SYNGENTA HUDDERSFIELD MANUFACTURING CENTRE

BS 4142 Noise Impact Assessment

10053234-ARC-XX-XX-RP-AE-0036-01-Plinazolin Noise Assessment

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CONTACTS

RIANNA SPENCER
Acoustic Consultant

e rianna.spencer@arcadis.com

Arcadis.
“80 Fenchurch Street”
City of London
Fenchurch Street
~~“80 Fenchurch Street”~~
~~City of London~~
~~Fenchurch Street~~

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Executive Summary

Arcadis (UK) Limited have been commissioned by Syngenta Limited (Syngenta) to undertake a noise assessment to support a planning application for the expansion of the Syngenta Huddersfield Manufacturing Centre (Syngenta HMC). Specifically, the proposed development will comprise a new tank farm containing no.4 tanks and a warehouse which will have internal and external plant, known as the Phoenix Project.

Within the scope of this study, baseline noise levels have been quantified at a number of locations around the site representative of the closest noise sensitive receptors to the facility. Noise levels generated by the new facility have been assessed in line with the impact assessment criteria as defined in British Standard **BS4142: 2014 Method for Rating and Assessing Industrial and commercial sound**.

The study concluded that where the standard is appropriate, noise associated with the proposed development would be at a level where BS 4142 considers it to be “an indication of the specific sound source having a low impact”. This is as a result of the predicted noise falling significantly below the existing baseline noise climate of the area.

As such it is concluded, and demonstrated within this report, that there are no noise related issues preventing the granting of planning permission for the operation of the new tank farm and warehousing facilities at the Syngenta HMC.

1 Introduction

1.1 Project Introduction

Arcadis (UK) Limited have been commissioned by Syngenta Limited (Syngenta) to undertake a noise assessment to support a planning application for the expansion of the Syngenta Huddersfield Manufacturing Centre (Syngenta HMC). Specifically, the proposed development (the site) will comprise a new tank farm and warehousing facilities, known as the Phoenix Project, in the southern area of the Syngenta HMC footprint.

This assessment is based upon a baseline noise survey undertaken in the vicinity of the site during June 2022 during the proposed operational hours of the proposed manufacturing centre. Details regarding the assessment methodology employed, together with the results of the survey undertaken, and the subsequent conclusions and recommendations drawn are presented within the following report.

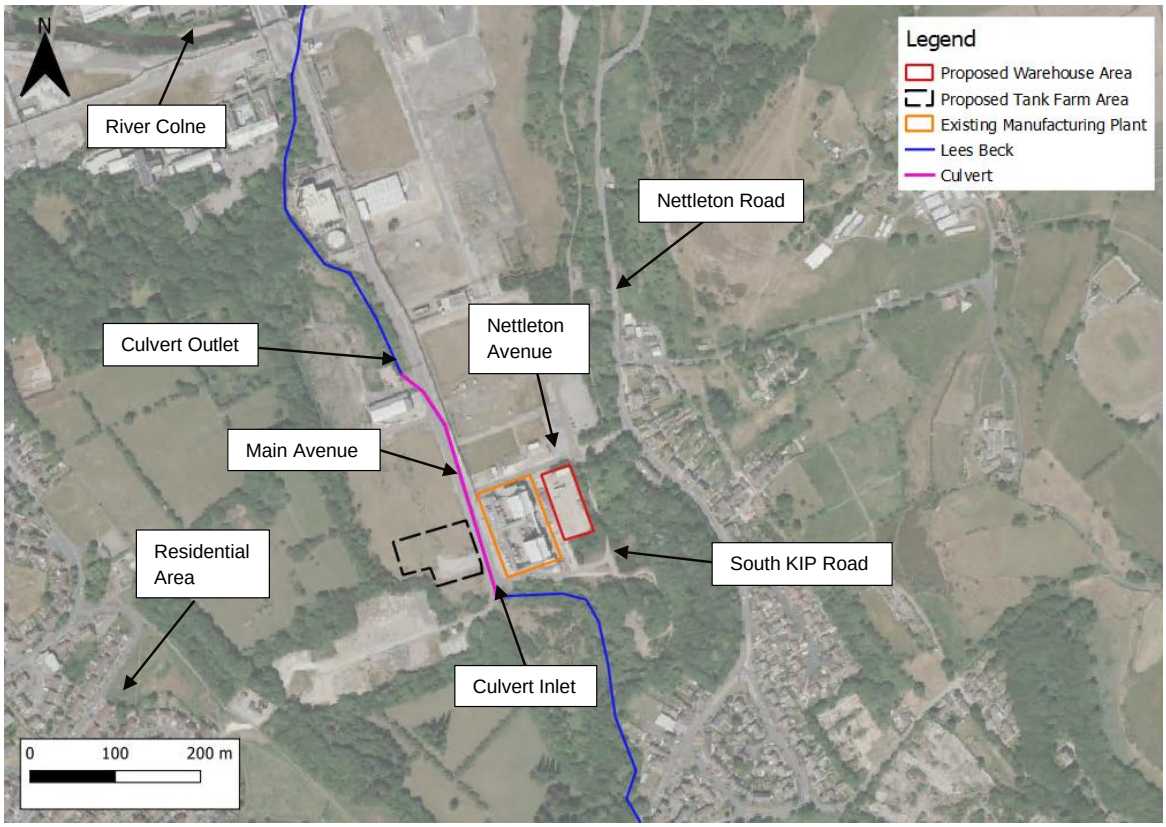
Due to the technical nature of this report a Glossary of Terms is provided in **Appendix A.**

