LAND NORTH OF BARTON ROAD -TECHNICAL NOTE

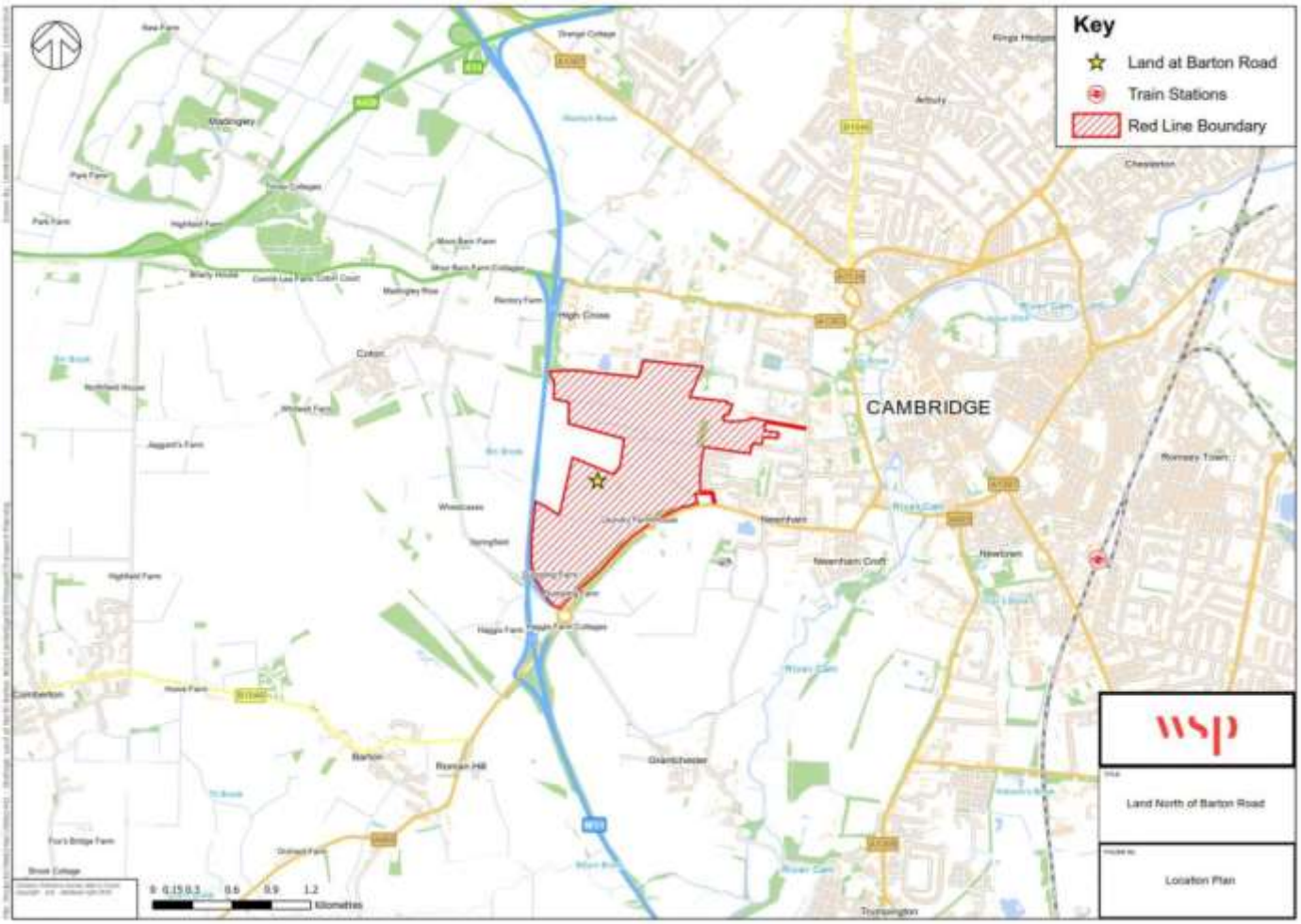
DATE:	24 February 2020	**CONFIDENTIALITY:**	Public
SUBJECT:	South West Cambridge: Land North of Barton Road – Initial Noise Assessment		
PROJECT:	70062442	**AUTHOR:**	Toby Lewis
CHECKED:	Steve Fisher	**APPROVED:**	Toby Lewis

INTRODUCTION

WSP has been instructed by the North Barton Landowners Group (North BRLOG) to undertake an initial noise assessment for a potential development site referred to as 'South West Cambridge: Land North of Barton Road' (the development site). The development site is being promoted for an urban extension, including residential development, through the Greater Cambridgeshire Local Plan. The purpose of this initial noise assessment is to understand potential constraints to the development which might result from road traffic noise arising from the M11, to the west, and Barton Road to the south.

