



Noise Impact Assessment

Huyton Industrial Park

Reference: 50-613-R1-1

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NOISE IMPACT ASSESSMENT

**Huyton Industrial Park
Huyton**

Prepared for:

Derwent Development Management Ltd

Report Ref: 50-613-R1-1

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EXECUTIVE SUMMARY

BACKGROUND

Site Address	Huyton, Liverpool L36 6JG
National Grid Reference	E 345356 N 390116
Proposed Development	Erection of 24 industrial/commercial units with associated car parking and landscaping.
Report Objectives	To identify, measure and assess the potential impact of the proposed commercial development upon existing noise sensitive receptors in the immediate vicinity of the Site. The report follows current and relevant British Standards in order to provide a robust assessment.

ASSESSMENT

Surveys Completed	A worst-case unattended weekday background sound survey in a position considered representative of the closest existing noise sensitive receptors to the development. The sound level meter was located on the southern boundary of the Site in a position representative of the closest receptors to the south.
Assessments	E3P has undertaken detailed 3D noise modelling of all the proposed sources in order to predict noise levels at ground and 1st floor windows for the daytime and night-time periods respectively, in accordance with BS 4142:2014+A1:2019, at the closest receptors to the site. A 3.8 m high acoustic barrier is specified on the proposed site plan and has been included within the 3D noise model.
Mitigation Requirements	The proposed 3.8 m high acoustic barrier is sufficient at reducing noise levels at the noise-sensitive receptors. No further mitigation is required.

CONCLUSIONS

This assessment has shown, with the proposed 3.8 m acoustic barrier in place, that there should be no adverse impact upon existing residential receptors due to the proposed operations. As such, noise should not be a determining factor in the determination of the planning application.



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1. INTRODUCTION

1.1. BACKGROUND

E3P were commissioned by Derwent Development Management Ltd to undertake a Noise Impact Assessment for the proposed commercial development at Huyton Industrial Park, Huyton, to be referred to hereafter as '*the site*'.

This assessment looks to determine the key noise sources associated with the development and undertake an assessment of any impacts upon existing noise-sensitive receptors.

1.2. PROPOSED DEVELOPMENT

The Site currently exists as unused land within an existing retail/commercial area. This is a full planning application for the erection of 24 industrial/commercial units with associated car parking and landscaping.

The key sources of sound associated with the development will be noise break-out from the units and car park usage.

This assessment has been undertaken in accordance with the following supplied drawings:

-  Proposed Site Plan (Drawing No 11049PL X L03 Rev H) dated 17th February 2023.

The Proposed Site Plan is shown in Figure 1 of Appendix II.

1.3. LIMITATIONS

Where a noise or vibration survey is required to inform an assessment, E3P will endeavour to ensure that all noise and vibration measurements taken are robust, representative and reliable in order to inform an accurate assessment at the time.

E3P will endeavour to capture all existing and proposed sources of sound and vibration at the time of the surveys and/or assessments. However, should new sources of sound be introduced, existing sources modified/changed, or characteristics of the sound be altered following completion of such, E3P cannot be held accountable for this.

Where mitigation measures are specified in this report, it should be noted that these measures are relative to a specific sound or vibration source, both in terms of the measured sound pressure and vibration level and the character of the sound source. Where either the sound pressure level or the character of the sound varies following completion of the sound survey, E3P cannot be held responsible for any subsequent variations in the proposed mitigation performance, for either absolute levels or frequency content.



2. ASSESSMENT METHODOLOGY

2.1. NATIONAL PLANNING POLICY FRAMEWORK

To prevent unacceptable risks from pollution, planning policies and decisions should ensure that new development is appropriate for its location. The effects (including cumulative effects) of pollution on health, the natural environment or general amenity, and the potential sensitivity of the area or proposed development to adverse effects from pollution, should be considered.

The national planning policy framework states that planning policies and decisions should aim to:

- ✳ Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development.
- ✳ Mitigate and reduce to a minimum, other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions.
- ✳ Recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established.
- ✳ Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

2.2. NATIONAL PLANNING PRACTICE GUIDANCE

Noise needs to be considered when new developments may create additional noise and when new developments would be sensitive to the prevailing acoustic environment. When preparing local or neighbourhood plans, or taking decisions about new development, there may also be opportunities to consider improvements to the acoustic environment.

Local planning authorities' plan-making and decision-making should take account of the acoustic environment and in doing so consider:

- ✳ Whether or not a significant adverse effect is occurring or is likely to occur.
- ✳ Whether or not an adverse effect is occurring or is likely to occur.
- ✳ Whether or not a good standard of amenity can be achieved.

In line with the explanatory note of the NPSE, this would include identifying whether the overall effect of the noise exposure (including the impact during the construction phase, where applicable) is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation.



The “observed effect levels” are as follows:

-  **Significant observed adverse effect level:** This is the level of noise exposure above which significant adverse effects on health and quality of life occur.
-  **Lowest observed adverse effect level:** This is the level of noise exposure above which adverse effects on health and quality of life can be detected.
-  **No observed effect level:** This is the level of noise exposure below which no effect at all on health or quality of life can be detected.

Table 2.1 summarises the noise exposure hierarchy, based on the likely average response.