1.2 Site Location and Setting

The proposed development sites are located at the southern end of the Syngenta Huddersfield Manufacturing Centre, off Nettleton Road in the Dalton District of Huddersfield, West Yorkshire, at National Grid Reference (NGR) SE169177.

The proposed development comprises two areas next to an existing manufacturing plant. A warehouse is proposed on the hardstanding area to the east of the manufacturing plant, and a chemical storage tank farm is proposed on the brownfield land to the west of the manufacturing plant. The development sites are connected to the wider Syngenta site by Nettleton Avenue and Main Avenue. Across the wider area there is woodland to the south and east, and a mix of industrial and brownfield land to the north and west. The proposed warehouse red line boundary is circa 0.3ha and the proposed tank farm black line boundary is circa 0.5ha.

Figure 1: Site Location and Setting



The proposed development sites are located immediately east and west of the Lees Beck (classed as a 'Main River'), which flows south to north through the Syngenta site before discharging into the River Colne (also classed as a 'Main River)' approximately 650m to the north of the site. The Lees Beck flows through an area of woodland to the south before it is culverted under Main Avenue between the existing manufacturing plant and the proposed tank farm (Figure 1).

1.3 Description of Operational Details

The assessments undertaken within the scope of this report seeks to consider the potential noise related impacts associated with proposed development at the site. Following commissioning the plant would operate continuously on a 24/7 basis Monday to Sunday.

The new proposed development will comprise of a tank farm and a warehouse. For the purpose of this assessment Arcadis have been commissioned to assess the following:

1. For the new tank farm 4no. pumps
2. For the warehouse facility various plant detailed in document *'280622 Noise Survey Data GB4510174-42-LI-0001_D_01 Phoenix2'*
3. Vehicle movements, detailed below:
    - 22 wagons per month delivering during daylights hours;
    - HAFB between 1-2 deliveries per month during daylight hours;
    - Spent Resin leaving site, 1-2 wagons per month during daylight hours;
    - Resin arriving in 4 wagons per month during day light hours;
    - Tankers will be approx. 92 months, in the KIP South area.
    - Forklift truck movements will be approximately 24 per 24 hours to and from the warehouse,

Indicative plans for the proposed development are presented in below:

Figure 2: Proposed Development

1.4 Scope of Work

In order to assess the potential impacts arising from the proposed development a number of elements of work have been completed. These are as detailed below:

- Consultation with the LPA to discuss and agree appropriate assessment methodologies and protocols, as detailed above;
- Long- and short-term background and ambient noise surveys, with associated metrological monitoring, within the vicinity of the site to quantify the current noise climate;
- Assessment and consideration of noise generation associated with the proposed development on the amenity of the surrounding area; and,
- Where necessary suitable acoustic mitigation measures and strategies that could be employed at the site to control noise are proposed.

Within the scope of the application, Arcadis initiated a consultation exercise with the local planning authority (LPA), Kirklees Council.

The consultation was undertaken with the Kirklees Environmental Health Department in June 2022, regarding the baseline noise monitoring protocol and the assessment methodology to be employed. An email was sent to the Environmental Health department which covered the following points:

- Brief outline of the proposed development;
- Appropriate noise assessment methodology; and,
- Appropriate noise monitoring methodology including survey timings, durations and locations.

