Botley West Solar Farm

Environmental Statement

Volume 3

Appendix 13.1: Baseline Sound Survey

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Glossary

Term	Meaning
Ambient sound level, $L_{Aeq,T}$	The steady sound level which, over a period of time *T*, contains the same amount of A-weighted sound energy as the time varying sound over the same period. Also known as the equivalent continuous L_p.
Decibel	A unit used to measure or compare the intensity of a sound by comparing it with a given reference level on a logarithmic scale.
Environmental Impact Assessment	The process of identifying and assessing the significant effects likely to arise from a project. This requires consideration of the likely changes to the environment, where these arise as a consequence of a project, through comparison with the existing and projected future baseline conditions.
Noise	An unwanted or unexpected sound.
Preliminary Environmental Information Report	A report that provides preliminary environmental information in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. This is information that enables consultees to understand the likely significant environmental effects of a project and which helps to inform consultation responses.
Sound	Part of an electrical transmission and distribution system. Substations transform voltage from high to low, or the reverse by means of electrical transformers.
Sound Power Level, L_w	The total sound energy emitted by a source per unit time.
The Applicant	SolarFive Ltd
The Project	The Botley West Solar Farm

Abbreviations

Abbreviation	Meaning
BS	British Standard
BWSF	Botley West Solar Farm
DCO	Development Consent Order
EIA	Environmental Impact Assessment
ES	Environmental Statement
NGET	National Grid Electricity Transmission
NPPF	National Planning Policy Framework
NPS	National Policy Statement
NSIP	Nationally Significant Infrastructure Project
OS	Ordnance Survey

Abbreviation	Meaning
PEIR	Preliminary Environmental Information Report
PINS	The Planning Inspectorate
PV	Photovoltaic
PVDP	Photovolt Development Partners GmbH

Units

Unit	Description
dB	Decibels
h	Hour
m	Metre
min	Minute
ms	Millisecond
dB	Decibels
h	Hour

1 Baseline Sound Survey

1.1 Introduction

Overview

1.1.1 This document forms Appendix 13.1 of the Environmental Statement (ES) prepared for the Botley West Solar Farm Project (BWSF), henceforth referred to as the Project. The ES presents the findings of the Environmental Impact Assessment (EIA) process.

1.1.2 This document provides the methodology and results of baseline sound surveys undertaken for the Project. The report informs Volume 1, Chapter 13: Noise and Vibration of the ES.

1.1.3 The purpose of a baseline sound survey is to quantify the existing sound climate at noise sensitive receptors within the noise study areas. The measured levels inform the derivation of noise criteria against which operational and construction noise impacts arising from the Project may be assessed.

1.1.4 There are no significant existing sources of vibration impacting the Project Site. Moreover, whilst the assessment of noise impacts is undertaken relative to the baseline noise environment, the assessment of vibration impacts is undertaken relative to absolute limits. As such, no vibration survey is deemed necessary.

1.2 Baseline Sound Survey Methodology

1.2.1 A desktop study was undertaken to identify existing key noise sources and noise sensitive receptors within the study area and select representative baseline sound survey locations.

1.2.2 The baseline sound environment was characterised by undertaking long-term measurements at the locations identified.

1.3 Desktop Study

1.3.1 Information on noise and vibration within the study area was collected through a detailed desktop review of existing studies and datasets. These sources are summarised below.

- OS AddressBase Plus – Address Data
- OS_MasterMap_Topography_Layer_780637_1046228.dwg
- OS Terrain 5 – Topography Data
- Google Earth Imagery

1.4 Desk study – Baseline Characterisation

1.4.1 Noise sensitive receptors were identified through analysis of OS AddressBase Plus point data which includes detailed information on the address, classification (and thereby use) of properties within a user-defined area.

1.4.2 This data was filtered to include address points with a classification deemed to be noise sensitive within the study area such as:

- residential dwellings;
- educational institutions;
- hotels;
- hospitals; and
- care homes.

1.4.3 Subsequently, baseline survey locations were identified that were deemed to be suitably representative of the nearest receptors.

1.5 Site-specific surveys

1.5.1 A summary of the surveys undertaken to inform the noise and vibration assessment is outlined in **Table 1.1** below.

Table 1.1: Summary of survey undertaken to inform noise and vibration assessment.

