazing and also acoustic barrier height to protect future residents from road traffic noise and leisure noise.

Noise Modelling of Noise at Work Levels for Esso Refinery, Fawley

Esso, Fawley required noise measurements to be taken at a total of 11 blocks for the operations at their Fawley Refinery. This meant a high number of noise measurements were taken due to the scale of the area. The results of the noise survey were used to create contour noise graphics using 3D Noise Modelling in order to determine the noise levels across each block.

NOISE AND VIBRATION ES CHAPTER FOR LEISURE DEVELOPMENT

Noise and Vibration monitoring was required in order to provide baseline conditions across the Site. A Noise and Vibration ES Chapter was provided which addressed construction noise and vibration, construction generated traffic, rail noise and vibration and proposed impacts such as new leisure facilities and fixed plant items. The assessment overcame issues with rail noise for very closely situated receptor by way of an earth bund.

SOUND VERIFICATION TESTING, SHEFFIELD

Sound Testing in order to verify the effectiveness of the installed glazing and alternative ventilation applied to a residential scheme, following the recommendations of a Noise Impact Assessment. Noise Surveys were undertaken over an entire 48-hour period in a dwelling for each phase and showed compliance with the necessary criteria given in the British Standard

NEW SUPERMARKET, SHIPLEY

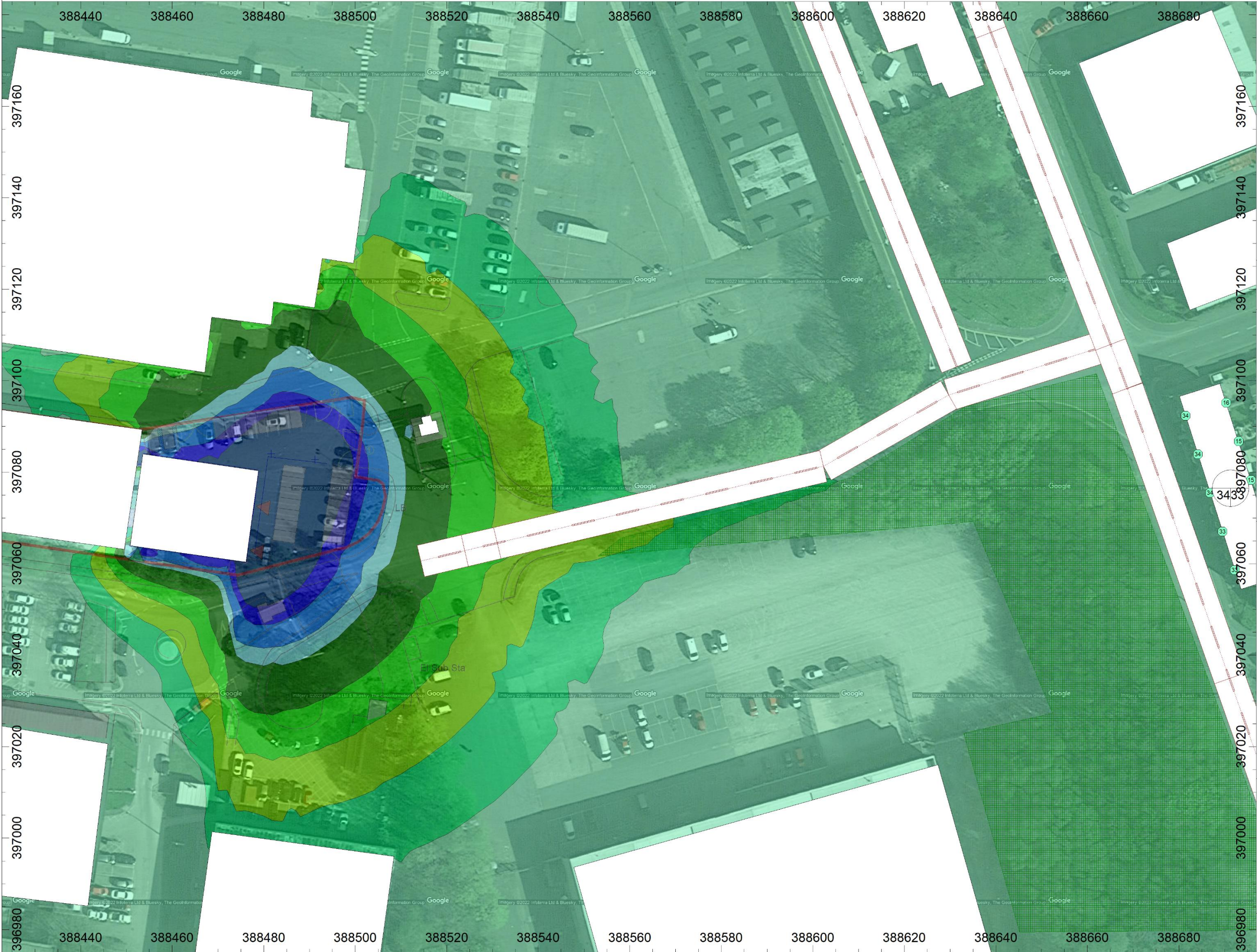
Noise Impact Assessment in support of a planning application for a new supermarket in Shipley including a Café Retail Unit. Assessed for noise associated with the delivery yard, fan units and the petrol filling station associated with the development. Lee advised on the acoustic fence locations and heights and to ensure no exceedance of the applicable criterion.