A response was received from the Senior Technical Officer for Environmental Health Pollution and Noise Control at Kirklees Council on the 13th of June 2022. The response cited that in general Kirklees Council were accepting of the methodology proposed. Arcadis is not aware of any recent complaints reported in association with the site to date.

2 Planning Policy and Guidance

2.1 Introduction

Within the following section of the report, detail will be presented relating to the guidance documents and assessment methodologies appropriate for noise associated with the proposed development at the Syngenta HMC site.

As the operational processes of the proposed treatment works are industrial in nature, they fall within the scope of **BS 4142: 2014 'Methods for rating and assessing industrial and commercial** sound' The assessment methodology for BS4142 based upon measured background levels are described in detail as follows:

2.1.1 BS 4142: 2014 'Methods for rating and assessing industrial and commercial sound'

This revision to the British Standard 4142 was issued in 2014 and provides a methodology for the rating and assessing of sound associated with both industrial and commercial premises. The purpose of the Standard is clearly outlined in the opening section where it states the method to be appropriate for the consideration of:

- 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 premises or processes, such as that from forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site.

The Standard is based around the premise that the significance of the impact of an industrial/ commercial facility can be derived from the numerical subtraction of the background noise climate level (not necessarily the lowest background level measured, but the typical background of the receptor) from the measured/calculated rating level of the specific sound under consideration. This comparison will enable the impact of said sound to be concluded based upon the premise that typically "*the greater this difference, the greater the magnitude of the impact*". This difference is then considered as follows:

- A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context;
- A difference of around +5dB is likely to be an indication of an adverse impact, depending upon 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 or a significant adverse impact.

BS4142 further states that "*where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact*" again depending upon the specific context of the site. The Standard further qualifies the assessment protocol by outlining conditions to the comparative assessment and stating that "*not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact*", thus implying that all sites should be assessed on their own merits and specifics.

The Standard quantifies the typical reference periods (for the purposes of the standard) to be used in the assessment of noise:

Table 1 BS 4142 Assessment

Time Period	Hours	Assessment Measurement Intervals
Typical Daytime	07:00 – 23:00	1hr assessment period
Typical Night-time	23:00 – 07:00	15min assessment period

The Standard outlines a number of methods for defining appropriate "character corrections" within the Rating Levels to account for tonal qualities, Impulsive qualities, other sound characteristics and/or intermittency. These are a) the Subjective Method, b) the Objective Methods for tonality, and c) the Reference Method. It is noted by the Standard that where multiple features are present the corrections should be added in a linear fashion to the Specific level.

The Subjective Method is based on the following corrections:

Table 2: BS4142 Subjective Method Rating Corrections

Level of Perceptibility	Tonal Correction	Impulsivity Correction	Correction for "Other sound characteristics"	Intermittency Correction
No Perceptibility	+0 dB	+0 dB	Where neither tonal nor Impulsive but clearly identifiable +3 dB	If intermittency is readily identifiable +3 dB
Just Perceptible	+2 dB	+3 dB		
Clearly Perceptible	+4 dB	+6 dB		
Highly Perceptible	+6 dB	+9 dB		

The Objective Methods are based around the actual quantification of 1/3 Octave data for the sound under investigation where possible.

However, the Standard states that the assessment methodology provided is not intended for the derivation of internal noise levels arising from sound levels outside or "where background sound levels and rating levels are low", however, with regard to the latter, no definition of "low" is provided[1]. Where these situations prevail, it is considered appropriate to reference the absolute guidance levels provided in British Standard **BS 8233: 2014 – Guidance on Sound Insulation and Noise Reduction for Buildings** and the World Health Organisation's **'Guidelines for Community Noise'** and **'Night Noise Guidance for Europe'.**

[1] Within the 1997 revision of the BS4142 Standard "(very) low" was defined as a background level of below 30dB L_{A90} and a Rating level below approximately 35dB $L_{Ar,T}$.

3 Noise Monitoring Survey

This section of the report describes the specifics of the background noise surveys undertaken in the vicinity of the Syngenta HMC site.

As detailed below surveys were undertaken at three locations which comprised of two unattended long-term monitoring locations at NML 01 between 15th June 2022 and 22nd June 2022 and NML 02 between 15th June 2022 and 16th June 2022 and one attended attended-term monitoring location NML03 on 15th June 2022 and 16th June 2022. These locations were considered to be representative of the noise climate of the area and acceptable for the purposes of assessment. The image below shows the noise monitoring locations.