Title	Extent of Survey	Overview of Survey	Survey Contractor	Date
2023 Baseline sound survey	Long-term measurements at locations representative of receptors within and around the Northern, Central and Southern sites of the Project.	A total of 15x long-term measurement positions: • Three positions within the boundary of the Northern Site Area; • Seven positions within the boundary of the Central Site Area; and • Five positions within the boundary of the Southern Site Area.	RPS	May 2023
2024 Baseline sound survey	Long-term measurements at locations representative of receptors within and around the Northern, Central and Southern sites of the Project.	A total of 7 long-term measurement positions: • Two additional locations along the cable route between the Central Site Area and Southern Site Area. • Three positions within the boundary of the Northern Site Area; and, • Two positions within the boundary of the Central Site Area.	Tetra-Tech	July 2024
	Short-term measurements at locations representative of receptors within and around the Northern,	A total of 3 short-term measurement positions: • Three short term positions along the cable route between	Tetra-Tech	July 2024

Central and Southern sites of the Project.	the Central Site Area and Southern Site Area.

1.6 Limitations

1.6.1 It was not possible to undertake measurements at all locations presented to the local authorities due to limitations on the availability of equipment. An alternative survey plan was developed which allowed for a refined number of positions at the nearest and most exposed noise-sensitive receptors to the Project site.

1.6.2 Short term monitoring was undertaken at locations to characterise the baseline sound environment along the cable corridor between the southern and central site since the construction works will be undertaken during the daytime.

1.6.3 Measurements were only undertaken at locations representative of the nearest human receptors.

1.7 Methodology

1.7.1 The baseline sound surveys comprised unattended, long-term noise measurements at a total of 22 locations. A further three short-term locations have been used to characterise the daytime sound level for the construction phase assessment.

1.7.2 Sound level meters were installed accompanied by meteorological equipment at one monitoring position in two of the Project sites to capture any periods of adverse weather, defined as precipitation events or wind speeds greater than 5 m/s. These conditions can negatively impact the measured noise levels and result in unrealistic noise criteria following analysis.

1.7.3 At all locations, measurements were undertaken in the free-field at approximately 1.5 m to 3.0 m above local ground level and away from any other reflective surfaces.

1.7.4 The survey positions are set-out in **Table 1.2** and presented graphically in **Figure 1.1** to **Figure 1.3** below.

Table 1.2: Baseline sound survey positions

Position	Location		Description
	x-coordinate	y-coordinate	
LT1	445164	204863	South-western boundary near Upper Whitley Farm.
LT2	445460	205375	Northern boundary near Cumnor Road.
LT3	446288	205513	On the boundary of Denmans Farm.
LT4	446493	205832	North-eastern boundary near Eynsham Road.
LT5	446731	205342	South-eastern boundary near the A420.
LT6	443509	211153	South-western boundary near City Farm.

Position	Location		Description
	x-coordinate	y-coordinate	
LT7	443266	212987	North-western boundary near Church Road.
LT8	444314	212043	On the boundary of Purwell Farm.
LT9	445192	211197	South-eastern boundary near dwellings on Elms Road.
LT10	446587	212384	Eastern boundary near Cassington Road.
LT11	446708	214125	North-eastern boundary near Woodstock Road East.
LT12	445343	214947	North-western boundary near Grove Road.
LT13	446667	217629	South-eastern boundary near Banbury Road.
LT14	444835	219675	Western boundary near Tew Lane (B4027)
LT15	445765	221418	Northern boundary near Dornford Lane.
LT16	444075	209120	North of Wharf Road
LT17	444878	213287	West of Burleigh Road, and to the north of Burleigh Farm
LT18	444332	214428	To the south of the A4095, and east of Cassington Road
LT19	446454	215048	To the south west of Woodstock Road
LT20	445846	215602	To the south of Bladon Roundabout
LT21	445685	216686	To the east of Orchid Walk
LT22	445685	216686	To the west of the A4260
ST1	444598	207264	To the south of Oaklands
ST2	445144	206771	To the west of Cunmor Road
ST3	443807	209624	To the west of the B4449 and north of Cassington Road.

1.7.5 Long-term equipment was deployed at positions LT1 to LT15 on 17 and 18 May 2023 with measurements commencing at 13:15 hours and concluding between 14:00 hours on 22 May 2023 and 11:15 on 23 May 2023.

1.7.6 Further long-term equipment was deployed at positions LT16 to LT22 on 11th July 2024 with measurements commencing at between 14:30 hours and 17:45 hrs, and concluding between 00:00 hours and 11:30 hours on the 18th July 2024.

