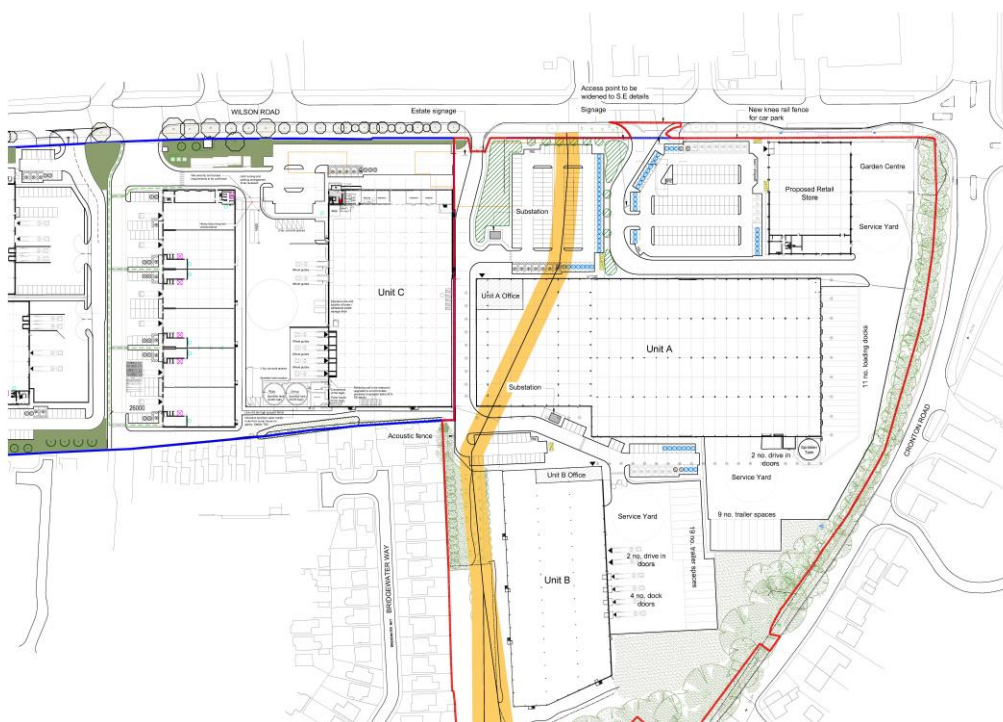


Unit C, Sovereign Industrial Park, Huyton

784-B066702



Noise Assessment

T J Morris

11th June 2024

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Table of contents

Executive Summary.....	6
1.0 Introduction.....	7
1.1 Purpose of this Report.....	7
1.2 Legislative Context	8
1.3 Local & Regional Policy Context.....	11
1.4 Acoustic Consultants' Qualifications and Professional Memberships	12
2.0 Assessment Criteria	13
3.0 Assessment Methodology	17
3.1 Noise Modelling Methodology.....	17
3.2 Model Input Data	19
3.3 Modelling Inputs & Rating Corrections	20
3.4 Sensitive Receptors.....	22
4.0 Noise Survey	24
4.1 Noise Survey Local Planning Authority Consultation	24
4.2 Noise Survey Details	24
4.3 Noise Survey Results	25
4.4 Representative Background Noise Levels.....	28
5.0 Assessment of Effects	30
Fixed	30
5.1 Plant Noise Assessment.....	30
5.2 Cumulative Operational Assessment.....	32
6.0 Conclusion	35
Appendices	36

List of tables

Table 1.1: NPPG Noise Exposure Hierarchy	10
Table 1.2: Acoustic Consultants' Qualifications & Experience	12
Table 2.1: Noise Level Criteria and Actions	14
Table 3.1: Modelling Parameters Sources and Input Data	17
Table 3.2: Summary of Noise Input Data – Sound Pressure Levels	19
Table 3.3: Summary of Noise Input Data – Sound Power Levels	20
Table 3.4: Modelling Inputs & Rating Corrections	21
Table 3.5 Existing Sensitive Receptor Locations	22
Table 4.1 Results of Baseline Noise Monitoring Survey (Average Levels)	26
Table 4.2: Representative Background Noise Levels (All Receptors)	29
Table 5.1: Plant Noise BS 4142:2014+A1:2019 Assessment	31
Table 5.2: Daytime Noise Intrusion Levels $L_{Aeq,1hour}$	32
Table 5.3: Night-time Noise Intrusion Levels $L_{Aeq,1hour}$	33

List of figures

Figure 1 - Noise Sensitive Receptor Locations	23
Figure 2 – Noise Monitoring Locations	25
Figure 3 – Fire Pump Exhaust and Louvre and Condenser Unit Locations	30
Figure 4 – Fixed Plant Noise Night-time Noise Contour Plot L_{Aeq} at 4m Height	32
Figure 5 – Cumulative Plant and Operations Night-time Noise Contour Plot L_{Aeq} at 4m Height	34

Appendices

Appendix A – Acoustic Terminology

Appendix B – References

Acronyms/Abbreviations

Acronyms/Abbreviations	Definition
ASHP	Air Source Heat Pump
CADNA	Computer Aided Noise Abatement
HGV	Heavy Goods Vehicle
PPG	Planning Practice Guidance
LPA	Local Planning Authority

Executive Summary

This report presents the findings of a noise assessment to support a Section 73 application for the addition of external plant to an industrial unit, comprising a service yard and car parking, located at Unit C, The Sovereign Distillery, Wilson Road, Huyton.

A noise assessment was previously undertaken for the wider Sovereign Distillery development to support the planning application (ref: 22/00109/FU). The application was granted with a number of conditions attached, with condition 6 and 7 relating to noise. Since, details of the plant and development plans for Unit C of the development have been revised and a noise assessment for Unit C has been undertaken to comply with the above conditions.

A baseline monitoring survey was undertaken in June 2021 by Tetra Tech to support the planning application for the wider Sovereign Distillery development. Following agreement from the Local Planning Authority (LPA), this has been used to inform the assessment for Unit C.

Fixed Plant Noise Assessment

A plant noise assessment has been undertaken in line with the methodology presented in BS4142:2014+A1:2019 to determine noise impacts from additional fixed plant upon sensitive receptors. Rating noise levels are predicted to be at least 5dB below existing background sound levels at all receptors during daytime and nighttime periods, in line with condition 7. This demonstrates that with the noise mitigation measures in place, as per condition 6, would remain valid and no further mitigation is required.

Cumulative Operational Noise Assessment

A noise intrusion assessment has been carried out to predict noise from all noise sources associated with Unit C (fixed external plant, HGV deliveries, movements, and car parking) at the façade of the closest sensitive receptors. Predicted daytime noise levels are below daytime and nighttime criteria presented in BS 8233/WHO at all receptors, resulting in a No Observed Adverse Effect (NOAEL). This demonstrates that the noise mitigation measures in place, as per condition 6, remain valid and no further mitigation is required.

1.0 Introduction

1.1 Purpose of this Report

This report presents the findings of a noise assessment to support a Section 73 application for the addition of external plant to an industrial unit, comprising a service yard and car parking, located at Unit C, The Sovereign Distillery, Wilson Road, Huyton.

A noise assessment was previously undertaken for the wider Sovereign Distillery development to support the planning application (ref: 22/00109/FU). The planning application was granted by Knowsley Council in July 2022 with a number of conditions attached. These state in relation to noise:

“6. All works which form part of the mitigation measures as detailed within the Noise Assessment (Network Space Ltd, Sovereign Business Park, February 2022, report ref: 784-B029681) shall be implemented in full in accordance with the scheme as agreed prior to the first occupation of the development and shall be retained at all times the development is in use and maintained in accordance with the approved scheme. Documentary evidence of the implementation of the works shall be submitted to and approved in writing by the Local Planning Authority prior to first use of the development.

Reason: To safeguard local residents from noise and disturbance, and to comply with Saved Policy ENV2 of the Knowsley Replacement Unitary Development Plan adopted June 2006.

7. Fixed plant and machinery associated with the development shall be designed to a level that is at least 5dB(A) below the existing LA90 background noise level as measured during the relevant time period. Any tonal, impulsive and/or irregular noise would be addressed by imposing a penalty as per the methodology set out in BS4142:2014+A1:2019, Methods for Rating and Assessing Industrial and Commercial Sound. Noise limits for fixed plant are to apply at a position 1 metre from the closest affected window of the nearest noise sensitive property.

Reason: To safeguard local residents from noise and disturbance, and to comply with Saved Policy ENV2 of the Knowsley Replacement Unitary Development Plan adopted June 2006.”