Figure 3: Monitoring Locations

Monitoring equipment at NML 01 was located to the northeast of the proposed scheme representing dwellings along Nettleton Road. The main noise sources affecting NML 01 was observed to be from road traffic from Nettleton Road and distant plant noise from the Syngenta site. The unattended noise monitoring was carried out between 12:30 of 15th June 2022 and 13:00 of 22nd June 2022. The monitoring position was located approximately 2 metres from the site boundary fence and approximately 1.5 metres above ground. The monitoring position was considered within façade position.

Monitoring equipment at NML 02 was located to the south of the proposed scheme representing dwellings along Nettleton Road. The main noise source affecting NML 02 was observed to be from Syngenta operating site noise. The noise monitoring was between 12:00 of 15th June 2022 and 11:00 of 16th June 2022. The monitoring location was located within the Syngenta land, approximately 130m from the Syngenta building. The monitoring position was within free-field location and approximately 1.5m above ground.

Monitoring equipment at NML 03 was located to the southwest of the proposed scheme, representing the dwellings along Brock Bank. The attended noise monitoring was undertaken between 14:15 and 15:15, 21:15 and 22:15 of 15th June 2022 and between 01:00 and 01:30, 07:30 and 08:00 16th June 2022. The main noise sources affecting NML03 was observed to be from the substation locating to the northwest approximately 60m away from the monitoring location, bird noises and pedestrian. The monitoring position was approximately 1.5m above ground and conserved within free-field position.

3.1 Weather

The monitoring survey was undertaken in conjunction with a specific meteorological survey quantifying information relating to wind speed, wind direction, temperature, humidity and rainfall data during the survey period.

3.2 Monitoring Equipment

The monitoring of noise was undertaken in line with the guidance set out within **BS7445: 2003 Description and measurement of environmental noise. Guide to quantities and procedures**. The sound level meters were programmed to monitor over 1-hour intervals during the daytime and 15 minutes during the night-time. No whether measured data was discounted from survey. Full dataset is available upon request/

The noise monitoring equipment used was set to record the following statistical parameters:

- L_{Aeq} dB
- L_{A90} dB
- L_{Amax} dB

The meteorological monitoring equipment used was set to record the following parameters:

- Precipitation using a Doppler radar system, providing amount in mm, rate and type;
- Wind speed (ms-1) and direction (degrees) using 4 ultrasonic sensors and a built-in compass which automatically locates north for the purpose of setting the direction measurements;
- Temperature (°C);
- Barometric Pressure (hPa);
- Relative Humidity (%);
- Dew point (°C)

The following monitoring equipment was used for both noise and weather in order to undertake the survey work in the vicinity of the site.

Table 3 Table of Equipment

Equipment	Manufacturer	Type	Serial Number	Date of last calibration (at the time of the survey)
Sound Level Meter	01dB	Fusion	11037	21/02/2022
	01dB	Fusion	11039	21/02/2022
	01dB	DUO	12656	20/01/2022
Microphone	GRAS	40CE	233364	21/02/2022
	GRAS	40CE	233310	21/02/2022
	GRAS	40CD	331782	20/01/2022

The following set-up parameters were used on the noise monitoring equipment used during all of the noise measurements undertaken:

- Time Weighting: “Fast”
- Frequency Weighting: “A”

The noise meters used within this assessment are fully calibrated and within their calibration period, certificates can be provided upon request. They were locally calibrated using an electronic calibrator prior to commencement and upon completion of each survey, no significant drift in calibration was observed.

4 Noise Survey Results

This section of the report summarises the results of the noise and meteorological monitoring survey undertaken within the scope of this assessment. The full monitoring data for both noise and meteorological conditions is available is available on request.

4.1 Meteorological Monitoring Survey Results

The meteorological data amassed during the survey period has been analysed in order that periods with inclement weather has been excluded from the survey on the basis of the following:

- Any periods of Rainfall greater than 0mm; and,
- Average wind speed of 15 minutes exceeding 5m/s^{-1}.

Within the analysis of the dataset monitored no periods have been excluded from the analysis as a result of either excessive average wind speed or precipitation as defined above.

4.2 Noise Monitoring Survey Results

Presented within the table below is a summary of the noise levels monitored at locations NML1, NML2 and NML3 as detailed within Section 3 of this report.

Given the proposed operational hours of the pumping station following commissioning, as detailed within Section 1.4 of this report, it has been considered necessary to present the averaged noise levels measured at during:

- Normal weekday and weekend daytime period (07:00 – 23:00);
- Normal weekday and weekend night-time period (23:00 – 07:00);

A -2.5dB correction has been applied to the results to convert the façade measurement into a free-field measurement. This is reflected in the tables below.