The extent of the development site is illustrated in Figure 1 below.

Figure 1 – South West Cambridge: Land North of Barton Road – Site Location Plan



LAND NORTH OF BARTON ROAD -TECHNICAL NOTE

DATE:	24 February 2020	**CONFIDENTIALITY:**	Public
SUBJECT:	South West Cambridge: Land North of Barton Road – Initial Noise Assessment		
PROJECT:	70062442	**AUTHOR:**	Toby Lewis
CHECKED:	Steve Fisher	**APPROVED:**	Toby Lewis

ASSESSMENT APPROACH

The initial site assessment has been undertaken via a combination of noise monitoring and noise modelling so that day time and night time noise level contours could be imposed on plans of the development site to inform the site suitability and initial design evolution.

NOISE SURVEY

A noise survey was undertaken between Thursday 3 October and Tuesday 8 October 2019.

Three monitoring locations were used in the survey. Monitoring Locations (MLs) 1 and 2 comprised largely unattended measurements untaken over multiple days and nights in arable fields to the east of the M11. ML3 was a 4-hour measurement undertaken to the north of Barton Road to enable appropriate road traffic noise levels to be derived using the CRTN[1] shortened procedure.

The monitoring positions and durations are set out in Table 1 and shown on Figure 2 below. In each case the sound level meter was housed within a weatherproof case with an external battery pack and the microphone and preamplifier mounted on a tripod, connected to the sound level meter via an extension cable. Each assembled system was subjected to field calibration checks prior to commencing measurement runs and to drift checks prior to collection. Instrument details, calibration certification and photographs of the monitoring locations are available on request. A photograph of the equipment in-situ at ML1 is provided at Figure 3 as an example.

Table 1 – Monitoring Locations, Timings and Durations

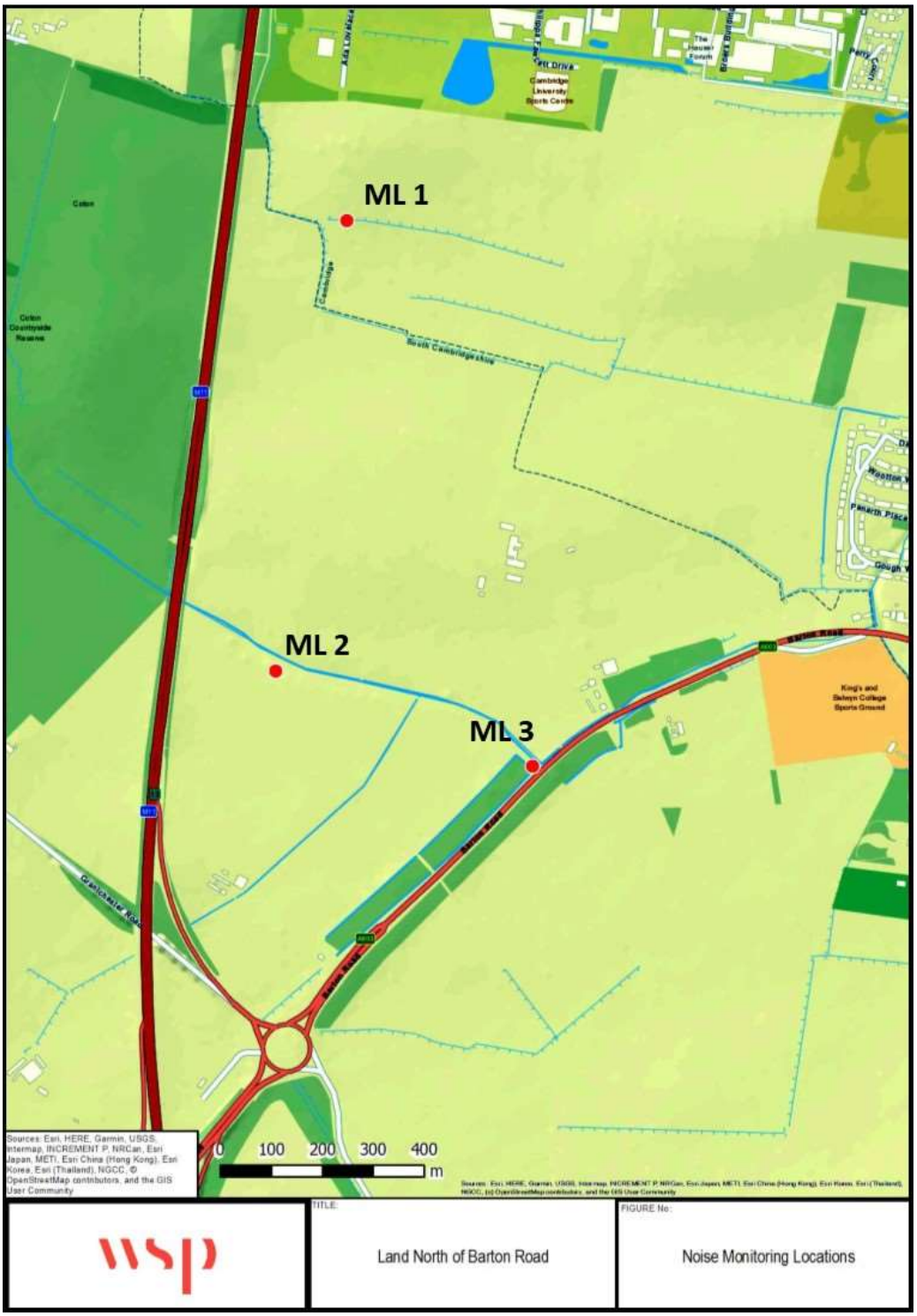
Monitoring Location	Instrument Name	Location	Distance from Road	Start Time and Date	Stop Time and Date
1	*Solo 16*	*Field South of Ada Lovelace Way*	*225 m east from M11*	*03/10/2019 14:00*	*08/10/2019 16:05*
2	*Duo 7*	*Field North of Dumpling Farm*	*210 m east from M11*	*03/10/2019 08:35*	*08/10/2019 15:45*
3	*Solo 16*	*Field Access North of Barton Road*	*16m north-west from Barton Road*	*03/10/2019 09:00*	*03/10/2019 13:15*