TABLE 2.1 NOISE EXPOSURE HIERARCHY

PERCEPTION	EXAMPLES OF OUTCOMES	INCREASING EFFECT LEVEL	ACTION
Not Noticeable	No effect.	No observed effect	No specific measures required
Noticeable and Not Intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No observed adverse effect	No specific measures required
Lowest Observed Adverse Effect Level			
Noticeable and Intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television, speaking more loudly, or having to close windows for some of the time because of the noise where there is no alternative ventilation. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed adverse effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Noticeable and Disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion, having to keep windows closed most of the time because of the noise where there is no alternative ventilation. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant observed effect	Avoid
Noticeable and Very Disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening, loss of appetite, significant/medically definable harm (auditory and non-auditory).	Unacceptable adverse effect	Prevent



The subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any situation. These factors include the following:

- ✿ The source and absolute level of the noise together with the time of day it occurs. Some types and level of noise will cause a greater adverse effect at night than if they occurred during the day. The adverse effect can also be greater simply because there is less background noise at night.
- ✿ For non-continuous sources of noise, the number of noise events, and the frequency and pattern of occurrence of the noise can be important.
- ✿ The spectral content of the noise and the general character of the noise. The local topology and topography should also be considered along with the existing and, where appropriate, the planned character of the area.

More specific factors to consider when relevant:

- ✿ Where applicable, the cumulative impacts of more than one source should be considered along with the extent to which the source of noise is intermittent and of limited duration.
- ✿ Consideration should also be given to whether adverse internal effects can be completely removed by closing windows and, in the case of new residential development, if the proposed mitigation relies on windows being kept closed most of the time. In both cases, a suitable alternative means of ventilation is likely to be necessary.
- ✿ If external amenity spaces are an intrinsic part of the overall design, then the acoustic environment of those spaces should be considered so that they can be enjoyed as intended.

2.3. 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

- ✳ +3dB: 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.

It is common that a Local Planning Authority (LPA) will specify their own criterion and, where this is the case, this criterion will usually take precedence over a simple comparison of the rating level against the background sound level.



3. SURVEY RESULTS

3.1. UNATTENDED BACKGROUND AND AMBIENT SOUND SURVEY

E3P have undertaken an unattended background and ambient sound survey in a position considered representative of the closest noise sensitive receptors located south of the site on Kipling Avenue.

The survey was carried out over the following time periods:

📍 11:00 Friday 27th May to 10:00 Monday 30th May 2022.

The following noise measurement position was chosen for the Background Sound Survey:

📍 Noise Measurement Position 1 (NMP1): Located close to the southern boundary of the site adjacent to the nearest noise sensitive receptors on Kipling Avenue. The microphone of the sound level meter was set at a height of 1.5 m above ground level and in free-field conditions. Sound sources consisted of road traffic on the local road network and local commercial/industrial sources.

Table 3.1 details the measured background sound levels. The daytime levels correspond to the $L_{A90,1hr}$ and the night-time levels to the $L_{A90,15mins}$. The full data set is available upon request.

TABLE 3.1 MEASURED BACKGROUND SOUND PRESSURE LEVELS

DATE	TIME PERIOD	RANGE OF MEASURED BACKGROUND SOUND LEVELS, $L_{A90,T}$ (dB)	MODAL MEASURED BACKGROUND SOUND LEVEL, $L_{A90,T}$ (dB)
Friday 27th May 2022	Daytime	43-51	50
	Night-time	37-47	42
Saturday 28th May 2022	Daytime	40-47	46
	Night-time	42-52	45
Sunday 29th May 2022	Daytime	37-50	47
	Night-time	30-47	44
Monday 30th May 2022	Daytime	48-49	48

The levels highlighted bold above are the lowest measured modal levels to be used in the assessment to inform a worst-case assessment. It is important to note that BS 4142 states the following:

In using the background sound level in the method for rating and assessing industrial and commercial sound it is important to ensure that values are reliable and suitably represent both the particular circumstances and periods of interest. For this purpose, the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods.

Weather forecasts were monitored throughout the surveys to ensure no adverse conditions as the location of the Site was not suitable for the installation of an unattended weather station. During the survey, conditions remained dry and wind speeds rarely exceeded 10 mph.



The equipment outlined in Table 3.2 was used for the noise survey.

TABLE 3.2 NOISE MEASUREMENT EQUIPMENT AND CALIBRATION DATES

MEASUREMENT POSITION	EQUIPMENT DESCRIPTION	MANUFACTURER & TYPE NUMBER	SERIAL NUMBER	CALIBRATION DUE DATE AT TIME OF SURVEY
NMP1	Sound Level Meter	01dB Fusion	14226	01/12/2023
	Pre-amplifier	01dB Pre22	2135072	
	Microphone	GRAS 40CD	470570	
	Calibrator	01dB Cal31	87281	31/01/2023

The sound level meter was field calibrated on site using the above-mentioned calibrator prior to and after noise measurements were taken. No significant drift was witnessed as noted above. Calibration certificates are available upon request.



4. NOISE IMPACT ASSESSMENT

This assessment has made assumptions on the sources of sound relating to the development, to predict the noise level impact on the existing closest residential dwellings during the daytime and night-time periods. At this stage, it is assumed that all units will operate 24/7.