Table 4 NML1 Noise Monitoring Results

Date	Time Period	$L_{Aeq,T}$ dB	$L_{Amax,T}$ dB	$L_{A90,T}$ dB
15/06/2022	Daytime	52.5	79.2	46.0
	Night-time	50.0	77.5	46.0
16/06/2022	Daytime	52.9	89.1	47.0
	Night-time	50.3	80.1	46.0
17/06/2022	Daytime	53.7	82.5	50.0
	Night-time	48.6	72.9	46.0
18/06/2022	Daytime	52.9	84.0	48.0
	Night-time	48.3	71.1	46.0
19/06/2022	Daytime	52.0	83.3	47.0
	Night-time	49.3	74.0	44.0
20/06/2022	Daytime	52.7	83.9	46.0
	Night-time	49.8	76.5	45.0
21/06/2022	Daytime	52.6	80.9	46.0
	Night-time	49.7	78.3	45.0
22/06/2022	Daytime	52.7	77.2	47.0

Table 5: NML2 Noise Monitoring Results

Date	Time Period	$L_{Aeq,T}$ dB	$L_{Amax,T}$ dB	$L_{A90,T}$ dB
15/06/2022	Daytime	54.1	72.5	51.0
	Night-time	54.0	70.9	51.0
16/06/2022	Daytime	53.5	68.3	51.0

Table 6: NML3 Noise Monitoring Results

Date	Time Period	$L_{Aeq,T}$ dB	$L_{Amax,T}$ dB	$L_{A90,T}$ dB
15/06/2022	Daytime	43.9	73.2	39.0
	Night-time	45.6	68.8	41.0
16/06/2022	Daytime	44.5	69.3	38.0
	Night-time	44.2	47.6	42.0

5 Predictive Noise Modelling Assessment

This section of the report will detail the calculation methodologies used, along with the assumptions embodied within the noise modelling aspect of the study.

5.1 Noise Modelling Protocols

The noise model was constructed within the commercially available Braunstein + Berndt GmbH computer noise mapping software SoundPLAN version 8.2. Within the scope of this modelling exercise acoustic propagation has been calculated in accordance with the following standards:

- **ISO 9613-2: Acoustics – Attenuation of sound during propagation outdoors: Part 2: General method of calculation**

5.2 Foundation of the Model

The noise model was constructed utilising the following information:

- Detailed site layout information in the form of OS Vector mapping;
- Topography from the National Lidar Programme
- Noise data provided by the Design Engineers for the proposed plant and equipment required
- HGV Calculator for predicting noise level of vehicle movements

6 Noise Impact Assessment

In this section of the report the results of the noise modelling assessment will be compared to the noise climate of the area in order to conclude the envisaged noise impacts of the proposed development.

As previously stated, the impacts associated with the proposed developments would be assessed in accordance with the methodology set out in BS4142:2014 as detailed in section 2.

It is noted that BS4142 stipulates that the methodology is not suitable for assessing noise within buildings (from external sources) or in areas with low background noise climates (when facility noise is also low). Given this, where necessary additional consideration of the potential noise impacts based upon absolute levels will be made where necessary.

It is noted that the warehouse and tank farm facilities will operate at the same level/output 24/7 following commissioning and as such a single noise model scenario has been constructed. The noise model output used to inform the assessment undertaken for the weekday and weekend, daytime and overnight periods is presented in Table 8.

6.1 Character Corrections

Within the methodology of BS 4142 it is necessary to calculate a “Specific” external noise level at each receptor location from the operations under consideration. This “Specific” noise level then requires converting to a “Rating” level in order to take account of tonal or noticeable characteristics of the source noise.

Noise generated by the warehouse facility will be masked by road traffic noise particularly at NML1 and NML 2 and is not predicted to have a great impact on top of the existing noise from site, Therefore, the following has been concluded with regard to suitable character corrections for the operations. The Subjective Method from BS 4142 has been used in this case:

Table 7 BS 4142 Correction for characteristics of the noise assessed

Characteristic	Subjective Perception	Justification	BS 4142 Correction
Tonality	None	Noise from the warehouse and tank farm will be enclosed within a building structure. However, as all plant and equipment would be within the purpose-built building noise generated within the plant would be controlled into the environment by the façade envelope of the building.	+0
Impulsivity	None	No significant impulsive noises would be evident as the plant would operate at a constant level when operational.	+0
Other Characteristics	None	No ‘other’ characteristics have been identified associated with the site.	+0
Intermittency	Possible	Following commissioning the pump-set plant would operate continually on a 24/7 basis and as such would not be intermittent.	+0
Total Character Correction			+/- 0

6.2 Baseline Noise Climate Analysis

With regard to the baseline noise climate used within the scope of any BS4142 assessment, the Standard states that:

"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."

