



Sainsbury's Supermarkets Limited

Sainsbury's Waterlooville,

Plant Noise Assessment

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1.0 Introduction

1.1 Purpose of this Report

This report presents the findings of a noise assessment undertaken for the Sainsbury's store at Hambledon Road, Waterloooville. This report assesses combined noise levels from the new building services plant at the store; measurements of the plant have been undertaken to demonstrate compliance with the requirements of Condition 11 of application reference APP/13/001190 which states:

11 "No externally visible or audible plant, machinery or structures required for ventilation or filtration purposes, including the extraction of fumes from cooking processes, shall be installed at the premises until and unless details of the external appearance and acoustic performance of the same have been submitted to and approved in writing by the Local Planning Authority".



2.0 Assessment Criteria

2.1 Building Services Plant Noise Assessment

The effect of noise from external plant has been assessed with reference to the WYG Noise Survey Ref A053120 Dated 16th October 2009.

The effects of plant noise associated with the store have been assessed in accordance with BS 4142:2014, *'Methods for rating and assessing industrial and commercial sound'*.

This standard sets down the following guidelines for assessing the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes, based upon difference between the measured background noise level and the rating level of the source under consideration. In particular, the standard states:

- "a) Typically, the greater the difference, the greater the magnitude of the impact.
- b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
- d) 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."

In addition to noise levels the significance of the impact depends on the individuals affected and to the acoustic features present which may be assessed subjectively or objectively as appropriate. Section 9 of BS 4142:2014 recommends that correction factors be applied to the specific noise level if the noise contains certain acoustic features such as:

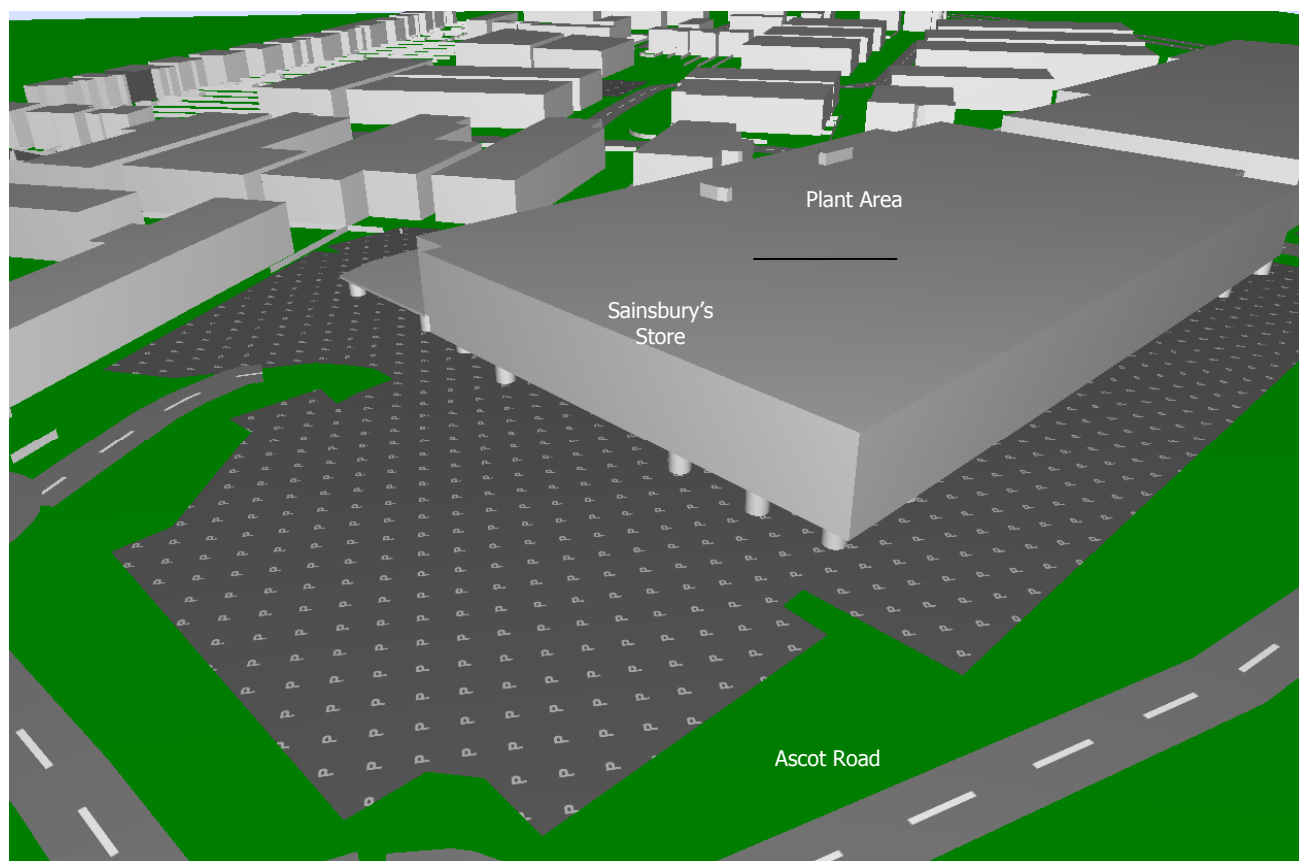
- tonality
- impulsivity
- other sound characteristics which are readily distinctive
- intermittency