It is understood that the details of the plant and development plans for Unit C of the development have since been revised and therefore a noise assessment is required to comply with the above conditions.

A list of acoustic terminology used in this report is provided in Appendix A. Report Conditions are available upon request.

1.2 Legislative Context

This report is intended to provide information relevant to the local planning authority and their consultees in support of a planning application for the above proposed development. Policy guidance with respect to noise is found in the National Planning Policy Framework (NPPF), published in December 2023. With regard to noise and planning, the NPPF contains the following statement at Paragraph 191:

“191. Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- (a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;
- (b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason [...]

“193. Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or ‘agent of change’) should be required to provide suitable mitigation before the development has been completed.

“194. The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities.”

Planning Practice Guidance (PPG): Noise provides further guidance with regard to the assessment of noise within the context of Planning Policy. The overall aim of this guidance, tying in with the principles of the NPPF and the Explanatory Note of the Noise Policy Statement for England (NPSE), is to “identify whether the overall effect of noise exposure is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation.”

A summary of the effects of noise exposure associated with both noise generating developments and noise sensitive developments is presented within the PPG and repeated below in Table 1.1.

Table 1.1: NPPG Noise Exposure Hierarchy

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not present	No Effect	No Observed Effect	No Specific Measures Required
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No Observed Adverse Effect	No Specific Measures Required
Lowest Observed Adverse Effect Level (LOAEL)			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level (LOAEL)			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. 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 Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

The NPPF, NPSE and PPG do not, however, present absolute noise level criteria which define SOAEL, LOAEL and NOEL which is applicable to all sources of noise in all situations. Therefore, within the context of the Proposed Development, national planning policy and appropriate guidance documents including 'BS 8233 – Guidance on Sound Insulation and Noise Reduction for Buildings' (2014) and 'BS 4142: 2014 Methods for Rating and Assessing Industrial and Commercial Sound'. Section 2.0 presents the noise level criteria used as a basis of this assessment.

The PPG also states that neither the NPSE nor the NPPF (which reflects the Noise Policy Statement) expects noise to be considered in isolation, separately from the economic, social and other environmental dimensions of the proposed development.

1.3 Local & Regional Policy Context

1.3.1 Knowsley Local Plan Core Strategy January 2016

The Knowsley Local Plan Core Strategy was adopted by Knowsley Council in January 2016 and sets out the vision, objectives, and policies to guide development within Knowsley up to the year 2028.

Principle 4 of Policy CS2: Development Principles states in relation to noise:

“Principle 4: Recognise environmental limits, protect, and enhance environmental assets, enhance local character and promote quality of place by:

[...]

e) Mitigating potential negative impacts of traffic growth and road traffic on highway safety, air quality, noise and health;

[...]

j) Minimising negative impact upon flood risk, air quality, water quality, land quality, soil quality, and noise or vibration levels and ensuring any negative impacts are appropriately mitigated.

Development that will have an unacceptable impact upon any of the above will only be permitted where the benefits of the proposal clearly outweigh the harm.”

Policy CS8: Green Infrastructure goes on to say:

“1) Knowsley’s existing Green Infrastructure and its beneficial functions will be protected, managed and/or enhanced, primarily to:

[...]

e) Mitigate air, water and noise pollution”

1.3.2 Knowsley Replacement Unitary Development Plan Adopted June 2006

The Unitary Development Plan was adopted by Knowsley Council in June 2006 and sets out the development of housing, jobs and services in Knowsley, with focus on how the environment will be protected and improved.

Policy ENV2: Noise and Vibration states:

“1. Development that will either cause an unacceptable increase in noise or vibration levels or itself be subject to unacceptable noise or vibration from an existing source will not be permitted.

2. Where developments are permitted, conditions may be attached to the planning permission to ensure effective noise insulation or other required mitigation measures are carried out.”

1.4 Acoustic Consultants' Qualifications and Professional Memberships

The lead project Acoustic Consultant is Chloe Glenn. The report has been checked and verified by Dawit Abraham. Relevant qualifications, membership and experience are summarised in Table 1.2 below.

Table 1.2: Acoustic Consultants' Qualifications & Experience

Name	Education	Experience in Undertaking Noise Assessments (Start date of working in noise & acoustics)	Attained Technician or Associate Membership of the Institute of Acoustics (date)	Attained Membership of the Institute of Acoustics (date)
Chloe Glenn	BSc 2022	Feb 2022	Jul 2023	-
Dawit Abraham	BSc 2008 MSc 2010	Oct 2010	Jan 2011	Jan 2015

2.0 Assessment Criteria

In order to enable the assessment of the proposed development in terms of LOAEL and SOAEL, Table 2.1 presents equivalent noise levels and associated actions with the target noise level criteria identified. The noise level criteria detailed below have been derived from standards and design guidance:

- BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings – Code of practice'
- BS4142:2014 'Method for rating industrial and commercial sound'
- Condition 6 and 7 of planning application 22/00109/FUL decision notice

A full bibliography of documents referenced within this report is provided within Appendix B.

Table 2.1: Noise Level Criteria and Actions

Noise Sources	Noise Level Criteria	Justification for Effect Level- Action Required
No Observed Adverse Effect Level (NOAEL)		
HGV loading sources, movements and car parking located externally	Difference between Rating Level ($L_{Ar,T}$) dB and existing background level $LA_{90,T}$ dB is less than or equal to 0dB	Justification for Effect Level: Below low impact threshold in BS4142:2014 Action Required: None
Absolute internal noise criteria for the following noise sources with windows closed: - Road traffic noise - Goods vehicle deliveries and unloading of vehicles. - Service yard noise including forklift truck movements. - Car Parks	Noise levels are below: Living Rooms: - 35 dBL _{Aeq,16hours} Kitchens, Dining Rooms, and Studies: - 40 dBL _{Aeq,16hours} Bedrooms: - 35 dBL _{Aeq,16hours} - 30dB L _{Aeq,8hr} - L _{AFmax,2min} noise levels do not exceed: 45dB L _{AFmax} based on 10 th highest L _{AFmax,2min} sample)	Justification for Effect Level: Less than threshold values in Table 4 in BS8233:2014 and Table 1 in World Health Organisation (1999) Guidelines on Community Noise Action Required: None
Absolute external noise criteria for the following noise sources: - Road traffic noise - Goods vehicle deliveries and unloading of vehicles. - Service yard noise including forklift truck movements. - Car Parks	Noise levels are below 50dBL _{Aeq,16hours}	Justification for Effect Level: Less than 'desirable' values in BS8233:2014 Paragraph 7.7.3.2. Action Required: None
Change in noise levels for the following noise sources: - Road traffic noise - Goods vehicle deliveries including arrival and departure of vehicles and unloading of vehicles. - Service yard noise including forklift truck movements. - Car Parks	Increase in ambient L _{Aeq,T} due to contribution from proposed development of ≤1dB.	Justification for Effect Level: Within negligible short-term impact classification range in Table 7.14 in IEMA 2014 guidance Guidelines for Environmental Noise Impact Assessment Action Required: None
Lowest Observed Adverse Effect Level (LOAEL)		
HGV loading sources, movements and car parking located externally	Difference between Rating Level ($L_{Ar,T}$) dB and existing background sound level $LA_{90,T}$ dB is between 1-4dB.	Justification for Effect Level: Within less likely for adverse or significant adverse impact to occur low impact threshold in BS4142:2014 Action Required: Mitigate and reduce to a minimum the exceedance over 0dB above background threshold
Absolute internal noise criteria for the following noise sources with windows closed: Road traffic noise	Noise levels are between: Living Rooms: - 35-40 dBL _{Aeq,16hours} Kitchens, Dining Rooms, and Studies:	Justification for Effect Level: Exceed threshold guidelines in Table 4 of BS8233:2014 and World Health Organisation (1999) Guidelines on Community Noise