"Among other considerations, diurnal patterns can have a major influence on background sound levels, and, for example, the middle of the night can be distinctly different (and potentially lesser importance) compared to the start or end of the night-time period for sleep purposes. Furthermore, in this general context it can also be necessary to separately assess weekends and weekday periods."

The background (L_{A90}) data collected during the noise surveys has therefore been analysed to determine the modal value recorded at each of the monitoring locations. This has been done separately for each location during the weekday and weekend periods for the daytime and overnight periods separately. This will ensure that noise is considered suitably across the entire 24hr period.

The BS4142 assessment undertaken within the scope of this report has been undertaken against the mode of the measured data.

7 Assessment

Operational Noise

The colour contour noise maps are shown in **Appendix B** and display the noise levels are the most exposed façade; NML1, NML2, and NML3. The predicted levels are also presented in Table 10 below:

Table 8: Predicted noise from proposed external plant

Calculation Point	Daytime (07:00-23:00) L_{Aeq} dB	Night-time (23:00-07:00) L_{Aeq} dB
NML1	37.6	37.8
NML2	35.3	35.3
NML3	30.1	30.2

Daytime BS 4142 Noise Assessment

Based on the noise modelling output, the specific noise level calculated for the nearest receptors was found to are detailed in the table above at NML1, NML2 and NML3 on this information a BS 4142 assessment was carried out, the outcomes are displayed in Tables 11, 12 and 13 for the daytime assessment and Tables 14, 15 and 16 for the night-time assessment.

Table 9: NML1 Daytime BS 4142 Assessment

Results	Assessment	Notes
Specific Sound Level ($L_{Aeq,t}$)	38dB	From Table 10
Character Correction	0	No character correction as road traffic may mask noise from site during daytime operations
Rating Level ($L_{Ar,t}$)	38dB	
Background Sound Level ($L_{A90,t}$)	46dB	Modal L_{A90}
Excess of rating over background sound level	-8dB	Low Impact

*Note: All noise levels rounded to the nearest whole number in line with BS 4142 requirement

It can be seen from the table above that during the daytime, the rating level is predicted to be 8dB below the background ($L_{A90,t}$) and as such would be inaudible at the assessment location.

BS 4142 suggests that "*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 or a significant 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, depending on the context.*"

Table 10: NML2 Daytime BS 4142 Assessment

Results	Assessment	Notes
Specific Sound Level ($L_{Aeq,t}$)	35dB	From Table 10
Character Correction	0	No character correction as road traffic may mask noise from site during daytime operations
Rating Level ($L_{Ar,t}$)	35dB	
Background Sound Level ($L_{A90,t}$)	51dB	Modal L_{A90}
Excess of rating over background sound level	-16dB	Low Impact

*Note: All noise levels rounded to the nearest whole number in line with BS 4142 requirement

It can be seen from the table above that during the daytime, the rating level is predicted to be 16dB below the background ($L_{A90,t}$) and as such would be inaudible at the assessment location.

BS 4142 suggests that "*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 or a significant 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, depending on the context.*"

Table 11: NML3 Daytime BS 4142 Assessment

Results	Assessment	Notes
Specific Sound Level ($L_{Aeq,t}$)	30dB	From Table 10
Character Correction	0	No character correction as road traffic may mask noise from site during daytime operations
Rating Level ($L_{Ar,t}$)	30dB	
Background Sound Level ($L_{A90,t}$)	41dB	Modal L_{A90}
Excess of rating over background sound level	-11dB	Low Impact

*Note: All noise levels rounded to the nearest whole number in line with BS 4142 requirement

It can be seen from the table above that during the daytime, the rating level is predicted to be 11dB below the background ($L_{A90,t}$) and as such would be inaudible at the assessment location.

BS 4142 suggests that "*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 or a significant 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, depending on the context."