3.0 Assessment Methodology

3.1 Noise Modelling Methodology

Operational noise measurements have been undertaken at location within 1m of the plant. As the plant is not audible/measurable above daytime background levels at the nearby receptors three dimensional noise modelling has been undertaken based on the monitoring data to predict source noise levels at receptor locations. . CADNA noise modelling software has been used (as shown in Figure 1). This model is based on ISO 9613 noise propagation methodology.

Figure 1 CADNA Noise Model – Proposed Scenario



The modelling software calculates noise levels based on the emission parameters and spatial settings that are entered. Input data, assumptions and model settings as given in the table below have been used.

Table 3.1 Modelling Parameters Sources and Assumptions

Parameter	Source	Details
Horizontal distances – around site	Ordnance Survey	Ordnance Survey
Ground levels – around site	Ordnance Survey	Ordnance Survey
Ground levels – other areas	Site Observations and Ordnance Survey	OS 1:25,000 contours and OS 1:10,000 spot heights.
Traffic data – main surrounding roads	WYGE	Traffic flows for local roads based on WYGE observations and experience.
Traffic data – local roads	WYGE	Traffic flows for local roads based on WYGE observations and experience.
Building heights – around site	WYGE Observations	8 m height for two storey residential properties, and 4 m for Bungalows
Barrier heights	WYGE Observations	All existing barriers at 1.0 m with the exception of hedges and trees which are assumed to offer no noise protection.
Receptor positions	WYGE	Barriers on site from site visit data.
Reflections	WYGE	1 m from façade, height of 1.5 m for ground floor, 4 m for first floor properties with ground floor or bungalow dormer windows. 7 m for dormer windows on two storey properties. 1.5 m height for model grid and monitoring locations for validation.
Absorbent Ground	CADNA	First order reflections have been applied based on mirror image sources
Façade Correction	CADNA	Frequency dependant ground absorption has been applied based on values specified in VDI 2714/16 clause 6.3.
Gradient	CADNA	Façade corrections have been incorporated into the modelling
Proposed Layout	Essex Services Group PLC	Plant Deck Layout – Job Number M14908 – drawing Number 01 Roof Cowl Layout – Job Number M14908 – Drawing Number 02

It is acknowledged that a number of these assumptions will affect the overall noise levels presented in this report. However, it should be noted that certain assumptions made, as identified above, are worst case.

3.2 Model Input Data

3.2.1 Building Services Plant Noise Data

Point and vertical area sources have been defined in the model to represent all external plant associated with the scheme; the following measured noise levels have been used within the model. The locations of the plant are shown in SK02 in Appendix B.