• Goods vehicle deliveries and unloading of vehicles. • Service yard noise including forklift truck movements. • Car Parks	- 40-45 dBL_{Aeq,16hours} Bedrooms: - 35-40 dBL_{Aeq,16hours} - 30-35dB L_{Aeq,8hr} - L_{AFmax,2min} noise levels do not exceed 45dB L_{AFmax} based on 10th highest L_{AFmax,2min} sample)	by no greater than 5dB to achieve <u>reasonable internal conditions</u> as defined by Note 7 to Table 1 in BS8233:2014 Action Required: Mitigate and reduce to a minimum the exceedance over the threshold
Absolute external noise criteria for the following noise sources: • Road traffic noise • Goods vehicle deliveries and unloading of vehicles. • Service yard noise including forklift truck movements. • Car Parks	Noise levels are between 50-55 dBL _{Aeq,16hours}	Justification for Effect Level: Exceed 'desirable' threshold guidelines but within upper threshold guidelines in Paragraph 7.7.3.2 of BS8233:2014
Change in noise levels for the following noise sources: • Road traffic noise • Goods vehicle deliveries including arrival and departure of vehicles and unloading of vehicles. • Service yard noise including forklift truck movements. • Car Parks	Increase in ambient L _{Aeq,T} due to contribution from proposed development of 1.0-2.9dB.	Justification for Effect Level: Within minor short-term impact classification range in Table 7.14 in IEMA 2014 guidance Guidelines for Environmental Noise Impact Assessment Action Required: Additional mitigation required to achieve effect of LOAEL or less.
Significant Observed Adverse Effect Level (SOAEL)		
HGV loading sources, movements and car parking located externally	Difference between Rating Level (L _{Ar,T}) dB and existing background sound level L _{A90,T} dB is between 5-9dB.	Justification for Effect Level: Within adverse impact threshold in BS4142:2014. Action Required Additional mitigation required to achieve effect of LOAEL or less.
Absolute internal noise criteria for the following noise sources with windows closed: • Road traffic noise • Goods vehicle deliveries and unloading of vehicles. • Service yard noise including forklift truck movements. • Car Parks	Noise levels are between: Living Rooms: - 40-45 dBL_{Aeq,16hours} Kitchens, Dining Rooms, and Studies: - 45-50 dBL_{Aeq,16hours} Bedrooms: - 40-45 dBL_{Aeq,16hours} - 35-40dB L_{Aeq,8hr} - 45-55dB L_{AFmax,2min} based on 10th highest L_{AFmax,2min} sample)	Justification for Effect Level: Exceeds BS8233:2014 L_{Aeq,T} reasonable criteria by 5dB or exceeds L_{AFmax,2min} (10th highest sample) Action Required: Additional mitigation required to achieve effect of LOAEL or less.
Absolute external noise criteria for the following noise sources: • Road traffic noise • Goods vehicle deliveries and unloading of vehicles. • Service yard noise including forklift truck movements. • Car Parks	Noise levels exceed 55 dBL _{Aeq,16hours}	Justification for Effect Level: Exceeds BS8233:2014 L_{Aeq,16hours} upper criteria. Action Required: Additional mitigation required to achieve effect of LOAEL or less.
Change in noise levels for the following noise sources: • Road traffic noise	Increase in ambient L _{Aeq,T} due to contribution from proposed development of 3.0-4.9dB.	Justification for Effect Level: Within moderate short-term impact classification range in

• Goods vehicle deliveries including arrival and departure of vehicles and unloading of vehicles. • Service yard noise including forklift truck movements. • Car Parks		Table 7.14 in IEMA 2014 guidance Guidelines for Environmental Noise Impact Assessment Action Required: Additional mitigation required to achieve effect of LOAEL or less.
Unacceptable Observed Adverse Effect Level (UOAEI)		
HGV loading sources, movements and car parking located externally	Difference between Rating Level ($L_{Ar,T}$) dB and existing background sound level $L_{A90,T}$ dB is equal to or greater than 10dB	Justification for Effect Level: Within significant adverse impact threshold in BS4142:2014 Action Required: Additional mitigation required to achieve effect of LOAEL or less.
Absolute internal noise criteria for the following noise sources with windows closed: • Road traffic noise • Goods vehicle deliveries and unloading of vehicles. • Service yard noise including forklift truck movements. • Car Parks	Noise levels exceed: Living Rooms: - 45 dBL_{Aeq,16hours} Kitchens, Dining Rooms, and Studies: - 50 dBL_{Aeq,16hours} Bedrooms: - 45 dBL_{Aeq,16hours} - 40dB L_{Aeq,8hr} - L_{AFmax,2min} noise levels exceeds 55dB L_{AFmax} based on 10th highest L_{AFmax,2min} sample)	Justification for Effect Level: Exceeds BS8233:2014 L_{Aeq,T} reasonable criteria by 10dB or exceeds L_{AFmax,2min} (10th highest sample) by 10dB or more. Action Required: Additional mitigation required to achieve effect of LOAEL or less.
Absolute external noise criteria for the following noise sources: • Road traffic noise • Goods vehicle deliveries and unloading of vehicles. • Service yard noise including forklift truck movements. • Car Parks	Noise levels exceed 60 dBL _{Aeq,16hours}	Justification for Effect Level: Exceeds BS8233:2014 L_{Aeq,16hours} upper criteria by 5dB or more. Action Required: Additional mitigation required to achieve effect of LOAEL or less.
Change in noise levels for the following noise sources: • Road traffic noise • Goods vehicle deliveries including arrival and departure of vehicles and unloading of vehicles. • Service yard noise including forklift truck movements. • Car Parks	Increase in ambient L _{Aeq,T} due to contribution from proposed development of ≥5.0dB.	Justification for Effect Level: Within major short-term impact classification range in Table 7.14 in IEMA 2014 guidance Guidelines for Environmental Noise Impact Assessment. Action Required: Additional mitigation required to achieve effect of LOAEL or less.

In line with Condition 7 of the granted planning application 22/00109/FUL for the wider site, noise from fixed plant located externally or internally with louvered grilles associated with the development should be at least 5dB (A) below the existing L_{A90} background noise level. Where this is demonstrated, a No Observed Adverse Effect Level (NOAEL) is achieved. This assessment has been undertaken in line with the methodology presented in BS 4142:2014.

3.0 Assessment Methodology

3.1 Noise Modelling Methodology

Three-dimensional noise modelling has been undertaken based on the monitoring data to predict noise levels at a number of locations both horizontally and vertically. CADNA noise modelling software has been used. This model is based on ISO 9613-2 noise propagation methodology and allows for detailed prediction of noise levels to be undertaken for large numbers of receptor points and different noise emission scenarios both horizontally and vertically. The modelling software calculates noise levels based on the emission parameters and spatial settings that are entered. Input data and model settings as given in Table 3.1 below have been used.

Table 3.1: Modelling Parameters Sources and Input Data

Parameter	Source	Details
Horizontal distances – around site	Ordnance Survey	Ordnance Survey
Ground levels – around site	DEFRA	LIDAR 1m DTM
Building heights – around site	Tetra Tech Observations	• 4.0m height for one-storey properties • 8.0 m height for two storey properties • 3.0m per additional storey
Receptor positions*	Tetra Tech	• 1.5 m for ground floor properties • 4.0m height for first-floor properties
Modelling Parameters	Tetra Tech	• Ground Absorption: 0.5 • Order of Reflections: 2 • Noise Contour Plot Grid Receiver Spacing: 1.5
Proposed Plans	WPL Consulting LLP	Drawing Title: Proposed External Canopy Elevations Drawing No: 1021 Date: April 2024
Barrier Heights	Tetra Tech Observations and granted 22/00109/FUL mitigation	1.8m existing garden fences. 3.0m fence on the western boundary of the site. 6.0m and two 3.5m and barriers on the western boundary of the site as included in the granted 22/00109/FUL assessment

*All receptors modelled 1.0m from building façade unless otherwise stated.

It is understood that as part of the granted planning application 22/00109/FUL, a 6m barrier in addition to two 3.5m barriers were proposed along the western boundary. This assessment is inclusive of the granted noise barriers.

It is acknowledged that a number of the values of parameters chosen will affect the overall noise levels presented in this report. However, it should be noted that the values used, as identified above, are worst-case.

3.2 Model Input Data

Information regarding noise emissions from proposed fixed external plant, HGV deliveries and movements and car parking has been determined using manufacturer data and Tetra Tech site surveys.

Data contained within Table 3.2 and Table 3.3 below presents noise information for the above noise sources.