Table 12: NML1 Night-time BS 4142 Assessment

Results	Assessment	Notes
Specific Sound Level ($L_{Aeq,t}$)	38dB	
Character Correction	0	No character correction as road traffic may mask noise from site during daytime operations
Rating Level ($L_{Ar,t}$)	38dB	
Background Sound Level ($L_{A90,t}$)	46dB	Modal L_{A90}
Excess of rating over background sound level	-8dB	Low Impact

*Note: All noise levels rounded to the nearest whole number in line with BS 4142 requirement

It can be seen from the table above that during the daytime, the rating level is predicted to be 8dB below the background ($L_{A90,t}$) and as such would be inaudible at the assessment location.

BS 4142 suggests that "*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 or a significant 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, depending on the context."*

Table 13: NML2 Night-time BS 4142 Assessment

Results	Assessment	Notes
Specific Sound Level ($L_{Aeq,t}$)	35dB	
Character Correction	0	No character correction as road traffic may mask noise from site during daytime operations
Rating Level ($L_{Ar,t}$)	35dB	
Background Sound Level ($L_{A90,t}$)	51dB	Modal L_{A90}
Excess of rating over background sound level	-16	Low Impact

It can be seen from the table above that during the daytime, the rating level is predicted to be 16dB below the background ($L_{A90,t}$) and as such would be inaudible at the assessment location.

BS 4142 suggests that "*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 or a significant 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, depending on the context.*"

Table 14: NML3 Night-time BS 4142 Assessment

Results	Assessment	Notes
Specific Sound Level ($L_{Aeq,t}$)	30dB	
Character Correction	0	No character correction as road traffic may mask noise from site during daytime operations
Rating Level ($L_{Ar,t}$)	30dB	
Background Sound Level ($L_{A90,t}$)	42dB	Modal L_{A90}
Excess of rating over background sound level	-12dB	Low Impact

It can be seen from the table above that during the daytime, the rating level is predicted to be 12dB below the background ($L_{A90,t}$) and as such would be inaudible at the assessment location.

BS 4142 suggests that "*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 or a significant 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, depending on the context.*"

8. Conclusions

Arcadis (UK) Limited have been commissioned by Syngenta to undertake a noise assessment to support a planning application for the expansion of the Syngenta HMC. Specifically, the proposed development will comprise a new tank farm containing no.4 tanks and a warehouse which will have internal and external plant, known as the Phoenix Project.

As detailed below surveys were undertaken at 3 locations which comprise of attended monitoring at 1 short-term monitoring location NML3 on 15th June 2022 and 16th June 2022and unattended monitoring at 2 long-term monitoring locations NML1 between 15th June 2022 and 22nd June 2022, and NML2 between 15th June 2022 and 16th June 2022. These locations were considered to be representative of the noise climate of the area and acceptable for the purposes of assessment

For each monitoring location during both the daytime and night-time periods, the BS4142 assessment has determined that the rating levels are predicted to be well below the background ($L_{A90,t}$) and as such would be inaudible at the assessment location and therefore not anticipated to cause disturbance to sensitive receptors around the site when operational.

The impact of the warehouse, both internal and external plant, and the tank farm facility during the daytime and night-time operational periods show that there is likely to be a ‘low impact’ operation.

Appendix A

Glossary of Terms

"A" Weighting (dB(A)) The human ear does not respond uniformly to different frequencies. "A" weighting is commonly used to simulate the frequency response of the ear. It is used in the assessment of the risk of damage to hearing due to noise.

Decibel (dB) The range of audible sound pressures is approximately 2 x 10^{-5} Pa to 200 Pa. Using decibel notation presents this range in a more manageable form, 0 dB to 140 dB.
Mathematically:
Sound Pressure Level (dB) = 20 log {p(t) / P_o}
where P_o = 2 x 10^{-5} Pa

Façade A facade sound level is that determined 1 metre in front of the most exposed window or door in a facade. Sound is reflected from hard surfaces in a similar manner to light by a mirror and the effect is to produce a slightly higher (about 2.5 dB) sound level than would occur if the building was not there.

Free-Field A situation in which the radiation from a sound source is completely unaffected by the presence of any reflecting surfaces.

$L_{eq}(T)$ The equivalent continuous sound level. It is that steady sound level which would produce the same energy over a given time T as a specified time varying sound.

$L_{Amax}(T)$ The maximum RMS A-weighted sound pressure level occurring within a specified time.

$L_{A90,T}$ Background noise level. The A-weighted sound pressure level of the residual noise in decibels exceeded for 90% of a given time interval.