With regard to assumptions for the assessment, the following has been considered for the full planning application aspects:

- ✿ Ground elevations have been taken as existing by way of a 2 m grid Digital Terrain Model (DTM) which contains public sector information licensed under the Open Government License v3.0.
- ✿ It is noted from the provided Proposed Site Plan, that an acoustic barrier at a height of 3.8 m is proposed along the southern boundary, this has been included within the assessment.
- ✿ The daytime period has been assessed between the hours of 07:00 to 23:00. For the assessment, BS 4142:2014+A1:2019 has been used to determine the likelihood of adverse impact within the garden areas over a reference time period of 1 hour.
- ✿ The night-time period has been assessed between the hours of 23:00 and 07:00 for a reference time period of 15 minutes.
- ✿ During the daytime, it is assumed, in order to inform a worst-case assessment, that there will be 10 FLT movements per hour for each unit. During the night-time, it is assumed that 5 FLT movements per hour will take place for each unit. These are input as moving point sources with paths following the façade of the units.
- ✿ HGV deliveries/collections are included, accounting for tail lift operations and trolleys being wheeled into the respective unit.
- ✿ Car parking sound from the proposed units has been inputted as an area source with daytime and night-time levels generated based on the car park is 100% full during the day and 25% full during the night
- ✿ During the daytime periods, it is assumed, that roller shutters to each of the units are open. During the night-time, roller shutters are assumed to be closed.
- ✿ The breakout noise from the roller shutters has been on-time corrected to account for the hourly and 15-minute assessment periods given in BS 4142:2014+A1:2019.
- ✿ Noise breakout from the façades of the proposed units has been input into the model as vertical area sources.
- ✿ Soft ground attenuation has been applied, where necessary.

E3P understand that the usage of the units is to be industrial in nature (B1, B2 and B8) and there could be any noise source associated with this, but all operations not assessed here or advised upon would be internal only. Given that a minimum sound reduction of 38 dB is expected for a typical industrial building facade and that it is highly unlikely that internal operations at any unit would exceed 80 dB inside, external noise levels at the facades are expected to be, at most, 42 dB radiating from the façade itself. Roller shutter entrances are assumed to be open, during the daytime period, with a vertical area source sound power level of 80 dB.



For the BS 4142:2014+A1:2019 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. Accordingly, the following subjective features have been accounted for in the assessment, in accordance with the subjective method detailed in BS 4142:2014+A1:2019, for the units as a whole operation.

TABLE 4.1 ACOUSTIC PENALTIES

SOURCE	CHARACTERISTIC	ATTRIBUTABLE PENALTY	COMMENT
Breakout from Proposed Units	Tonality	2 dB	It is assumed all forklifts would be fitted with white noise reverse alarms with tones just perceptible at the receptors.
	Impulsivity	3 dB	Impulsivity is expected as unloading/loading operations of vans and LGV's
	Intermittency	3 dB	Unloading/loading activities are intermittent in nature
	Other Sound Characteristics	-	Other penalties applied.

4.1. DAYTIME ASSESSMENT

Table 4.2 details the resultant rating level at the worst affected receptor. The grid noise map can be seen in Figure 2 of Appendix II.

The lowest modal background sound levels during the daytime periods have been used for each corresponding receptor. This informs a worst-case assessment.

TABLE 4.2 BS 4142:2014+A1:2019 ASSESSMENT - DAYTIME

RECEPTOR	CALCULATED RATING LEVEL, $L_{A,r}$ (dB)	TYPICAL BACKGROUND SOUND LEVEL, $L_{A90,1hr}$ (dB)	CRITERION, $L_{A90} = L_{A,r}$ (dB)	DIFFERENCE +/- (dB)
R1 – 106 Kipling Avenue	46	46	46	0
R2 – 88 Kipling Avenue	46	46	46	0
R3 – 76 Kipling Avenue	46	46	46	0

Table 4.2 indicates that the predicted rating level exceeds the existing typical background sound level during daytime periods at the closest residential receptors. As such, no further consideration towards mitigation measures is required.

4.2. NIGHT-TIME ASSESSMENT

The noise model has been used to predict the rating level at the receptors during the night-time period. Table 4.3 details the calculated rating level at the receptors and compares the rating level with the background sound level.



TABLE 4.3 BS 4142:2014+A1:2019 ASSESSMENT – NIGHT-TIME

RECEPTOR	CALCULATED RATING LEVEL, $L_{A,r}$ (dB)	LOWEST MEASURED BACKGROUND SOUND LEVEL, $L_{A90,1hr}$ (dB)	CRITERION, $L_{A90} = L_{A,r}$ (dB)	DIFFERENCE +/- (dB)
R1 – 106 Kipling Avenue	38	42	42	-4
R2 – 88 Kipling Avenue	38	42	42	-4
R3 – 76 Kipling Avenue	37	42	42	-5

Table 4.3 indicates that the predicted rating level falls below the typical measured background sound level during the night-time period. Furthermore, internal noise levels, at the residential receptors, assuming a 13 dB reduction for an open window, would be sufficiently low enough with worst case levels being well below the 30 dB criterion.

4.3. MAXIMUM NOISE LEVEL ASSESSMENT – NIGHT-TIME

When considering instantaneous maximum noise levels, E3P has considered the impact of car door slams at the closest car parking space between 23:00 and 07:00 at the receptors. As such, E3P has used measured source data for a typical car door slam. Any activities associated with HGV deliveries, that may result in higher maximum noise levels, are more distant from the receptors.

A criterion level of 58 dB $L_{Amax,fast}$ is used which relates to the 45 dB $L_{Amax,fast}$ internal criterion and a reduction of 13 dB afforded by a partially open window.