Table 3.2: Summary of Noise Input Data – Sound Pressure Levels

Noise Source	Type	Octave Band Sound Pressure Level (dB(A))								Sound Pressure Level (dB(A))	Distance (m)	Source
		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz			
Fire Pump - mechanical engine noise	Average	71.1	83.1	94.6	103.1	105.2	102.7	95.5	87.5	109	1	Clarke DP6H-UFKA88 Fire Pump Driver Noise Datasheet
Compressor Room Inlet and Exhaust	Average	-	-	-	-	-	-	-	-	73*	1	Atlas Copco GA 75L VSD Oil-Injected Rotary Screw Compressors Technical Data Sheet
Air Source Heat Pump 1 and 2	Average	-	-	-	-	-	-	-	-	67*	1	Daikin EWYT090CZPBA2 Technical Data Sheet
Air Source Heat Pump 3 Cooling	Average	-	-	-	-	-	-	-	-	55*	1	Mitsubishi Electric R410A Inverter Heat Pump
Air Source Heat Pump 3 Heating	Average	-	-	-	-	-	-	-	-	57*	1	Mitsubishi Electric R410A Inverter Heat Pump
HGV loading/unloading	Average	-	-	-	-	-	-	-	-	73*	3	Tetra Tech Library
HGV arriving/leaving	Average	-	-	-	-	-	-	-	-	63*	3	Tetra Tech Library

Noise Source	Type	Octave Band Sound Pressure Level (dB(A))								Sound Pressure Level (dB(A))	Distance (m)	Source
		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz			
HGV L _{max} noise event	Maximum	-	-	-	-	-	-	-	-	89*	3	Tetra Tech Library
HGV movements	Maximum	55.8	50.6	49.5	50.7	48.2	48.8	65.1	48.6	66	6	Tetra Tech Library
Car parking	Average	-	-	-	-	-	-	-	-	54*	1	Tetra Tech Library

*Where single figure values have been given instead of spectral, they have been inputted at 500Hz within the CadnaA model.

Table 3.3: Summary of Noise Input Data – Sound Power Levels

Noise Source	Type	Octave Band Sound Pressure Level (dB(A))								Sound Power Level (dB(A))	Source
		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz		
Fire Pump - raw exhaust engine noise inclusive of the exhaust silencers*	Average	63.1	69.1	75.6	82.1	88.2	89.7	84.5	78.5	93.8	Clarke DP6H-UFKA88 Fire Pump Driver Noise Datasheet and Armstrong Exhaust Silencers Datasheet

*The fire pump exhausts have been modelled inclusive of the noise reduction provided by the industrial exhaust silencers, as taken from the Armstrong Exhaust Silencers Datasheet.

3.3 Modelling Inputs & Rating Corrections

Table 3.4 below presents the model input information, on-time corrections and BS 4142 rating penalty corrections applied to noise data presented within Table 3.2 and Table 3.3. Rating corrections have been applied as +2dB for tonal noise sources and +3dB for sources considered to be impulsive just perceptible at the noise receptors, as per guidance within BS 4142 Section 9.2.

For the fire pump mechanical engine noise and compressor room inlet and exhaust, noise break-out calculations from the louvre locations have been undertaken using the plant noise level, building dimensions, acoustic absorption, sound reduction and louvre dimensions and characteristics. The building façades have been assumed as brick/block cavity walls, floors as concrete and the

roof as Kingspan KS100RW + No lining. The fire pump louvres have an area of 0.36m², as per the drawing titled 'Proposed External Canopy Elevations' (dated April 2024) provided by the client, and compressor room inlet and exhaust louvres have an area of 2.25m², as per the drawing titled 'SK M01 Compressor Room Ventilation Proposals' (dated May 2024) provided by the client, and hemispherical radiation has been assumed. The louvres have been modelled as vertical area sources with the calculated break-out sound pressure level assigned.

Table 3.4: Modelling Inputs & Rating Corrections

Noise Source	Height (m)	Source Type	Speed (km/h)	Movements per Hour		Operating Time per Reference Period (min)		BS4142 Rating Penalty
				Daytime	Night-Time	Daytime	Night-Time	
Fire Pump - Mechanical Engine Noise	1.5	Vertical Area Source	-	-	-	Steady State	Steady State	2
Compressor Room Inlet and Exhaust	2.0	Vertical Area Source	-	-	-	Steady State	Steady State	2
Air Source Heat Pump 1 and 2	1.0	Point Source	-	-	-	Steady State	Steady State	2
Air Source Heat Pump 3 Cooling and Heating	0.5	Point Source	-	-	-	Steady State	Steady State	2
Fire Pump - Raw Exhaust Engine Noise	1.8	Point Source	-	-	-	Steady State	Steady State	2
HGV Loading/Unloading	1.0	Point Source	-	-	-	30	15	3
HGV Arriving/Leaving	1.0	Point Source	-	-	-	3	-	3
HGV Movements	1.0	Line Source	10	6	6	Steady State	Steady State	3
Car Parking	0.5	Area Source	-	-	-	Steady State	Steady State	0

3.4 Sensitive Receptors

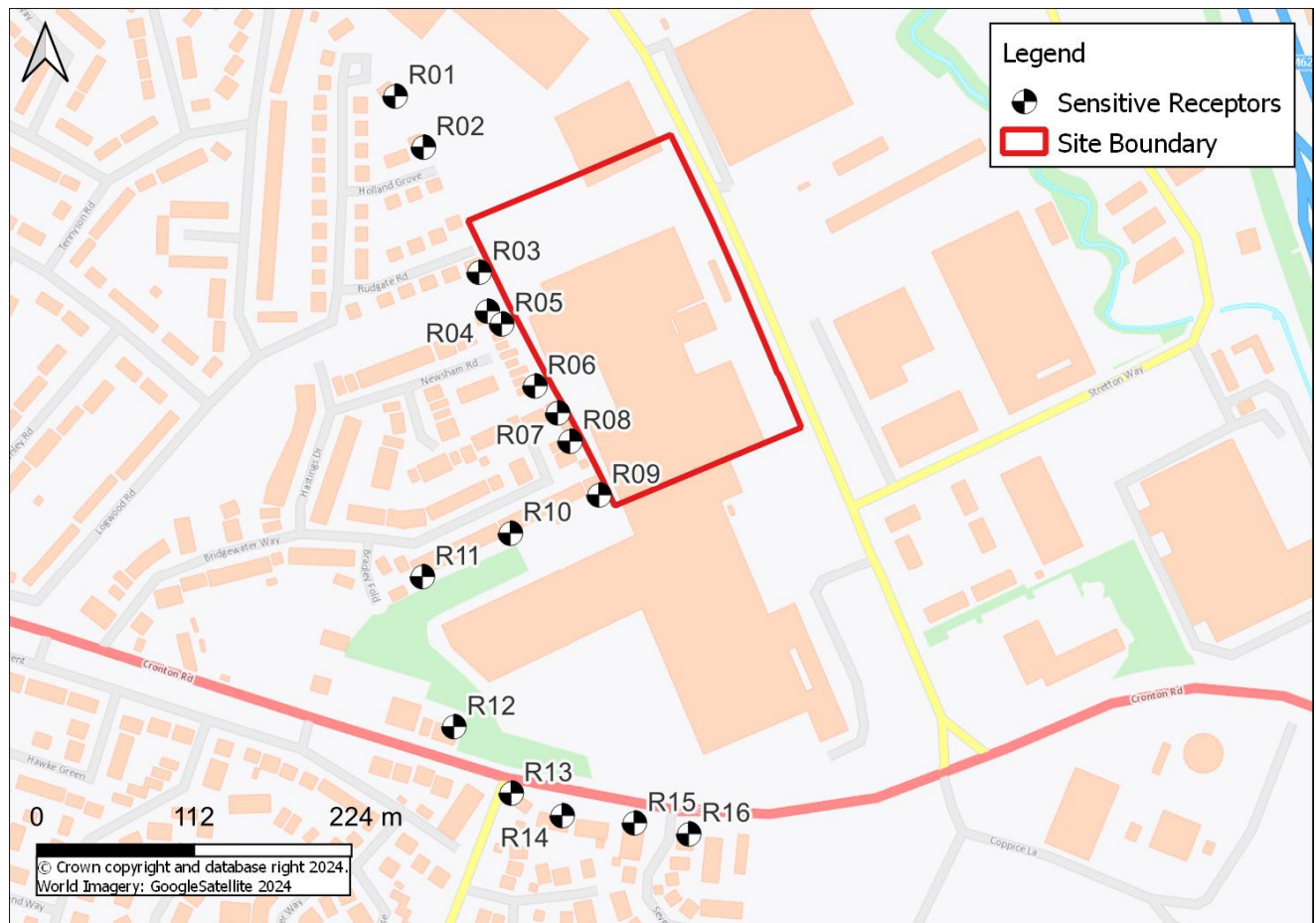
3.4.1 Existing Sensitive Receptor Locations

Table 3.5 below summarises receptor locations that have been selected to represent worst-case sensitive receptors with respect to direct noise from the site. Façades of the nearest noise sensitive properties to the development site have been represented. The locations of the receptors are presented in Figure 1.