Table 3.2 Building Services Air Handling Unit Plant Noise Levels

Description	Frequency (Hz)								Noise Level @ 1 m dB(A)
	63	125	250	500	1k	2k	4k	8k	
JSR Roof Cowl	68.4	75.6	59.8	48.2	48.1	46.0	42.1	36.6	61.1
Customer Toilets Roof Cowl	64.7	66.2	64.1	57.5	47.7	48.8	44.0	37.7	59.3
Staff Toilet Roof Cowl	63.2	60.5	63.0	49.4	45.5	38.8	29.1	29.1	54.7
Staff Restaurant Roof Cowl	80.9	75.4	65.2	61.9	59.4	56.3	55.0	46.8	66.3
Prep Area Roof Cowl	77.8	81.2	76.5	65.3	60.2	57.1	49.4	38.7	71.1
Bakery Roof Cowl	68.1	70.8	65.4	56.8	50.0	49.3	42.4	36.4	61.2
Air Handling Unit 1 GM	74.0	79.0	81.0	86.0	83.0	81.0	73.0	72.0	66.5
Air Con Unit JSR 5 Units Mitsubishi Electric AC- PURY-P300YJM-A	65.0	63.5	61.0	56.0	53.0	48.5	45.0	42.5	59.0
Air Con Unit: Mitsubishi Electric AC- PURY- P200YJM-A	62.5	61.0	58.5	53.0	50.0	45.5	39.0	36.0	56.0
Air Handling Unit 1SA	83.0	93.0	94.0	94.0	92.0	90.0	78.0	80.0	66.3
Heat Transfer Cooler 1	69.1	69.2	67.6	58.6	55.1	51.5	46.6	42.3	67.6
Heat Transfer Cooler 2	70.1	69.6	66.0	58.6	55.5	51.4	49.1	41.9	62.6
Air Handling Unit 1D	70.0	64.0	77.0	76.0	78.0	73.0	71.0	67.0	74.0

3.3 Sensitive Receptors

Table 3.3 below summarises receptor locations that have been selected to represent worst-case residential receptors with respect to direct noise from the store. Ground and First floor facades (facing the proposed development) of nearest properties have been represented. The locations of the receptors are shown on SK01 in Appendix B.

Table 3.3 Existing Receptor Locations

Ref.	Description	Co-ordinates		
		X	Y	Height (m)
R1	18 Hambledon Road, Waterloooville	389703.3	262446.7	4.0
R2	40 Coronation Road, Waterloooville	389701.1	262434.7	4.0
R3	31 Coronation Road, Waterloooville	389701.3	262420.1	4.0
R4	48 Muriel Road, Waterloooville	389696.7	262410.8	4.0
R5	37 Winifred Road, Waterloooville	389693.3	262399.3	4.0
R6	17 Winifred Road, Waterloooville	389655.1	262396.8	4.0
R7	26 Freshfield Gardens, Waterloooville	389653.6	262394	4.0
R8	48 Freshfield Gardens, Waterloooville	389642.2	262397.8	4.0

4.0 Noise Survey

Existing ambient noise levels around the site are dominated by road traffic using the B2150 and A3 and other local links along with some low level industrial and retail noise from units located immediately to the north, east and south of the proposed site.

4.1 Noise Survey Methodology

A monitoring survey was undertaken to characterise baseline ambient noise levels currently experienced on the site and to establish the relative local background and traffic noise levels.

Equipments used during the survey include:

B&K 2260	Environmental Noise Analyser (WYG1)	s/n 2361273
B&K 2238	Environmental Noise Analyser (WYG9)	s/n 2684499
B&K 4231	Calibrator	s/n 2326568

The measurement equipment was checked against the appropriate calibrator at the beginning and end of the measurements, in accordance with recommended practice and no drift was observed. The accuracy of the calibrators can be traced to National Physical Laboratory Standards, calibration certificates for which are available on request.

A baseline monitoring survey was undertaken at six locations (as specified in the following table and shown in SK01 from Tuesday 29th September 2009 to Wednesday 30th September 2009. Attended short term measurements were undertaken at four locations during the day, evening, peak and night-time periods with two additional locations being measured unattended over a 117 hour period.

Measurements were taken in general accordance with BS 7445: *The Description and Measurement of environmental Noise*. Weather conditions during the survey period were observed as being dry but overcast with a light breeze. Hand held anemometer readings confirmed that wind speeds were less than 5 ms⁻¹ at all times during the survey.

Table 4.1 Monitoring Locations

Ref	Description	Grid Reference	
		X	Y
LT1	Junction between Aston road and Hambledon Road	467846.43	109782.59
LT2	Inside yard of the proposed area, on east end	468055.28	109724.76
ST1	On Aston Road to the North of proposed area	467983.52	109830.51
ST2	On Hambledon Road, opposite proposed area	467929.62	109699.18
ST3	Freshfield Gardens residential area	468310.61	109690.15
ST4	Junction between Muriel Road and Winifred Road	468170.64	109874.42

4.2 Noise Survey Results

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).