NOISE AT WORK ASSESSMENT, YORKSHIRE

Atlas Steel Structures required a Noise at Work Assessment for their daytime and night-time shifts to accompany their annual risk assessment. The Noise at Work Survey comprised the use of personal dose badges and spot measurements to quantify the noise levels across the factory floor. The Noise at Work Assessment advised that existing hearing protection was overprotecting, and so alternative protection was recommended.



Figure 1 - Daytime Grid Noise Map - Calculation at 1.5m above ground level



Project:
Proposed Storage Building

Project-No:
50-564

Client:
Barton and Redman

**Rating Level,
LA,r (dB)**

- ... <= 38
- 38 < ... <= 40
- 40 < ... <= 43
- 43 < ... <= 45
- 45 < ... <= 48
- 48 < ... <= 50
- 50 < ... <= 53
- 53 < ... <= 55
- 55 < ...

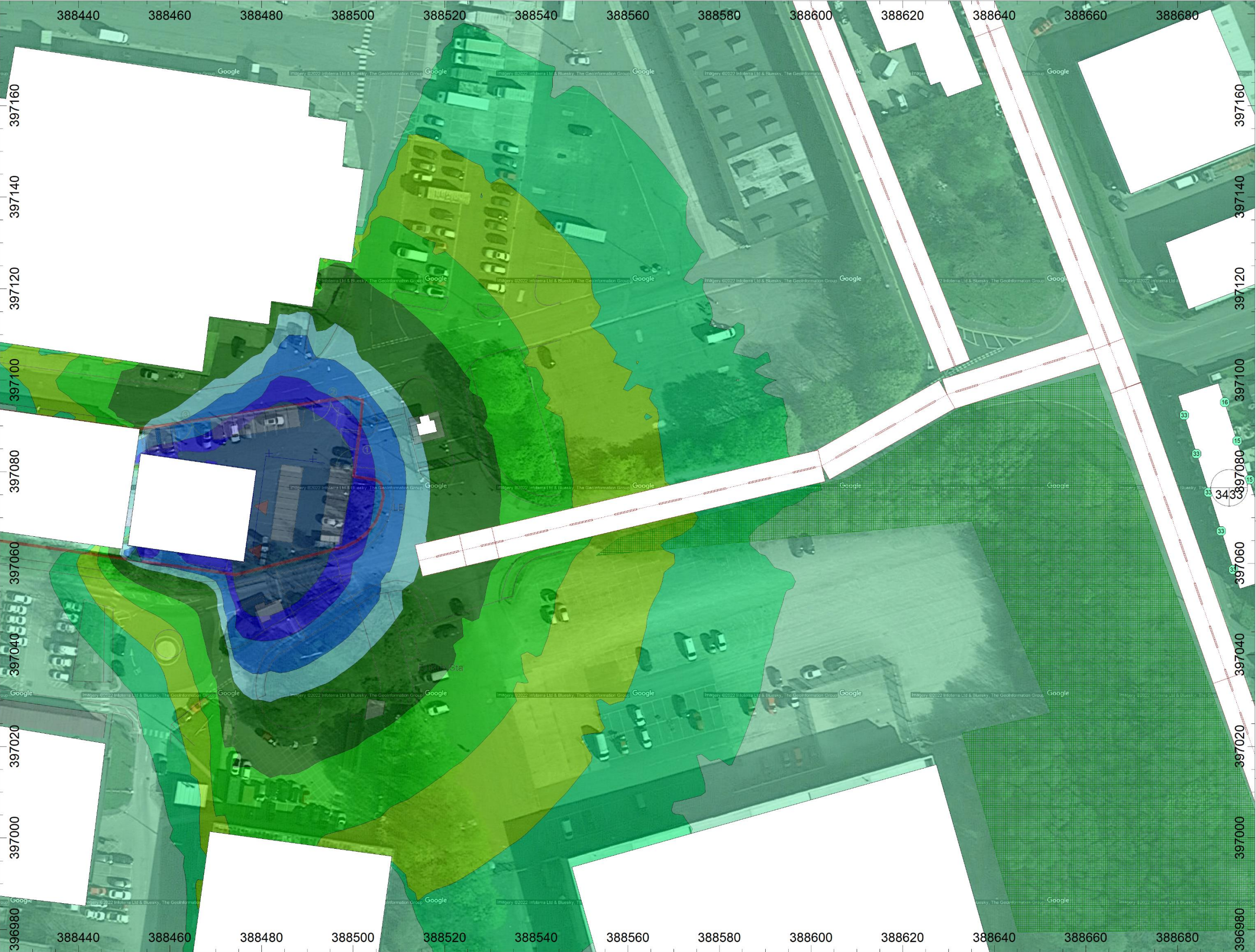
Noise Map Objects

- + Point Source
- Line Source
- ▨ Area Source
- ⋯ vert. Area Source
- ▭ Road
- ▭ Building
- ▨ Foliage
- Contour Line
- ⊕ Building Evaluation
- ▭ Calculation Area



Project Engineer: L Faulkner
Date: 08/03/2022

Figure 2 - Night-time Grid Noise Map - Calculation at 4m above ground level



Project:
Proposed Storage Building

Project-No:
50-564

Client:
Barton and Redman

Rating Level, LA,r (dB)

... ≤ 38
38 < ... ≤ 40
40 < ... ≤ 43
43 < ... ≤ 45
45 < ... ≤ 48
48 < ... ≤ 50
50 < ... ≤ 53
53 < ... ≤ 55
55 < ...

Noise Map Objects

+	Point Source
—	Line Source
▨	Area Source
—	vert. Area Source
—	Road
—	Building
▨	Foliage
—	Contour Line
⊕	Building Evaluation
□	Calculation Area

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