Table 3.5 Existing Sensitive Receptor Locations

Ref.	Description	Type of Use	Height (m) Daytime / Night-time
R01	98 Logwood Road	Residential	1.5 / 4.0
R02	9 Holland Grove	Residential	1.5 / 4.0
R03	20 Rudgate Road	Residential	1.5 / 4.0
R04	26 Newsham Road	Residential	1.5 / 4.0
R05	24 Newsham Road	Residential	1.5 / 4.0
R06	10 Newsham Road	Residential	1.5 / 4.0
R07	59 Bridgewater Way	Residential	1.5 / 4.0
R08	99 Bridgewater Way	Residential	1.5 / 4.0
R09	62 Bridgewater Way	Residential	1.5 / 4.0
R10	48 Bridgewater Way	Residential	1.5 / 4.0
R11	34 Bridgewater Way	Residential	1.5 / 4.0
R12	4 Cronton Road	Residential	1.5 / 4.0
R13	1 Whitefield Lane	Residential	1.5 / 4.0
R14	Meadow Villa	Residential	1.5 / 4.0
R15	2 Sevenoak Grove	Residential	1.5 / 4.0
R16	1 Sevenoak Grove	Residential	1.5 / 4.0

Figure 1 - Noise Sensitive Receptor Locations



4.0 Noise Survey

4.1 Noise Survey Local Planning Authority Consultation

A consultation exercise was undertaken with Knowsley Council on 19th April 2024 to discuss utilising the baseline noise survey undertaken as part of planning application 22/00109/FU to inform this noise assessment. The email sent is provided below:

“A noise assessment was previously undertaken for the wider Sovereign Distillery development to support the planning application (ref: 22/00109/FU) which has since been granted in July 2022 with a number of conditions attached. It is understood that the details of plant and development plans for Unit C of the development have since been revised and therefore a noise assessment is required to comply with the conditions.

A baseline monitoring survey was undertaken by Tetra Tech at the site in May 2021 to support the wider planning application. We are proposing to use the results from the baseline monitoring in 2021 to inform the updated noise assessment for Unit C. It is believed that this data would provide a robust assessment, where the background sound level is likely to be lower than if an updated survey was undertaken as it was undertaken when relaxed covid restrictions were still in place.

Would the above methodology be viewed as acceptable?”

A response was received from the Senior Environmental Protection Officer on 19th April 2024 stating that using the background noise levels from the 2021 noise survey was acceptable to inform our assessment.

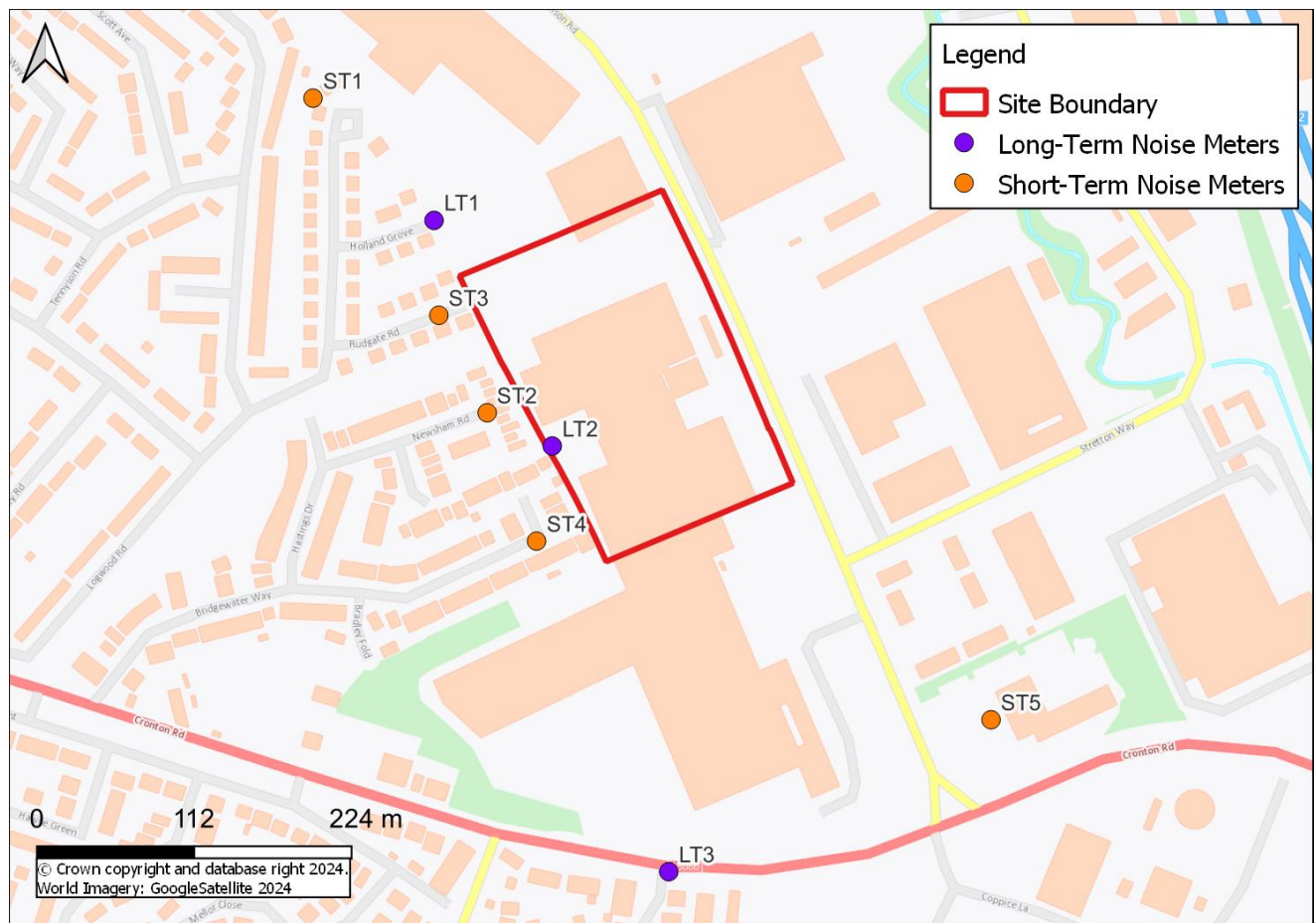
4.2 Noise Survey Details

A monitoring survey was undertaken from Friday 28th May 2021 to Wednesday 2nd June 2021 by Tetra Tech to support the planning application for the wider Sovereign Distillery development (ref: 22/00109/FU). Attended short term measurements were undertaken at five locations during day, evening, and night-time periods with three additional locations being measured unattended over a 121-hour period. Figure 2 shows the noise monitoring locations. The raw data collected from the long-term monitoring is available upon request.

Measurements were taken in accordance with BS 7445-1:2003 The Description and Measurement of Environmental Noise: Guide to quantities and procedures. Weather

conditions during the survey period were observed as being dry. Anemometer readings confirmed that wind speeds were less than 5 ms⁻¹ at all times during the survey, with a variable wind direction during the survey.

Figure 2 – Noise Monitoring Locations



4.3 Noise Survey Results

The dominant noise sources found in the area included road traffic noise from the A5080, M57 and surrounding local road network.

Ambient and background noise levels are usually described using the L_{Aeq} index (a form of energy average) and the L_{A90} index (i.e. the level exceeded for 90% of the measurement period) respectively.

Road traffic noise is generally described using the L_{A10} index (i.e. the level exceeded for 10% of the measurement period). For the long-term (LT) locations, the presented $L_{Aeq,T}$ and $L_{A10,T}$ are average noise levels whilst the L_{A90} is the modal noise level of each 5 minute measurement over the stated survey.

The results of the statistical measurements and frequency measurements conducted during the survey are summarised in the following table. All values are sound pressure levels in dB (re: 2×10^{-5} Pa).