1.7.7 In addition, three short term monitoring points were utilised on the 11th July 2024 with measurements commencing at 13:00 hours and concluding between 17:00 hours and 17:36 hours on the 11th July 2024.

1.7.8 Measurements of the L_{Aeq}, L_{Amax}, and L_{A90} were undertaken at 100 millisecond (ms) intervals and post-processed to 15-minute time periods for the duration of the survey period.

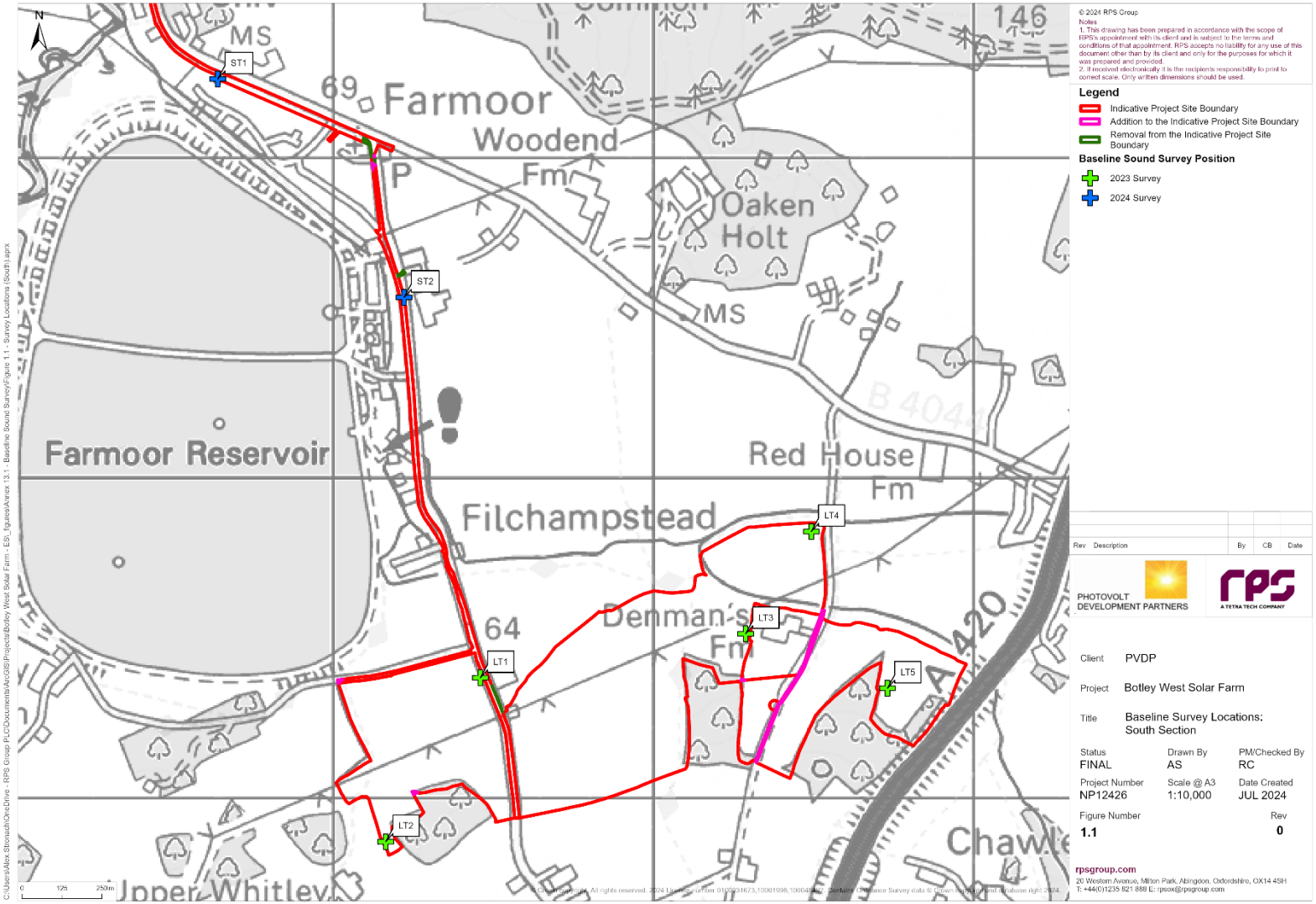

Figure 1.1: Baseline sound survey locations – South Section

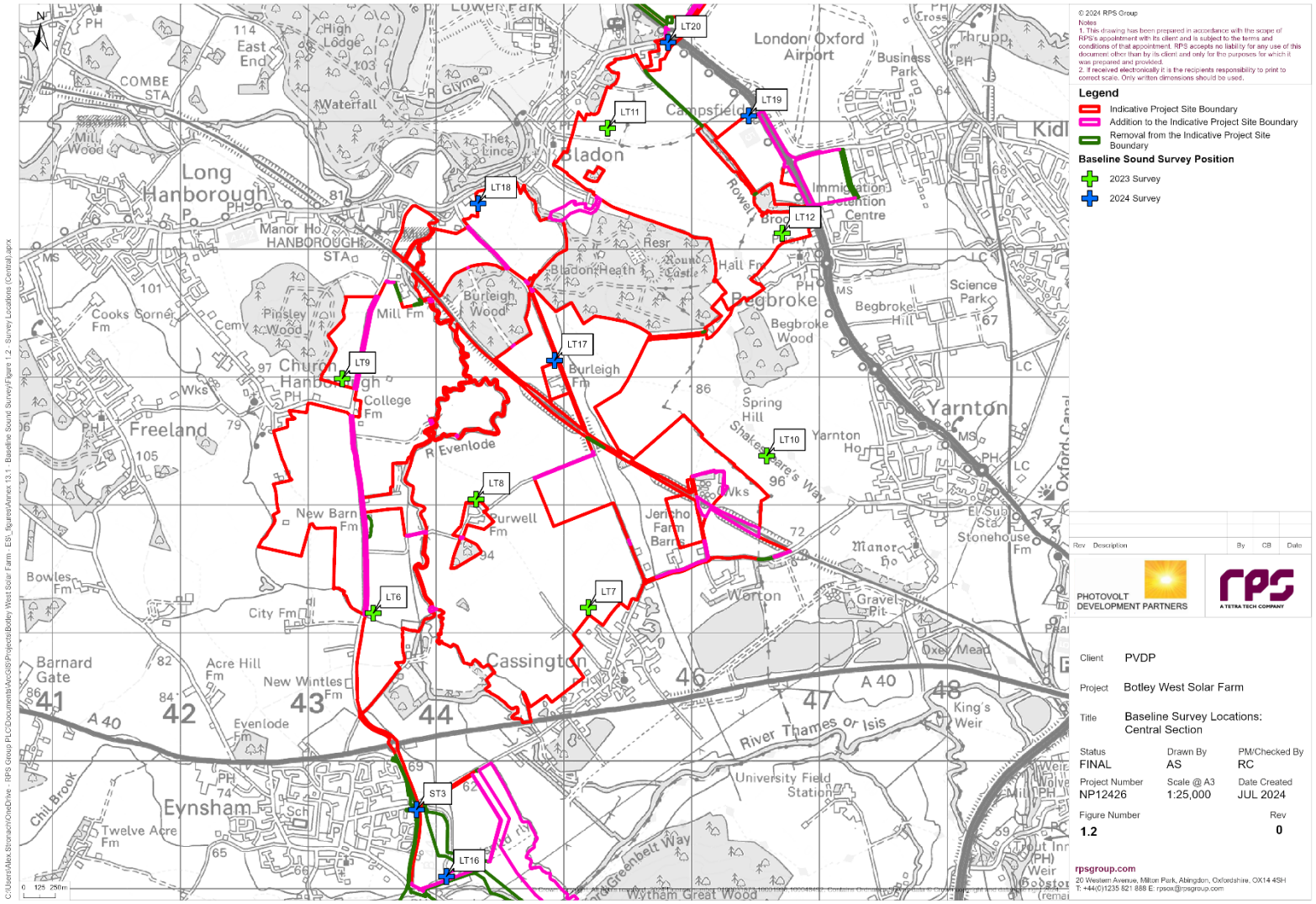