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

Table 4.2 Results of Baseline Noise Monitoring Survey (Average Levels)

Period	Duration	Monitoring Date and Times	Location	L_{Aeq} (dB)	L_{Amax} (dB)	L_{Amin} (dB)	L_{A10} (dB)	L_{A90} (dB)
Day 07:00 - 23:00	70 hours	9/25/2009 13:37	LT1	66.9	79.2	54.0	67.4	66.6
Night 23:00 - 07:00	48 hours	9/30/2009 11:27		59.9	75.1	44.3	60.4	59.6
Day 07:00 - 23:00	11 hours	9/29/2009 16:59	LT2	51.0	74.0	44.6	52.2	46.4
Night 23:00 - 07:00	8 hours	9/30/2009 11:40		44.6	54.9	39.3	46.7	41.4
Day 07:00 - 23:00	15 Mins	9/30/2009 10:06	ST1	60.3	79.5	45.8	62.8	48.7
	15 Mins	9/30/2009 10:24	ST2	68.5	92.1	45.5	71.5	50.9
	15 Mins	9/30/2009 11:06	ST3	42.7	62.3	35.0	44.6	37.0
	15 Mins	9/30/2009 10:45	ST4	53.8	74.7	30.6	54.9	33.2
Peak 17:00 - 18:00	10 Mins	9/29/2009 17:13	ST1	58.2	77.4	45.0	61.9	47.5
	10 Mins	9/29/2009 17:26	ST2	63.0	84.5	46.4	64.4	51.2
	10 Mins	9/29/2009 17:57	ST3	52.7	75.1	37.8	51.2	40.3
	10 Mins	9/29/2009 17:44	ST4	54.9	72.3	36.7	59.0	39.9
Evening 19:00 - 23:00	15 Mins	9/29/2009 21:42	ST1	47.3	71.8	38.8	47.0	40.8
	15 Mins	9/29/2009 22:00	ST2	47.3	74.5	39.6	48.7	43.0
	15 Mins	9/29/2009 22:45	ST3	43.9	63.7	36.0	45.1	39.2
	15 Mins	9/29/2009 22:25	ST4	40.0	69.2	32.9	40.5	36.0
Night 23:00 - 07:00	15 Mins	9/29/2009 23:06	ST1	50.2	66.2	38.5	50.5	41.2
	15 Mins	9/29/2009 23:25	ST2	44.0	59.1	38.6	46.2	40.6
	15 Mins	9/30/2009 0:05	ST3	39.9	58.5	33.3	42.3	35.8
	15 Mins	9/29/2009 23:45	ST4	37.2	70.2	29.2	35.9	32.1

5.0 Assessment of Key Effects

5.1 Roof-Mounted Building Services Plant Noise Assessment

This assessment has been undertaken in order to establish the effect of noise from mechanical plant at the store; the calculations are based on the location of the plant as shown on SK02 of Appendix B. The assessment compares the predicted average noise levels from plant with the measured pre-installation background noise levels, as described in section 2.1.

It should be noted that the pre-installation background noise levels used within this assessment are the lowest measured L_{A90} levels from representative monitoring location ST4 on Winifred Road, which is furthest away from the B2150 which is the dominant noise source on the site, for the purposes of a worst case assessment.

In order to account for any potential acoustic features of the plant, a +6 dB correction (see section 2.1 of this report) has been applied to the predicted noise levels at receptor before comparison with background levels.

Table 5.1 Assessment for Plant Only

Location	Measured Background L_{A90}		Noise Level from Plant		BS 4142 Score	
	Daytime	Night-time	Specific Noise Level	Noise Rating Level	Daytime	Night-time
R1	33	32	21	27	-6	-5
R2	33	32	15	21	-12	-11
R3	33	32	15	21	-12	-11
R4	33	32	14	20	-13	-12
R5	33	32	16	22	-11	-10
R6	33	32	16	22	-11	-10
R7	33	32	15	21	-12	-11
R8	33	32	18	24	-9	-8

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

The assessment above shows that the noise rating levels (inclusive of a 6 dB tonal correction) from the new plant at the store will be at least 5 dB below the lowest measured pre-installation daytime and night-time background noise levels and are expected to have a low impact at nearby sensitive receptor locations. Therefore the requirements of Condition 11 are met.



6.0 Conclusions of Noise Assessment

This report presents the findings of a noise assessment undertaken for the Sainsbury's store at Hambledon Road, Waterloooville inclusive of noise monitoring of operational equipment.

Building Services Plant Noise Assessment

Details of the acoustic performance of plant at the store have been provided and an assessment of noise shows that the noise rating levels (inclusive of a 6 dB tonal correction) from the new plant at the store will be at least 5 dB below the lowest existing daytime and night-time background noise levels. Therefore noise from plant at the store is expected to have a low impact and the requirements of Condition 11 are met.