Table 4.1 Results of Baseline Noise Monitoring Survey (Average Levels)

Period	Duration	Monitoring Date and Times	Location	$L_{Aeq,T}$	$L_{Amax,T}$	$L_{Amin,T}$	$L_{A10,T}$	$L_{A90,T}$
	(T)			(dB)	(dB)	(dB)	(dB)	(dB)
Weekday Daytime 07:00 - 23:00	49 Hours	28/05/2021 – 02/06/2021 11:20 – 12:05	LT1	55	90	35	54	50
Weekday Night-time 23:00 – 07:00	24 hours	28/05/2021 – 02/06/2021 23:00 - 07:00		54	90	33	53	42
Weekend Daytime 07:00 - 23:00	32 Hours	29/05/2021 – 30/05/2021 07:00 - 23:00		53	80	39	53	50
Weekend Night-time 23:00 – 07:00	16 hours	29/05/2021 – 30/05/2021 23:00 - 07:00		51	82	34	52	44
Weekday Daytime 07:00 - 23:00	49 Hours	28/05/2021 – 02/06/2021 10:43 – 11:18	LT2	50	83	32	49	46
Weekday Night-time 23:00 – 07:00	24 hours	28/05/2021 – 02/06/2021 23:00 - 07:00		47	73	32	47	42

Period	Duration	Monitoring Date and Times	Location	L _{Aeq,T}	L _{Amax,T}	L _{Amin,T}	L _{A10,T}	L _{A90,T}
	(T)			(dB)	(dB)	(dB)	(dB)	(dB)
Weekend Daytime 07:00 - 23:00	32 Hours	29/05/2021 – 30/05/2021 07:00 - 23:00		48	81	34	48	41
Weekend Night-time 23:00 – 07:00	16 hours	29/05/2021 – 30/05/2021 23:00 - 07:00		47	79	30	47	42
Weekday Daytime 07:00 - 23:00	49 Hours	28/05/2021 – 02/06/2021 10:13 – 10:58	LT3	67	103	42	70	60
Weekday Night-time 23:00 – 07:00	24 hours	28/05/2021 – 02/06/2021 23:00 - 07:00		62	97	37	61	46
Weekend Daytime 07:00 - 23:00	32 Hours	29/05/2021 – 30/05/2021 07:00 - 23:00		67	97	45	70	58
Weekend Night-time 23:00 – 07:00	16 hours	29/05/2021 – 30/05/2021 23:00 - 07:00		60	85	38	62	49
Daytime 07:00 - 19:00	15 Mins	01/06/2021 14:26	ST1	53	69	47	53	50
	15 Mins	01/06/2021 15:09	ST2	48	55	45	49	46

Period	Duration	Monitoring Date and Times	Location	L _{Aeq,T}	L _{Amax,T}	L _{Amin,T}	L _{A10,T}	L _{A90,T}
	(T)			(dB)	(dB)	(dB)	(dB)	(dB)
	15 Mins	01/06/2021 15:54	ST3	53	68	48	54	50
	15 Mins	01/06/2021 16:14	ST4	50	70	44	53	47
	20 Mins	02/06/2021 09:36	ST5	59	85	52	61	55
Evening 19:00 - 23:00	15 Mins	01/06/2021 18:57	ST1	52	72	46	54	49
	15 Mins	01/06/2021 19:17	ST2	52	72	41	56	44
	15 Mins	01/06/2021 19:37	ST3	53	73	46	56	49
	15 Mins	01/06/2021 19:58	ST4	53	81	42	54	45
	15 Mins	01/06/2021 20:20	ST5	56	81	50	58	52
Night-time 23:00 - 07:00	15 Mins	01/06/2021 23:01	ST1	51	69	43	51	47
	15 Mins	01/06/2021 23:21	ST2	45	55	40	47	43
	15 Mins	01/06/2021 23:41	ST3	52	77	42	50	45
	15 Mins	02/06/2021 00:01	ST4	56	75	36	45	39
	15 Mins	02/06/2021 00:22	ST5	49	61	41	52	44

4.4 Representative Background Noise Levels

Using the data collected during the baseline survey, representative background noise levels have been derived for all receptor locations presented in Table 3.5. Table 4.2 presents the

representative background noise levels considered appropriate for the existing sensitive receptors within the area (the lower of the respective daytime and evening measurements have been used to represent daytime noise levels, where appropriate).

Table 4.2: Representative Background Noise Levels (All Receptors)

Receptors	Monitoring Location	Time Period	Representative Background Noise Level ($L_{A90,T}$ dB)*
R01, R02 & R03	LT1	Daytime (07:00 – 23:00)	50
		Night-time (23:00 – 07:00)	42
R04, R05, R06, R07, R08 & R09	LT2	Daytime (07:00 – 23:00)	41
		Night-time (23:00 – 07:00)	42
R10 & R11	ST4	Daytime (07:00 – 23:00)	47
		Night-time (23:00 – 07:00)	39
R12, R13, R14, R15 & R16	LT3	Daytime (07:00 – 23:00)	58
		Night-time (23:00 – 07:00)	46
*Lowest $L_{A90,T}$ value selected from either Weekday or Weekend.			

The representative noise levels presented in Table 4.2 have been used to inform the assessment presented in Section 5.0.

5.0 Assessment of Effects

5.1 Fixed Plant Noise Assessment

5.1.1 BS 4142:2014+A1:2019 Assessment

This assessment has been undertaken in order to establish the noise impacts from the proposed fixed plant at the closest existing residential receptors. The plant noise assessment is inclusive of the fire pump exhaust and louvres, the compressor room inlet and exhaust louvres, and ASHP 1,2 and 3 only and does not include any sound sources related to HGV loading, movements, and car parking, this is included in Section 5.2.

Figure 3 below shows the locations of the modelled fire pump exhaust and louvres, compressor room inlet and exhaust louvres, and ASHP 1, 2 and 3 with the results of the plant noise assessment presented within Table 5.1.

Figure 3 – Proposed External Plant Locations

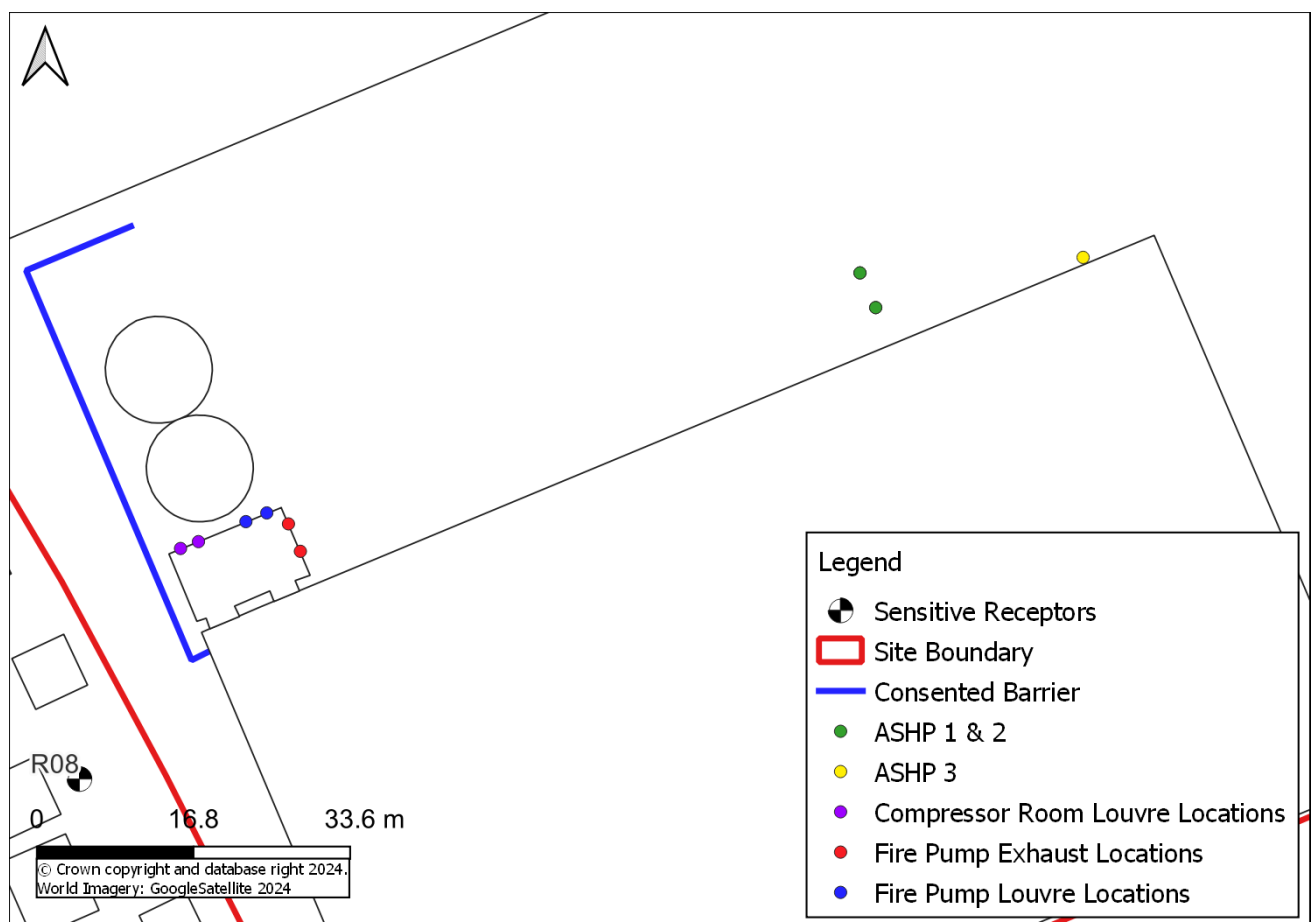


Table 5.1: Plant Noise BS 4142:2014+A1:2019 Assessment

Location	Existing Measured Background L_{A90}		Noise Rating Level From Plant		BS 4142:2014+A1:2019 Score	
	Daytime	Night-time	Daytime	Night-time	Daytime	Night-time
R01	50	42	14	15	-36	-27
R02	50	42	14	15	-36	-27
R03	50	42	19	19	-31	-23
R04	41	42	21	21	-20	-21
R05	41	42	23	23	-18	-19
R06	41	42	29	30	-12	-13
R07	41	42	32	33	-9	-9
R08	41	42	30	30	-11	-12
R09	41	42	25	25	-16	-17
R10	47	39	20	20	-27	-19
R11	47	39	17	17	-30	-22
R12	58	46	12	12	-46	-34
R13	58	46	11	11	-47	-35
R14	58	46	11	11	-47	-35
R15	58	46	11	11	-47	-35
R16	58	46	10	10	-48	-36