Figure 1.2: Baseline sound survey locations – Central Section

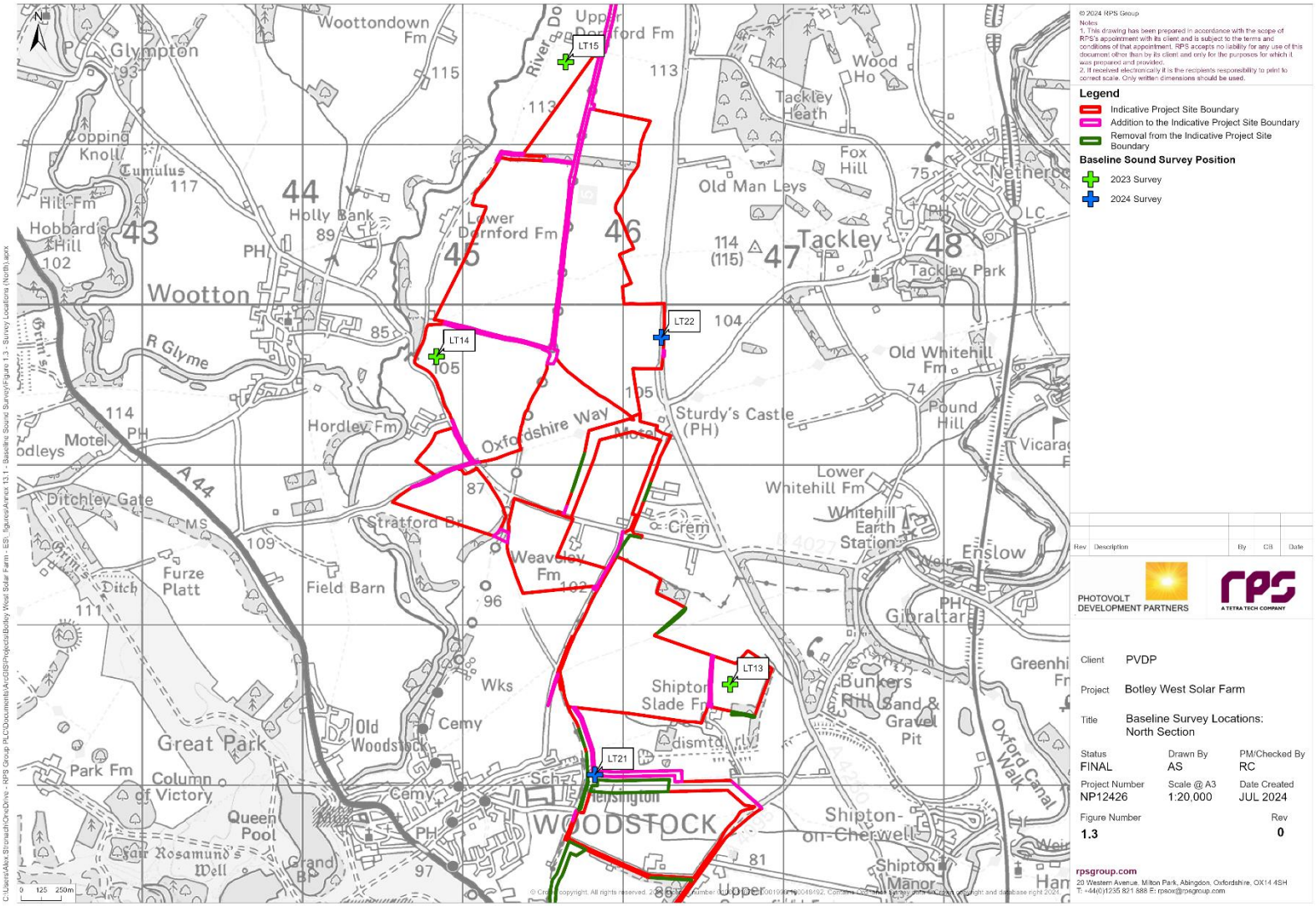

Figure 1.3: Baseline sound survey locations – North Section

1.8 Equipment

The equipment listed in **Table 1.3** below was used to undertake the survey.