TABLE 4.2 MAXIMUM NOISE LEVEL ASSESSMENT – CAR DOOR SLAM 06:00-07:00

RECEPTOR	MEASURED MAXIMUM NOISE LEVEL AT 2 m, $L_{Amax,fast}$ (dB)	DISTANCE TO RECEPTOR (m)	CALCULATED EXTERNAL MAXIMUM NOISE LEVEL, $L_{Amax,fast}$ (dB)	WHO GUIDELINES EXTERNAL NOISE LEVEL CRITERION, $L_{Amax,fast}$ (dB)	DIFFERENCE, +/- (dB)
R1 – 106 Kipling Avenue	Door slam 75/ HGV 80	23/35	54/55	58	-4/-3
R2 – 88 Kipling Avenue	Door slam 75/ HGV 80	23/38	54/54	58	-4/-4
R3 – 76 Kipling Avenue	Door slam 75/ HGV 80	21/30	55/57	58	-3/-1

As shown in the Table, the predicted maximum noise levels fall below the criterion at the rear facades of receptors.

4.4. PROPOSED FIXED PLANT

At the time of submission, details of proposed fixed plant items were unknown. As such, the following recommendations have been made:



-  Any fixed plant items should be located within the site and not located on façades that are orientated towards the noise sensitive receptors.
-  The resultant rating level from the cumulative impact of all proposed fixed plant items must not exceed the existing background sound levels, accounting for the above proposed noise levels, at the closest receptors.

It is assumed that any fixed plant items proposed would have a low noise level and most likely will consist of A/C units. Considering the typical noise levels of these units and the surrounding existing usage, the impact of these would be negligible.

Where this is not the case, it is recommended that an acoustician is involved to ensure the plant to be installed will not adversely affect the receptors.



5. MITIGATION AND DISCUSSION

5.1. SITE MANAGEMENT CONTROL

This assessment has been based on assumptions of proposed sources based on the proposed class usage. However, it assumes that best practice is followed for all activities/operations, as discussed below in order to limit any potential noise impact at nearby receptors:

- ✿ It is assumed that all rear/emergency access doors to units would be kept closed except for access or emergencies. During the summer, it would be acceptable for the front roller shutter doors to be open for ventilation and these have been modelled as such.
- ✿ Where night operations are required, care and attention should be paid to the noise produced. Engines should be switched off wherever possible and yard activity kept to a minimum between the hours of 23:00 and 07:00.
- ✿ Where vehicle mounted refrigeration units are used, these must be turned off upon entering the service yard and for the duration of the delivery/collection.
- ✿ Roller shutter doors should remain closed at night except for access. Plant and equipment should be well maintained to ensure optimal running without causing unduly high noise levels.
- ✿ Employees should be reminded that they are operating in close proximity to residential dwellings and should keep external noise to a minimum.

5.2. ACOUSTIC BARRIERS

The previous section determined that noise levels in rear garden areas associated with the closest residential receptors would be acceptable with the proposed acoustic barrier in place.

This acoustic barrier, at 3.8 m in height, is sufficient to bring noise levels within the worst affected gardens to achieve or fall below the modal measured background level.

Figures 2 and 3 detail the location of the acoustic barrier.

Barriers can be of wooden fence or brick wall construction, but wooden fences must be of close boarded construction and all barriers must be free from holes, sealed at the base and have a minimum mass of 10 kg/m².



6. COMMERCIAL SOUND IMPACT CONTEXT AND UNCERTAINTY

In order to determine the final outcome of the assessment, the context must be considered, in accordance with BS 4142:2014+A1:2019, Section 11. The factors to be considered are discussed below:

THE ABSOLUTE LEVEL OF THE SOUND

Since the assessment relates to a future noise source, it is not possible at present to compare the Specific Noise Level with the residual sound, as discussed within the standard. However, the absolute noise level at the façade of the most affected residential receptor is 37 dB $L_{Aeq,15min}$ respectively. Assuming 13 dB for attenuation provided by an open window, this would result in the internal noise levels falling below the internal bedroom criterion given in BS 8233:2014 by 5 dB. As such, this would not cause adverse impact.

THE CHARACTER AND LEVEL OF THE RESIDUAL SOUND COMPARED TO THE CHARACTER AND LEVEL OF THE SPECIFIC SOUND

As discussed above, this is not directly possible since the assessment relates to a proposed noise source rather than an existing noise source. However, there is existing commercial/industrial uses at the site, to the immediate north, east and west and, as such, commercial sound already forms part of the existing acoustic environment, and this would therefore form part of the Residual Sound. This is significant because the proposed noise source would therefore be contributing to an existing impact, rather than presenting a brand-new impact within the area. However, the new noise sources will bring this source closer to the receptors and so mitigation in order to reduce the potential impact is therefore justified.

THE SENSITIVITY OF THE RECEPTOR AND WHETHER DWELLINGS OR OTHER PREMISES USED FOR RESIDENTIAL PURPOSES WILL ALREADY INCORPORATE DESIGN MEASURES THAT SECURE GOOD INTERNAL AND/OR OUTDOOR ACOUSTIC CONDITIONS.

The closest receptors are residential and are therefore considered to be sensitive. Given that details of the existing receptors are not known, it is assumed that no design measures are incorporated, i.e. open windows rather than trickle vents are relied upon for ventilation. Based on the absolute noise levels at the façade, the internal noise levels would be below BS 8233:2014 criteria and would be acceptable when the windows are open. This is significant during the night-time, when indoor conditions are of paramount importance, and outdoor conditions are of less importance.

Given the contextual factors discussed above in accordance with BS 4142:2014+A1:2019, it is concluded that the sound sources proposed are likely to have a low to adverse impact during the daytime and night-time periods. Indeed, this is further compounded by the potential uncertainty of the assessment in relation to the measured background sound levels, accuracy of the noise model and subjective penalties applied that could result in a +/-3 dB uncertainty overall.

Even with this uncertainty, noise levels at the façade of the closest residential receptor would be at most 40 dB. Internal noise levels with windows open would be 27 dB which is 3 dB below the criteria set out in BS 8233: 2014.