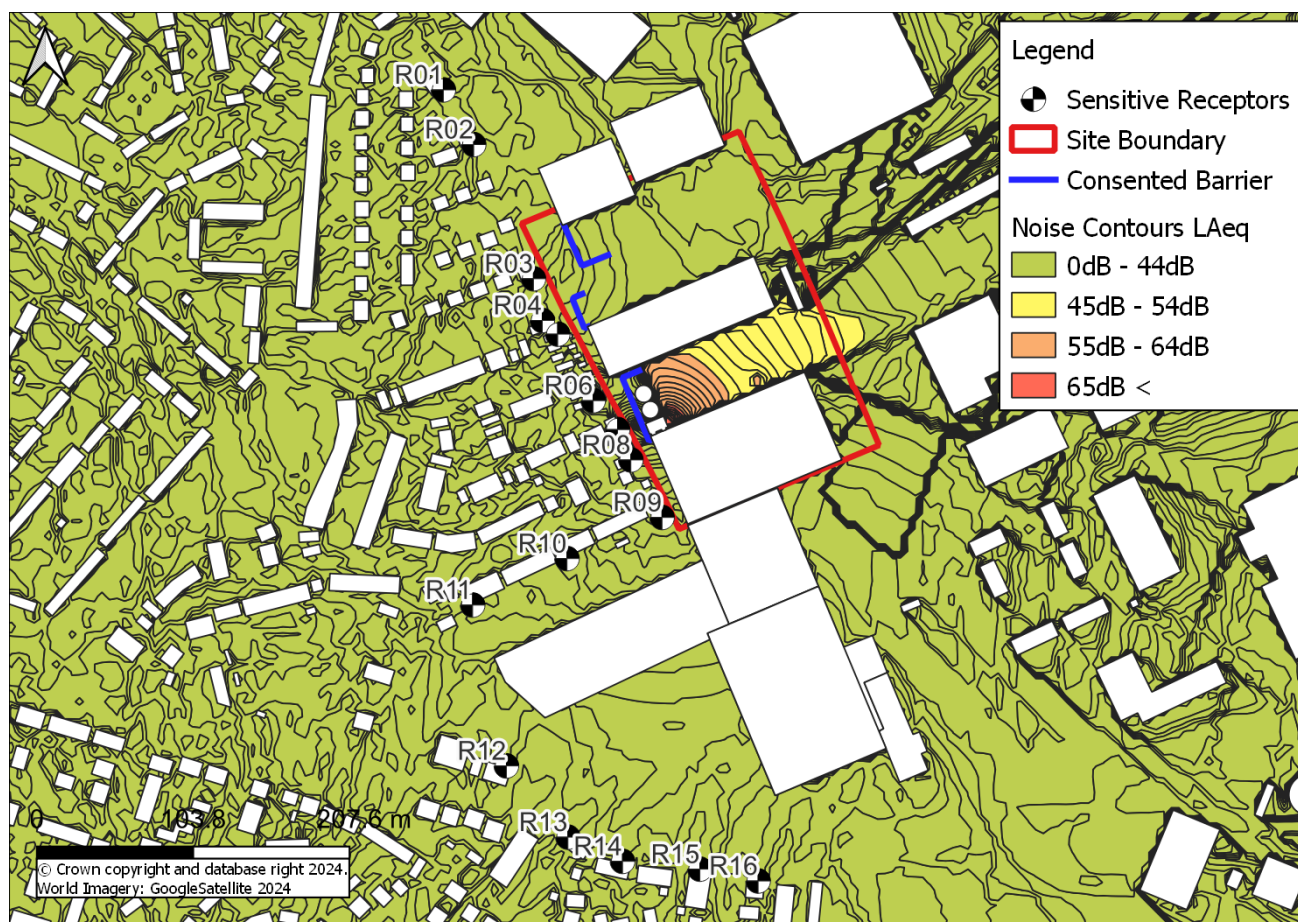
All values are sound pressure levels in dBA re: 2×10^{-5} Pa.

All calculations used to derive the above table (including averaging of background noise levels and predicted source noise levels) have been undertaken to 1 decimal place to avoid perpetuation of rounding errors. However, in accordance with BS4142 para 8.6 the levels are expressed as integers (with 0.5 dB being rounded up). This may mean that the arithmetic in the above table may appear to be up to 1 dB incorrect due to this rounding.

As demonstrated within Table 5.1, the results of the assessment indicate that the BS 4142:2014+A1:2019 Noise Rating Levels at sensitive façades of the existing noise sensitive properties are at least 5dB below existing background sound levels at all receptors for both the daytime and night-time periods. This is in line with Condition 7 of the consented scheme planning application (22/00109/FUL) and therefore a No Observed Adverse Effect Level (NOAEL) is achieved. The assessment also demonstrates that the noise mitigation measures that have already been approved as part of the consented scheme remain valid despite the additional of the plant, in line with Condition 6 of the consented scheme planning application.

Figure 4 illustratively presents the noise levels from the proposed plant as a noise contour plot for the night-time period.

Figure 4 – Fixed Plant Noise Night-time Noise Contour Plot L_{Aeq} at 4m Height



5.2 Cumulative Operational Assessment

5.2.1 Noise Intrusion Assessment

Internal noise levels at sensitive receptor locations, from all noise sources including proposed additional plant as well as the site operations from the approved and consented scheme (as part of the wider site), HGV deliveries, movements and car parking associated with Unit C have been assessed with windows open, where a reduction from a partially open window of 10 dB has been used.

Results of the noise intrusion assessment for average daytime and night-time noise levels are presented within Table 5.2 and Table 5.3 respectively.

Table 5.2: Daytime Noise Intrusion Levels $L_{Aeq,1hour}$

Location	External L_{Aeq} (dB)	Internal L_{Aeq} with windows open (dB)	Criteria L_{Aeq} (dB)
R01	20	10	35
R02	21	11	35
R03	23	13	35

Location	External L _{Aeq} (dB)	Internal L _{Aeq} with windows open (dB)	Criteria L _{Aeq} (dB)
R04	21	11	35
R05	23	13	35
R06	30	20	35
R07	33	23	35
R08	30	20	35
R09	25	15	35
R10	21	11	35
R11	18	8	35
R12	15	5	35
R13	17	7	35
R14	17	7	35
R15	17	7	35
R16	17	7	35

All values are sound pressure levels in dBA re: 2x 10⁻⁵ Pa.