Table 1.3: Baseline sound survey equipment

Position	SLM Make/ Model	Serial Number	Calibration (Ref: 94.0 dB)		Last Calibration Date
			Start	End	
Calibrator	Rion NC-74	110118	N/A	N/A	17/10/2022
LT1	Rion NL-52	620870	94.0	93.9	28/03/2023
LT2	Rion NL-52	976188	94.0	94.1	07/02/2023
LT3	Rion NL-52	943366	94.0	93.9	18/10/2021
LT4	Rion NL-52	732145	94.0	93.9	28/03/2023
LT5	Rion NL-52	976221	94.0	94.0	27/03/2023
LT6	Rion NL-52	610193	94.0	93.8	25/01/2023
LT7	Rion NL-52	810301	94.0	93.8	11/05/2023
LT8	Rion NL-52	164422	94.0	94.0	11/02/2022
LT9	Rion NL-52	586905	94.0	93.8	20/05/2022
LT10	Rion NL-52	998569	94.0	93.9	02/03/2022
LT11	Rion NL-52	1087404	94.0	94.0	14/07/2022
LT12	Rion NL-52	386736	94.0	94.0	19/10/2021
LT13	Rion NL-52	586906	94.0	93.8	08/06/2022
LT14	Rion NL-52	620564	94.0	93.9	22/09/2022
LT15	Rion NL-52	998566	94.0	93.9	02/03/2022
LT16	Rion NL-52	810558	94.0	94.1	29/05/2024
LT17	Rion NL-52	253701	94.0	94.3	12/09/2023
LT18	Rion NL-52	710312	94.0	94.2	26/09/2023
LT19	Rion NL-52	620858	94.0	94.2	25/09/2023
LT20	Rion NL-52	710448	94.0	94.2	11/01/2024
LT21	Rion NL-52	1021257	94.0	94.2	05/02/2024
LT22	Rion NL-52	810559	94.0	94.1	12/12/2023
ST1	Rion NL-52	1176464	94.0	94.0	21/09/2023
ST2	Rion NL-52	1221576	94.0	93.4	22/12/2023
ST3	Rion NL-52	843173	94.0	93.9	18/05/2023

The equipment was installed within weatherproof enclosures and microphones were fitted with Rion WS-15 windshield. The equipment was calibrated upon commencement and conclusion of the sound

survey to confirm an acceptable degree of accuracy. As shown in **Table 1.3** above, no significant drift (> ±0.5 dB) was noted to have occurred.

Measurements were undertaken in accordance with British Standard 7445- 2:1991 – 'Description and measurement of environmental noise – Part 2: Guide to the acquisition of data'. All sound level meters used meet the 'Class 1' criteria defined within British Standard EN 61672-2:2013+A1:2017 – 'Electroacoustics. Sound level meters – Pattern evaluation tests'. All calibrators used meet the 'Class 1' criteria defined within British Standard EN IEC 60942 – 'Electroacoustics. Sound Calibrators'.

1.9 Meteorological Conditions

Weather stations (Davies Instruments Vantage Vue 6250) were deployed alongside survey equipment in the Northern and Southern Project sites to monitor the variation in meteorological conditions throughout the survey period.

The weather stations were temporally synchronised with the sound survey equipment. During the analysis of the measured data, any 15-minute periods during which precipitation events or wind speeds greater than 5 m/s occurred were excluded.

1.10 Baseline Sound Climate

Subjective Description

A subjective description of the existing sound climate at each position is presented in **Table 1.4** below.

Table 1.4: Subjective description of the sound climate at survey positions

Position	Subjective description of sound climate
LT1	Distant traffic noise was audible on local roads. However, overall sound climate noted to be quiet.
LT2	The sound climate was noted to be dominated by traffic noise on B4017 to the east of the measurement position.
LT3	Traffic noise was audible from the B4017 to the north of this position.
LT4	Overall, the sound climate was noted to be dominated by road traffic noise on the B4044 to the north. Noise from equipment undertaking trial pitting was audible but not overly dominant in the time period observed.
LT5	Traffic noise on the A420 dominated the noise climate at this position.
LT6	The sound climate was noted to be dominated by road traffic on Lower Road situated close to the measurement position.
LT7	The sound climate was noted to be of a similar nature to LT6 though slightly reduced due to greater distance to the roads.
LT8	There was some influence from aircraft overhead at this position, however distant road traffic was the most influential source. Overall, the sound climate was noted to be quiet.
LT9	Distant traffic noise was most influential at this position. It was also noted that farming equipment was operational in a nearby field whilst deploying the equipment. However, this was not present upon collection.
LT10	This position was noted to be quiet overall with some influence from planes overhead, trains passing by on a nearby railway line, and distance traffic noise.