7. CONCLUSION AND RECOMMENDATIONS

E3P were commissioned by Derwent Development Management Ltd to undertake a Noise Impact Assessment for the proposed commercial development at Huyton Industrial Park, Huyton.

This assessment looked to determine the key noise sources associated with the development and undertake an assessment of any impacts upon existing noise sensitive receptors.

An unattended background sound surveys has been undertaken in order to capture worst case baseline noise levels.

E3P has undertaken detailed 3D noise modelling of all the proposed sources in order to predict noise levels at ground and 1st floor windows for the daytime and night-time periods respectively, in accordance with BS 4142:2014+A1:2019, at the closest receptors to the site.

A 3.8 m high acoustic barrier is specified on the proposed site plan and has been included within the 3D noise model.

The assessment has shown that the predicted rating level falls below the typical measured background sound level during daytime and night-time periods.

This assessment has shown, with the proposed 3.8 m acoustic barrier in place, that there should be no adverse impact upon existing residential receptors due to the proposed operations. As such, noise should not be a determining factor in the determination of the planning application.

END OF REPORT



APPENDIX I

GLOSSARY OF ACOUSTIC TERMINOLOGY

NOISE

Noise is defined as unwanted sound. Human ears are able to respond to sound in the frequency range 20 Hz (deep bass) to 20,000 Hz (high treble) and over the audible range of 0 dB (the threshold of perception) to 140 dB (the threshold of pain). The ear does not respond equally to different frequencies of the same magnitude but is more responsive to mid-frequencies than to lower or higher frequencies. To quantify noise in a manner that approximates the response of the human ear, a weighting mechanism is used. This reduces the importance of lower and higher frequencies, in a similar manner to the human ear.

Furthermore, the perception of noise may be determined by a number of other factors, which may not necessarily be acoustic. In general, the impact of noise depends upon its level, the margin by which it exceeds the background level, its character and its variation over a given period of time. In some cases, the time of day and other acoustic features such as tonality or impulsiveness may be important, as may the disposition of the affected individual. Any assessment of noise should give due consideration to all of these factors when assessing the significance of a noise source. The most widely used weighting mechanism that best corresponds to the response of the human ear is the "A"-weighting scale. This is widely used for environmental noise measurement, and the levels are denoted as dB(A) or L_{Aeq} , L_{A90} etc., according to the parameter being measured.

The decibel scale is logarithmic rather than linear, and hence a 3 dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective but, as a general guide, a 10 dB(A) increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3 dB(A) is generally regarded as the minimum difference needed to perceive a change under normal listening conditions. An indication of the range of sound levels commonly found in the environment is given in the following table.

TABLE A1 TYPICAL SOUND PRESSURE LEVELS

SOUND PRESSURE LEVEL	LOCATION/EXAMPLE
0	Threshold of hearing
20–30	Quiet bedroom at night
30–40	Living room during the day
40–50	Typical office
50–60	Inside a car
60–70	Typical high street
70–90	Inside a factory
100–110	Burglar alarm at 1 m away
110–130	Jet aircraft on take off
140	Threshold of pain



ACOUSTIC TERMINOLOGY

TABLE A2 TERMINOLOGY

DESCRIPTOR	EXPLANATION
dB (decibel)	The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure (2E-05 Pa).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. "A" weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
L_{Aeq, T}	L _{Aeq} is defined as the notional steady sound level which, over a stated period of time (T), would contain the same amount of acoustical energy as the A-weighted fluctuating sound measured over that period.
L_{Amax}	L _{Amax} is the maximum A-weighted sound pressure level recorded over the period stated. L _{Amax} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall L _{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the "fast" sound level meter response.
L₁₀ and L₉₀	If a non-steady noise is to be described, it is necessary to know both its level and the degree of fluctuation. The L _n indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L ₁₀ is the level exceeded for 10% of the time and as such can be regarded as the "average maximum level". Similarly, L ₉₀ is the "average minimum level" and is often used to describe the background noise. It is common practice to use the L ₁₀ index to describe traffic noise.
Free-field Level	A sound field determined at a point away from reflective surfaces other than the ground with no significant contributions due to sound from other reflective surfaces. Generally, as measured outside and away from buildings.
Fast	A time weighting used in the root-mean-square section of a sound level meter with a 125-millisecond time constant.
Slow	A time weighting used in the root-mean-square section of a sound level meter with a 1000-millisecond time constant.



APPENDIX II

MEASURED SOUND PRESSURE LEVELS

TABLE A1: HOURLY AMBIENT AND BACKGROUND SOUND LEVEL DATA – NMP1

PERIOD START	AMBIENT SOUND LEVEL, $L_{Aeq,1hr}$ (dB)	BACKGROUND SOUND LEVEL, $L_{A90,1hr}$ (dB)
27/05/2022 11:00	55.0	49.9
27/05/2022 12:00	56.0	50.9
27/05/2022 13:00	54.6	49.9
27/05/2022 14:00	55.4	49.9
27/05/2022 15:00	58.8	50.3
27/05/2022 16:00	56.2	50.2
27/05/2022 17:00	52.7	48.1
27/05/2022 18:00	52.4	47.5
27/05/2022 19:00	55.3	47.9
27/05/2022 20:00	53.8	47.0
27/05/2022 21:00	54.6	44.9
27/05/2022 22:00	48.7	42.8
27/05/2022 23:00	47.7	41.8
28/05/2022 00:00	46.4	39.6
28/05/2022 01:00	42.8	37.6
28/05/2022 02:00	43.9	38.4
28/05/2022 03:00	45.6	39.2
28/05/2022 04:00	51.1	41.0
28/05/2022 05:00	51.1	45.0
28/05/2022 06:00	53.0	44.7
28/05/2022 07:00	54.3	45.8
28/05/2022 08:00	53.0	46.3
28/05/2022 09:00	53.1	45.7
28/05/2022 10:00	54.8	46.1
28/05/2022 11:00	52.6	46.5
28/05/2022 12:00	55.2	45.7
28/05/2022 13:00	55.1	45.2
28/05/2022 14:00	52.7	44.8
28/05/2022 15:00	53.2	45.0
28/05/2022 16:00	54.2	45.9
28/05/2022 17:00	53.3	45.7
28/05/2022 18:00	53.0	45.4