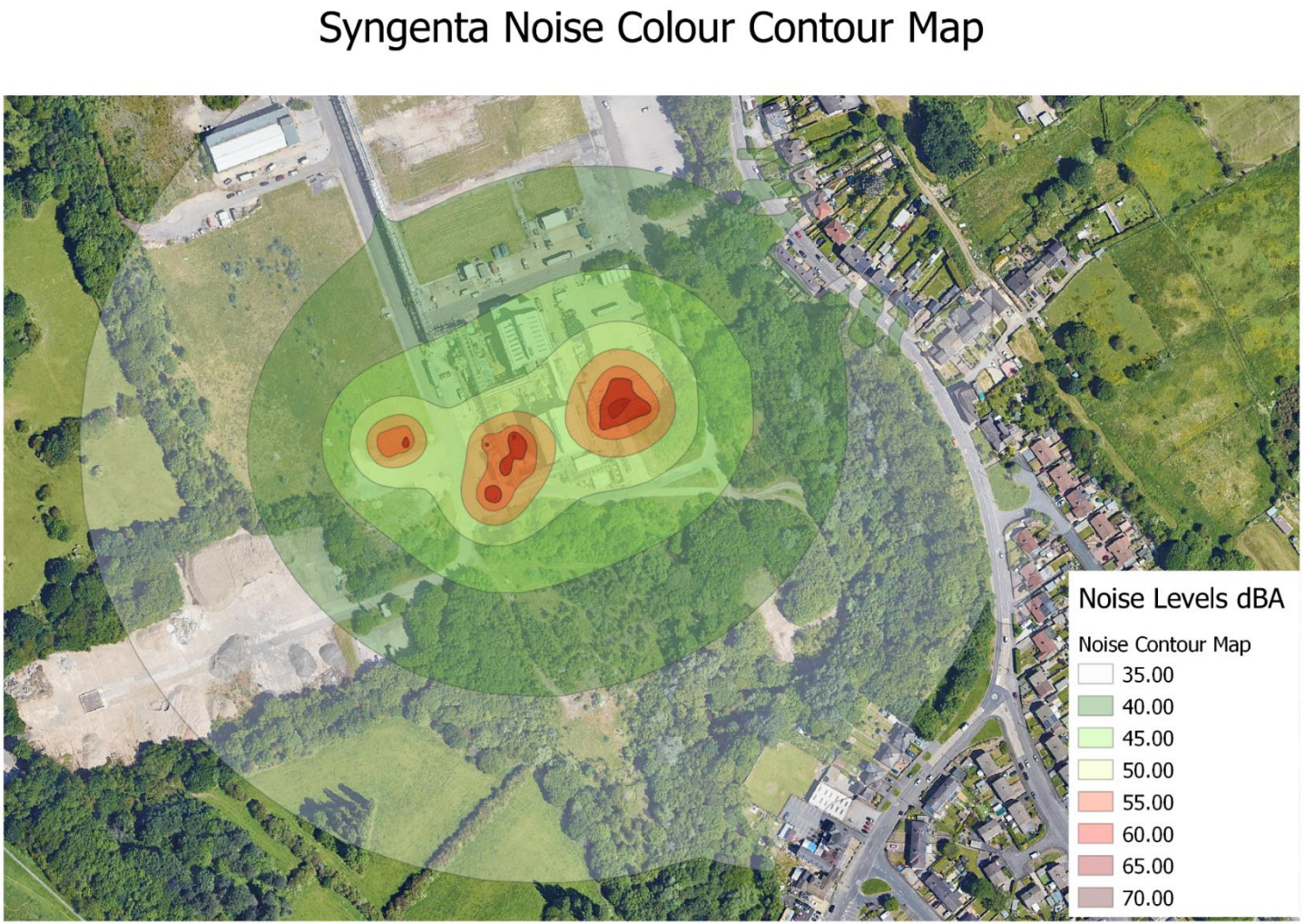
Noise Unwanted sound.

Ambient Noise Totally encompassing sound in each situation at any given time composed of noise from many sources, near and far

Loudness A rise of 10 dB in sound level corresponds approximately to a doubling of subjective loudness. That is, a sound of 85 dB is twice as loud as a sound of 75 dB which is twice as loud as a sound of 65 dB and so on. That is, the sound of 85 dB is 4 times the loudness of a sound of 65 dB.

Appendix B

Noise Contour Map



Arcadis .

“80 Fenchurch Street”
City of London
Fenchurch Street
London EC3M 4BY

arcadis.com