Position	Subjective description of sound climate
LT11	Distant traffic noise on the A44 was the dominant source. Additional influence was noted from aircraft overhead.
LT12	Traffic noise was audible on roads to the north and west of this position. Aircraft overhead were also audible, as well as contributions from plant situated to the north. However, this plant was not noted to be dominant.
LT13	Distant traffic noise on local roads was the dominant source. Additional influence was noted from aircraft overhead.
LT14	This position was noted to be quiet overall with influence from distant traffic noise and planes overhead.
LT15	This position was noted to be quiet overall with influence from distant traffic noise and planes overhead.
LT16	This position was away from any major sources of sound, with influence from distant traffic noise.
LT17	Noise at this location included occasional vehicles on Burleigh Road, as well as distant road traffic and aircraft overpasses.
LT18	Traffic noise on the A4095 was the dominant source. Additional influence was noted from aircraft overhead.
LT19	Noise at this location was dominated by road traffic on the A44. Additional influence was noted from aircraft overhead.
LT20	Noise at this location was dominated by road traffic on the A44 and Grove Road. Additional influence was noted from aircraft overhead.
LT21	This position was away from any major sources of sound, with influence from distant traffic noise.
LT22	Noise at this location was dominated by road traffic on the A4260. Additional influence was noted from aircraft overhead.
ST1	Noise at this location was dominated by road traffic on the B4044 Oxford Road and included frequent HGVs and cars/vans.
ST2	Noise at this location was dominated by road traffic on the B4017 Cumnor Road and included frequent HGVs and cars/vans.
ST3	Noise at this location was dominated by road traffic on the B4449 and Cassington Road and included frequent HGVs and cars/vans.

1.11 Results

The results of the baseline sound survey at the long-term and short-term monitoring positions are presented in Table 1.5 and Table 1.6 below, respectively.

Table 1.5: Range of measured sound levels at long-term monitoring positions

Location	Measured Sound Level (dB)					
	Daytime			Evening	Night-time	
	$L_{Aeq,16h}$ (0700-2300)	$L_{Aeq,12h}$ (0700-1900)	$L_{A90,1h}$ (0700-2300)	$L_{Aeq,4h}$ (1900-2300)	$L_{Aeq,8h}$ (2300-0700)	$L_{A90,15min}$ (2300-0700)
LT1	31-57	39-55	27-43	31-57	29-59	26-41
LT2	51-68	53-68	25-39	51-67	30-66	32-44
LT3	37-60	37-60	33-50	42-55	34-57	28-39
LT4	38-61	38-61	25-40	42-52	32-57	33-46
LT5	46-66	46-66	40-57	48-56	38-59	28-44
LT6	55-69	57-69	32-54	54-66	30-66	28-44
LT7	42-61	44-61	26-49	42-55	28-53	25-37
LT8	32-56	39-56	28-45	32-53	30-52	27-43
LT9	36-61	38-61	30-52	36-52	30-51	27-43
LT10	37-58	39-58	33-47	37-56	35-54	31-45
LT11	40-68	44-68	30-50	39-65	32-52	26-38
LT12	34-59	42-59	30-46	34-52	30-57	27-38
LT13	38-61	40-61	26-49	36-54	31-56	25-44
LT14	48-64	50-64	26-45	48-59	37-59	25-34
LT15	36-57	42-57	26-46	35-53	33-59	25-42
LT16	45-49	45-51	35-45	43-45	43-44	33-43
LT17	53-58	53-59	27-41	50-53	46-52	26-39
LT18	45-51	45-52	27-52	43-47	39-43	27-43
LT19	51-59	51-60	33-57	52-57	48-51	27-53
LT20	58-63	59-64	37-62	55-61	51-59	27-56
LT21	44-56	44-57	27-49	38-48	37-48	27-45
LT22	66-68	66-69	30-59	64-67	62-66	26-55

Table 1.6: Range of measured sound levels at short-term monitoring positions

Location	$L_{Aeq,15min}$ (dB)	$L_{A90,15min}$ (dB)
ST1	58-62	40-54
ST2	62-67	41-44
ST3	56-61	45-48

1.12 References

British Standards Institution (1991*), 'British Standard 7445-2:1991 Description and measurement of environmental noise – Part 2: Guide to the acquisition of data pertinent to land use'.*

British Standards Institution (2003), *'British Standard 7445-1:2003. Description and measurement of environmental noise – Part 1: Guide to environmental quantities and procedures'*

British Standards Institution (2017), *'BS EN 61672-2:2013+A1:2017 – 'Electroacoustics. Sound level meters – Pattern evaluation tests'*

British Standards Institution (2018), *'BS EN IEC 60942 – 'Electroacoustics. Sound Calibrators*