PERIOD START	AMBIENT SOUND LEVEL, $L_{Aeq,1hr}$ (dB)	BACKGROUND SOUND LEVEL, $L_{A90,1hr}$ (dB)
28/05/2022 19:00	54.9	43.7
28/05/2022 20:00	50.3	39.9
28/05/2022 21:00	47.9	40.5
28/05/2022 22:00	57.9	41.1
28/05/2022 23:00	52.3	48.1
29/05/2022 00:00	48.8	43.3
29/05/2022 01:00	47.0	43.6
29/05/2022 02:00	47.6	43.6
29/05/2022 03:00	48.9	44.6
29/05/2022 04:00	52.3	44.4
29/05/2022 05:00	56.3	48.2
29/05/2022 06:00	53.2	45.7
29/05/2022 07:00	52.9	46.6
29/05/2022 08:00	55.2	48.8
29/05/2022 09:00	54.4	47.0
29/05/2022 10:00	55.5	50.0
29/05/2022 11:00	52.9	45.1
29/05/2022 12:00	51.0	42.7
29/05/2022 13:00	52.7	43.1
29/05/2022 14:00	52.7	44.8
29/05/2022 15:00	55.9	47.1
29/05/2022 16:00	53.2	47.6
29/05/2022 17:00	53.5	47.4
29/05/2022 18:00	53.3	47.1
29/05/2022 19:00	51.9	42.8
29/05/2022 20:00	51.3	43.6
29/05/2022 21:00	52.6	42.1
29/05/2022 22:00	47.4	37.4
29/05/2022 23:00	43.7	34.1
30/05/2022 00:00	41.5	32.1
30/05/2022 01:00	38.0	30.6
30/05/2022 02:00	37.5	30.4
30/05/2022 03:00	44.7	33.1



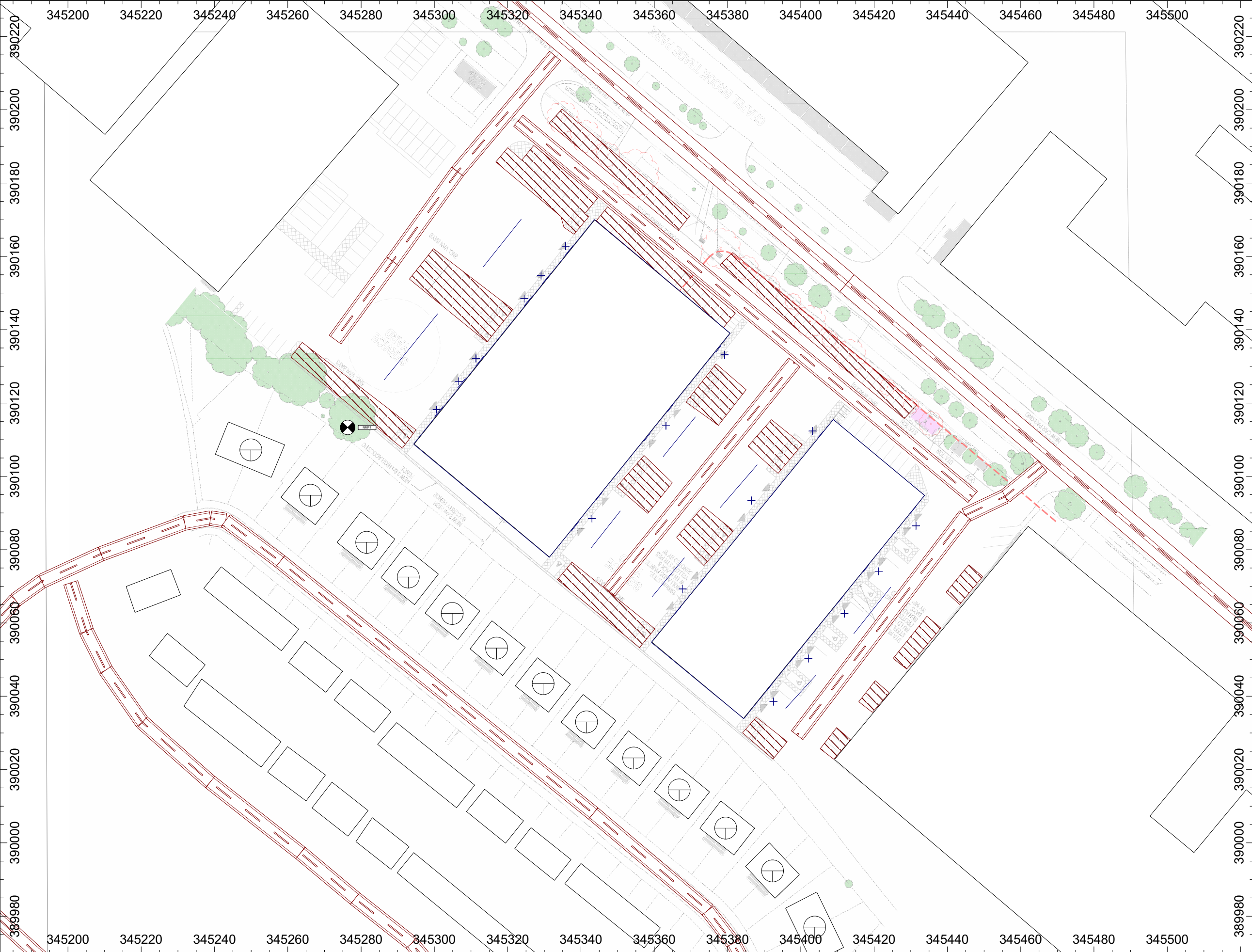
PERIOD START	AMBIENT SOUND LEVEL, $L_{Aeq,1hr}$ (dB)	BACKGROUND SOUND LEVEL, $L_{A90,1hr}$ (dB)
30/05/2022 04:00	59.4	35.4
30/05/2022 05:00	51.5	39.2
30/05/2022 06:00	53.0	43.4
30/05/2022 07:00	55.4	48.2
30/05/2022 08:00	55.1	49.0
30/05/2022 09:00	55.1	48.2