Table 5.3: Night-time Noise Intrusion Levels L_{Aeq,1hour}

Location	External L _{Aeq} (dB)	Internal L _{Aeq} with windows open (dB)	Criteria L _{Aeq} (dB)
R01	21	11	30
R02	22	12	30
R03	24	14	30
R04	22	12	30
R05	24	14	30
R06	31	21	30
R07	37	27	30
R08	30	20	30
R09	25	15	30
R10	22	12	30
R11	19	9	30
R12	16	6	30
R13	18	8	30
R14	17	7	30
R15	18	8	30
R16	18	8	30

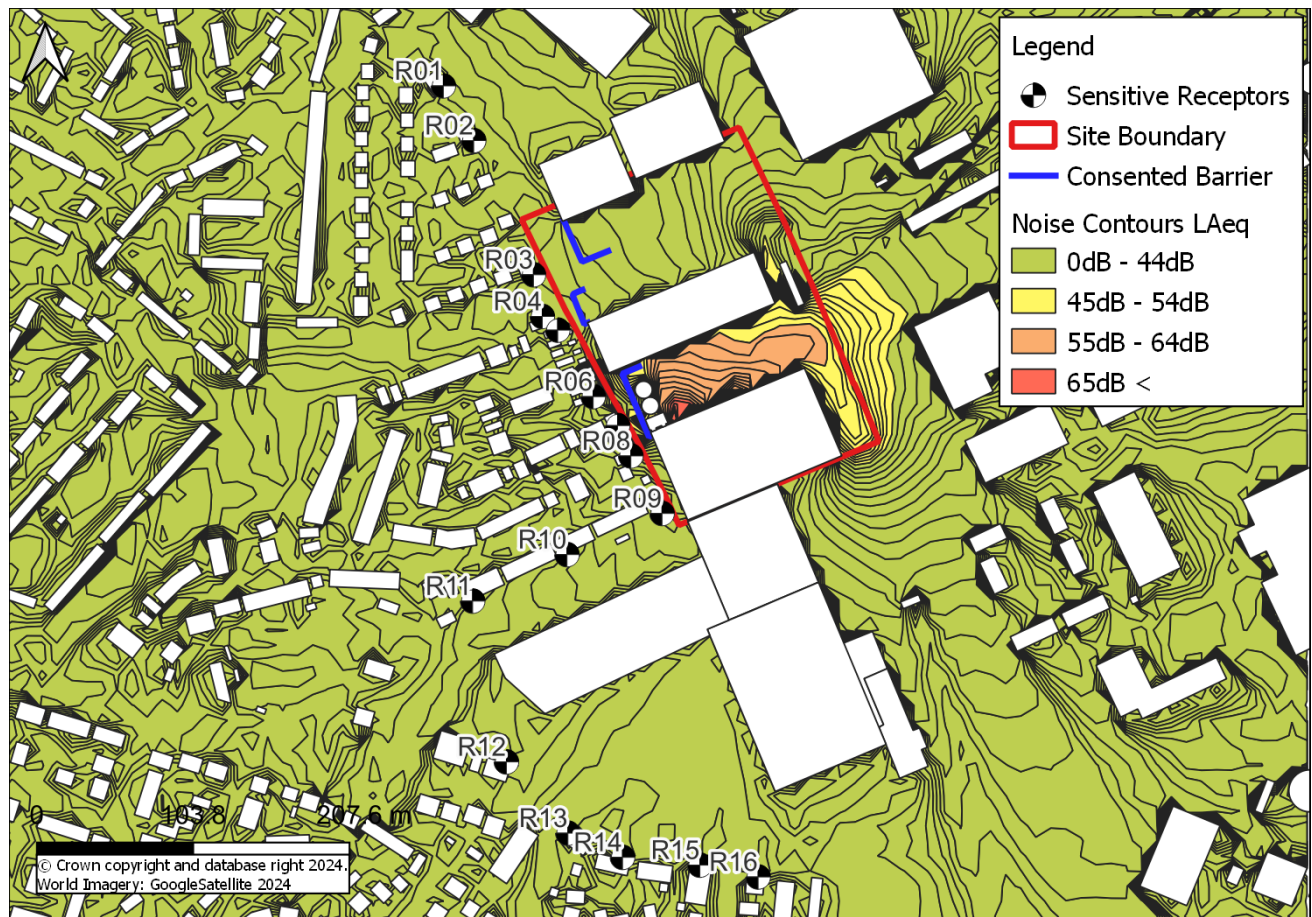
All values are sound pressure levels in dBA re: 2x 10⁻⁵ Pa.

As demonstrated within Table 5.2 and Table 5.3 above, predicted noise levels are below BS 8233 criteria at all receptors for both the daytime and night-time periods, resulting in a No Observed Adverse Effect (NOAEL). The assessment demonstrates that the noise mitigation measures that have already been approved as part of the consented scheme

remain valid despite the additional of the plant, in line with Condition 6 of the consented scheme planning application.

Figure 5 illustratively presents the noise levels from the proposed plant and site operations as a noise contour plot for the night-time period.

Figure 5 – Cumulative Plant and Operations Night-time Noise Contour Plot L_{Aeq} at 4m Height



6.0 Conclusion

This report presents the findings of a noise assessment to support a Section 73 application for the addition of external plant to an industrial unit, comprising a service yard and car parking, located at Unit C, The Sovereign Distillery, Wilson Road, Huyton.

A noise assessment was previously undertaken for the wider Sovereign Distillery development to support the planning application (ref: 22/00109/FU). The application was granted with a number of conditions attached, with condition 6 and 7 relating to noise. Since, details of the plant and development plans for Unit C of the development have since been revised and a noise assessment for Unit C has been undertaken to comply with the above conditions.

A baseline monitoring survey was undertaken in June 2021 by Tetra Tech to support the planning application for the wider Sovereign Distillery development. This has been used to inform the assessment for Unit C.

Fixed Plant Noise Assessment

A plant noise assessment has been undertaken in line with the methodology presented in BS4142:2014+A1:2019 to determine noise impacts from the additional fixed plant upon sensitive receptors. Rating noise levels are predicted to be at least 5dB below existing background sound levels at all receptors during daytime and nighttime periods, in line with condition 7. This demonstrates that the noise mitigation measures in place, as per condition 6, would remain valid and no further mitigation is required.

Cumulative Operational Noise Assessment

A noise intrusion assessment has been carried out to predict noise from all noise sources associated with Unit C (fixed external plant, HGV deliveries, movements, and car parking) at the façade of the closest sensitive receptors. Predicted daytime noise levels are below daytime and nighttime criteria presented in BS 8233/WHO at all receptors, resulting in a No Observed Adverse Effect (NOAEL). This demonstrates that the noise mitigation measures in place, as per condition 6, remain valid and no further mitigation is required.

Appendices

Appendix A – Acoustic Terminology

Acoustic Terminology

- dB** Sound levels from any source can be measured in frequency bands in order to provide detailed information about the spectral content of the noise, i.e. whether it is high-pitched, low-pitched, or with no distinct tonal character. These measurements are usually undertaken in octave or third octave frequency bands. If these values are summed logarithmically, a single dB figure is obtained. This is usually not very helpful as it simply describes the total amount of acoustic energy measured and does not take any account of the ear's ability to hear certain frequencies more readily than others.
- dB(A)** Instead, the dBA figure is used, as this is found to relate better to the loudness of the sound heard. The dBA figure is obtained by subtracting an appropriate correction, which represents the variation in the ear's ability to hear different frequencies, from the individual octave or third octave band values, before summing them logarithmically. As a result the single dBA value provides a good representation of how loud a sound is.
- L_{Aeq}** Since almost all sounds vary or fluctuate with time it is helpful, instead of having an instantaneous value to describe the noise event, to have an average of the total acoustic energy experienced over its duration. The L_{Aeq, 07:00 – 23:00} for example, describes the equivalent continuous noise level over the 16-hour period between 7 am and 11 pm. During this time period the L_{pA} at any particular time is likely to have been either greater or lower than the L_{Aeq, 07:00 – 23:00}.
- L_{Amin}** The L_{Amin} is the quietest instantaneous noise level. This is usually the quietest 125 milliseconds measured during any given period of time.
- L_{Amax}** The L_{Amax} is the loudest instantaneous noise level. This is usually the loudest 125 milliseconds measured during any given period of time.
- L_n** Another method of describing, with a single value, a noise level which varies over a given time period is, instead of considering the average amount of acoustic energy, to consider the length of time for which a particular noise level is exceeded. If a level of x dBA is exceeded for say, 6 minutes within one hour, then that level can be described as being exceeded for 10% of the total measurement period. This is denoted as the L_{A10, 1 hr} = x dB.
- The L_{A10} index is often used in the description of road traffic noise, whilst the L_{A90}, the noise level exceeded for 90% of the measurement period, is the usual descriptor for underlying background noise. L_{A1} and L_{Amax} are common descriptors of construction noise.
- R_w** The *weighted sound reduction index* determined using the above *measurement* procedure, but weighted in accordance with the procedures set down in BS EN ISO 717-1. Partitioning and building board manufacturers commonly use this index to describe the inherent sound insulation performance of their products.

Appendix B – References

British Standards Institute (BSI). (2014). BS 4142:2014+A1:2019. *'Method for Rating Industrial and Commercial Sound'*. United Kingdom.

British Standards Institute (BSI). (2014). BS 8233:2014. *'Guidance on Sound Insulation and Noise Reduction for Buildings'*. United Kingdom.

Council, K. (2022, February 18). FUL-Decision 22/00109/FUL. Knowsley.

Department for Communities and Local Government (DCLG). (2012). National Planning Policy Framework. United Kingdom.

Department for the Communities and Local Government (DCLG). (2014). *National Planning Practice Guidance*. United Kingdom.

World Health Organisation (WHO). (1999). Guidelines for Community Noise.