Appendices



Appendix A - Abbreviations

CADNA – Computer Aided Noise Abatement

DMRB – Design Manual for Roads and Bridges

HGV – Heavy Goods Vehicle

UDP – Unitary Development Plan

UKAS – United Kingdom Accreditation Service

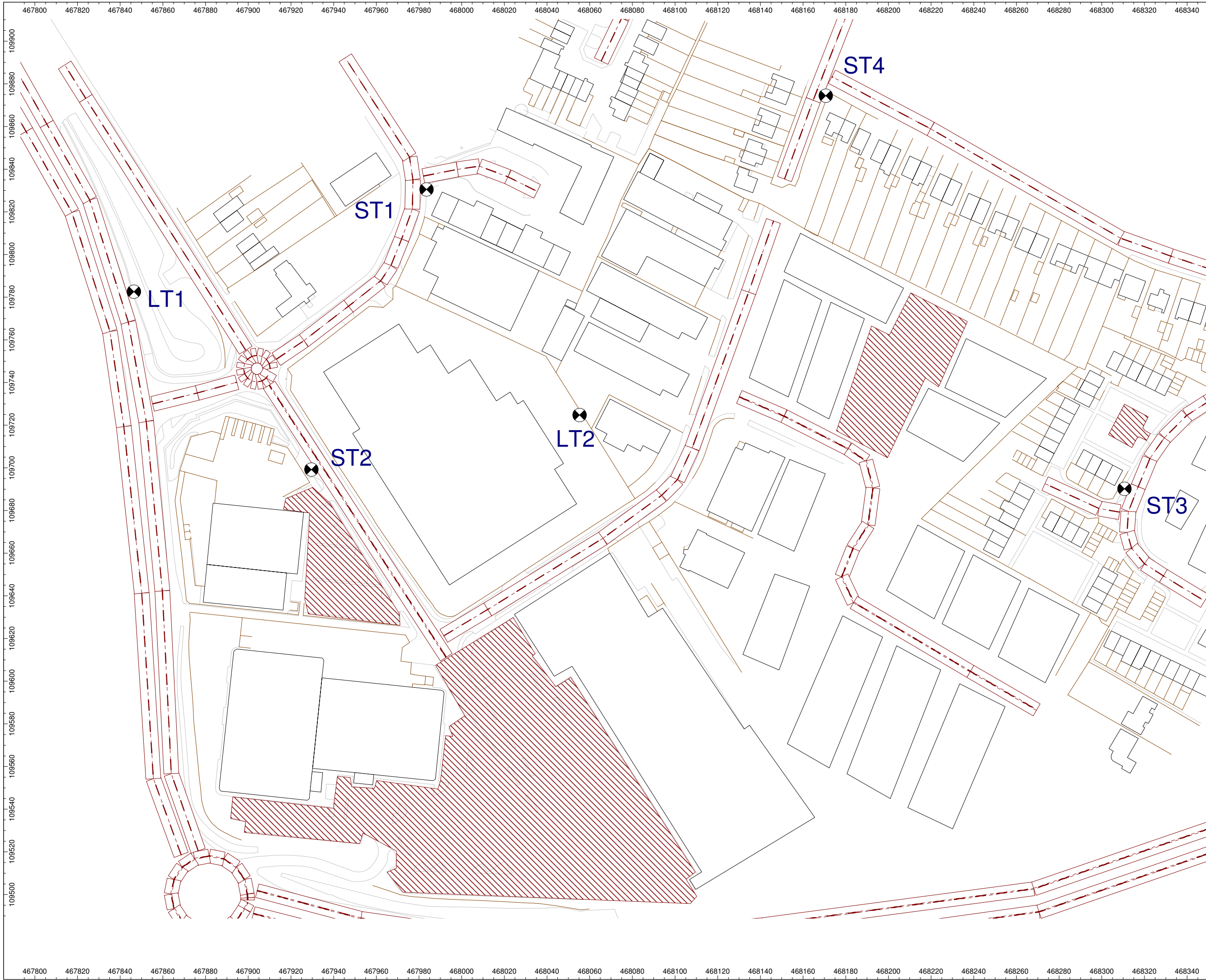
WYGE – WYG Environment



Appendix B – Sketches

SK01 Noise Monitoring Locations

SK02 Plant and Sensitive Receptor Locations



Client:
**Sainsbury's
Supermarkets Ltd.**

Project:
SSL Waterlooville

Project Number:
A092063