APPENDIX III

FIGURES

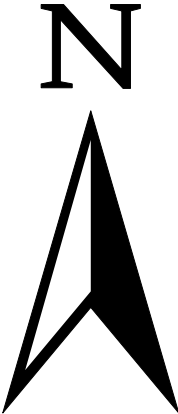
Figure 1 - Noise Survey Measurement Positions



Project:
Huyton Industrial Park

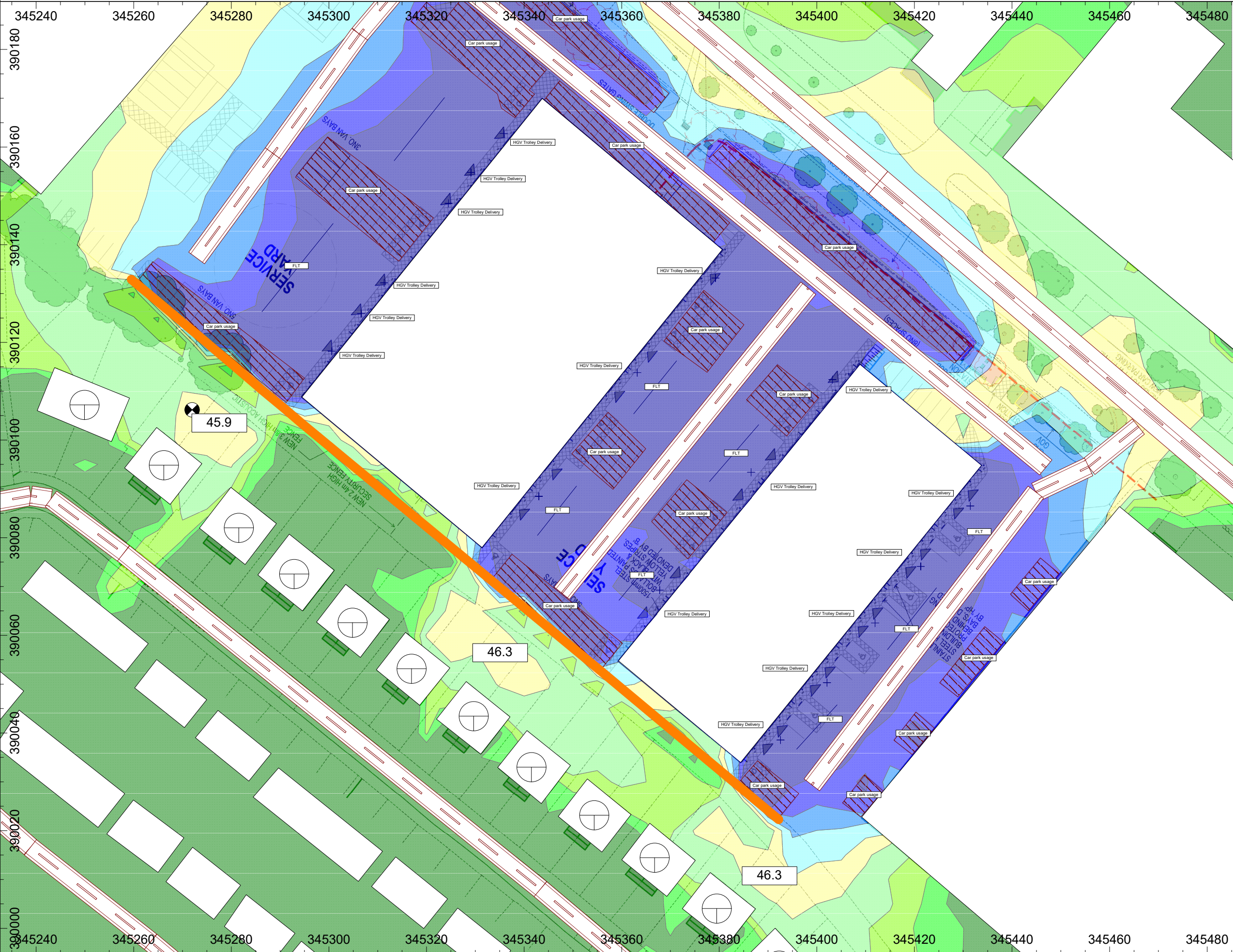
Project-No:
50-613

Client:
Derwent Development
Management Ltd



Project Engineer: L Faulkner
Date: 27/02/2023

Figure 2 - Daytime Grid Noise Map - Calculation at 1.5m above ground level



Project:
Huyton Industrial Park

Project-No:
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Client:
Derwent Development
Management Ltd

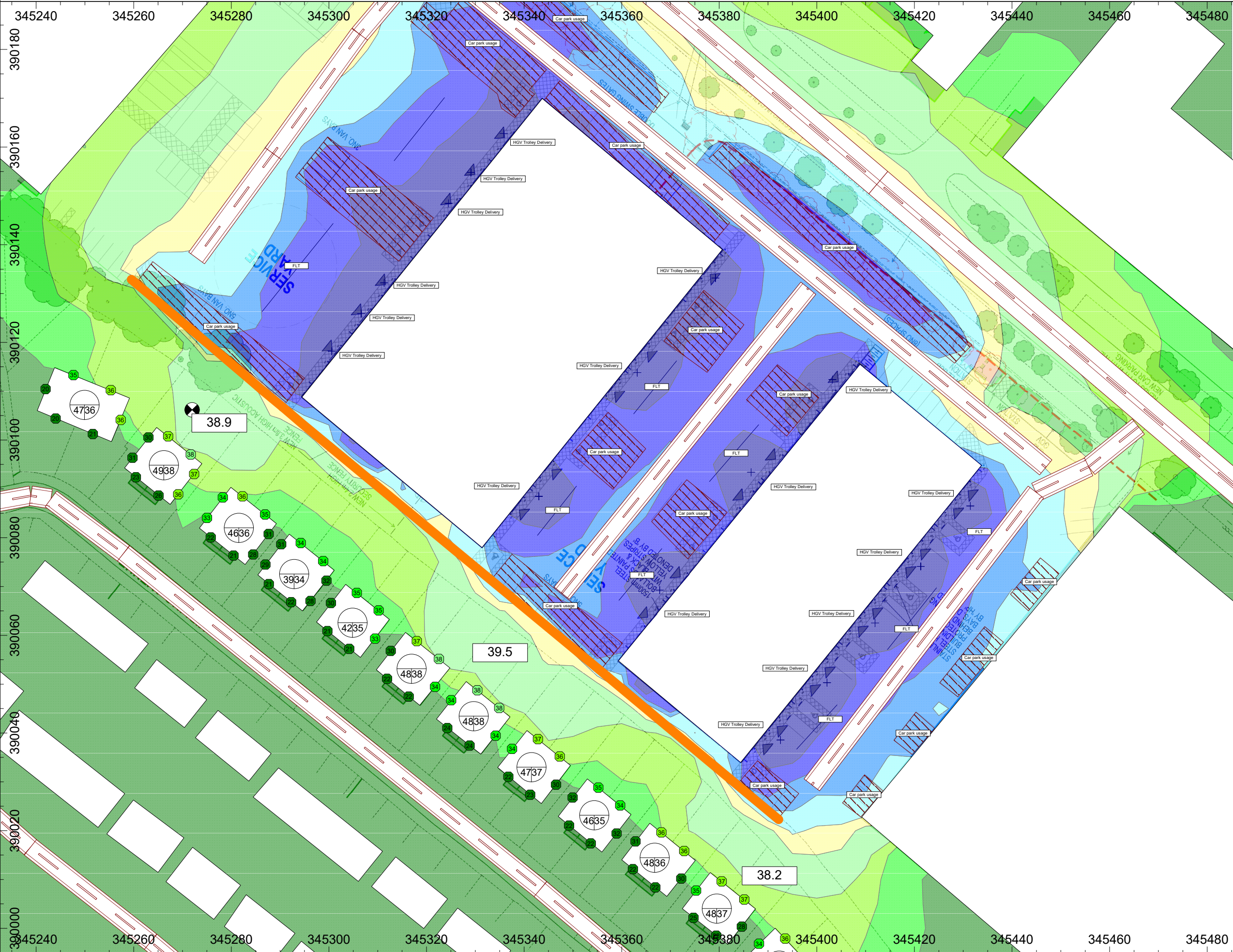
Rating Level, LA,r (dB)	
...	<= 38
38 < ...	<= 40
40 < ...	<= 42
42 < ...	<= 45
45 < ...	<= 48
48 < ...	<= 50
50 < ...	<= 52
52 < ...	<= 55
55 < ...	

- Noise Map Objects**
- + Point Source
 - Line Source
 - vert. Area Source
 - ▭ Road
 - ▨ Parking Lot
 - ▭ Building
 - ▬ Barrier
 - ⊗ Receiver
 - ⊕ Building Evaluation
 - Calculation Area



Project Engineer: L Faulkner
Date: 27/02/2023

Figure 3 - Night-time Grid Noise Map - Calculation at 4m above ground level



Project:
Huyton Industrial Park

Project-No:
50-613

Client:
Derwent Development
Management Ltd

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

...	<= 32
32 < ...	<= 35
35 < ...	<= 38
38 < ...	<= 40
40 < ...	<= 42
42 < ...	<= 45
45 < ...	<= 48
48 < ...	<= 50
50 < ...	

Noise Map Objects

- + Point Source
- Line Source
- vert. Area Source
- ▭ Road
- ▨ Parking Lot
- ▭ Building
- ▬ Barrier
- ⊙ Receiver
- ⊕ Building Evaluation
- ▭ Calculation Area



Project Engineer: L Faulkner
Date: 27/02/2023