Drawing Title / Scenario:
Noise Monitoring Locations

Drawing Number:
SK01

Scale : Not to scale

WYGE Leicester 29.06.15

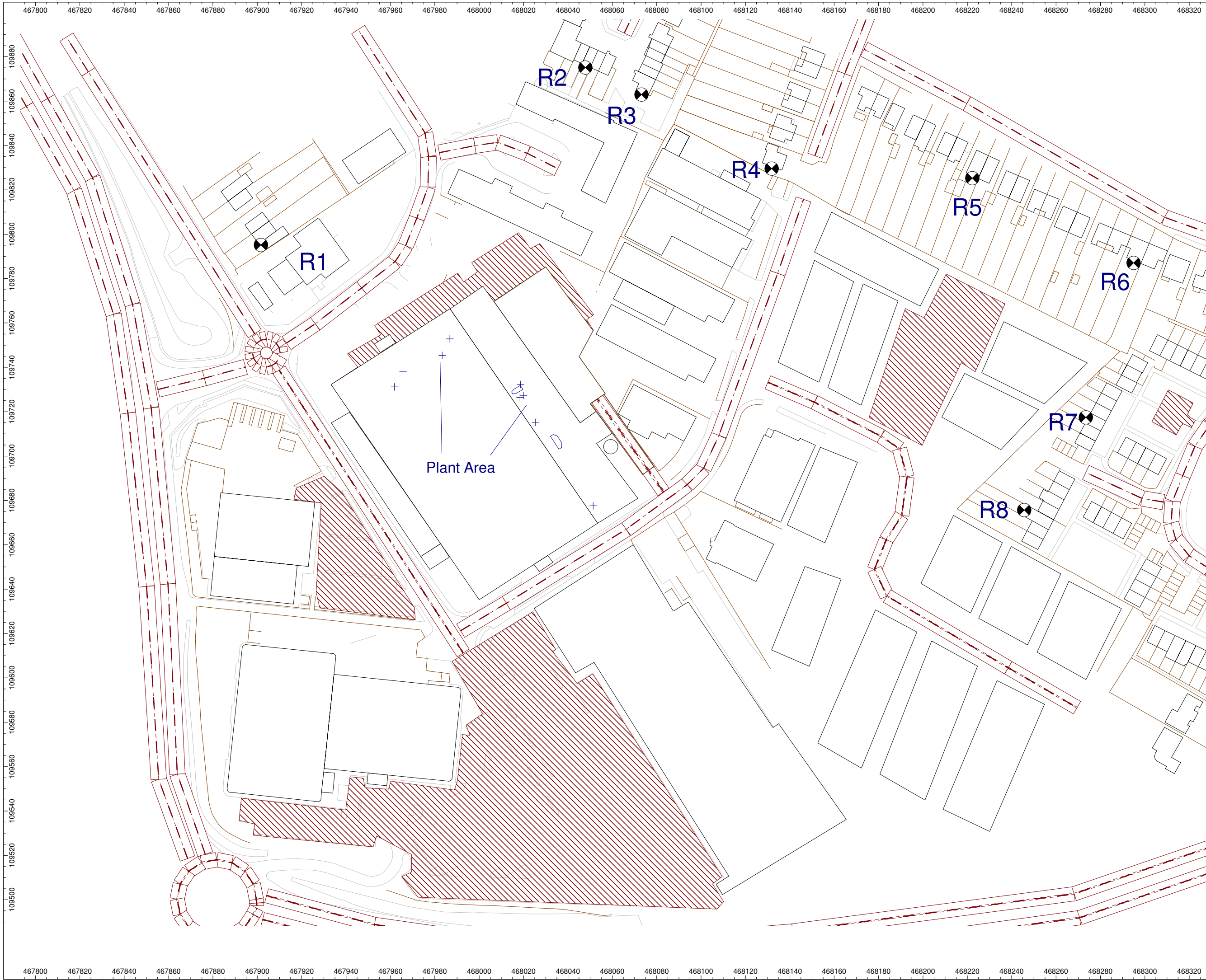
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Client:
**Sainsbury's
Supermarkets Ltd.**

Project:
SSL Waterlooville

Project Number:
A092063

Drawing Title / Scenario:
**Plant and Noise Sensitive
Receptor Locations**

Drawing Number:
SK02

Scale : Not to scale

WYGE Leicester 29.06.15

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