[1] Calculation of Road Traffic Noise 1988, Department of Transport Welsh Office

LAND NORTH OF BARTON ROAD -TECHNICAL NOTE

DATE:	24 February 2020	**CONFIDENTIALITY:**	Public
SUBJECT:	South West Cambridge: Land North of Barton Road – Initial Noise Assessment		
PROJECT:	70062442	**AUTHOR:**	Toby Lewis
CHECKED:	Steve Fisher	**APPROVED:**	Toby Lewis

Figure 2 – Map View of Monitoring Locations



DATE:	24 February 2020	**CONFIDENTIALITY:**	Public
SUBJECT:	South West Cambridge: Land North of Barton Road – Initial Noise Assessment		
PROJECT:	70062442	**AUTHOR:**	Toby Lewis
CHECKED:	Steve Fisher	**APPROVED:**	Toby Lewis

Figure 3 – Photograph of ML1 taken from the East

The weather conditions for most of the survey were acceptable for environmental monitoring, however there were some periods when half-hourly average windspeeds exceeded 5m/s, or there was precipitation, when noise measurements could potentially have been affected. On a precautionary basis any such data were removed.

Where the main noise source is road traffic, the wind direction is also important and, ideally, the monitoring locations should be downwind from the road. Fortunately, the winds were from the west for the majority of the survey and, importantly, for almost all of the weekdays periods which were used to derive the model verification data.

Wind speeds and rainfall are plotted in Figure 4 with periods for which monitoring data have been excluded shown. The hourly average noise levels ($L_{Aeq,1h}$) for the three monitoring locations are presented in Figure 5 on the same time base so the two graphs are directly comparable.

It is understood that a partial closure of the A14, directly to the north of the M11, occurred on Saturday 10 October resulting in much reduced traffic flows and noise levels (visible in Figure 5).

DATE:	24 February 2020	**CONFIDENTIALITY:**	Public
SUBJECT:	South West Cambridge: Land North of Barton Road – Initial Noise Assessment		
PROJECT:	70062442	**AUTHOR:**	Toby Lewis
CHECKED:	Steve Fisher	**APPROVED:**	Toby Lewis

Figure 4 – Windspeed, Rainfall and Data Exclusions

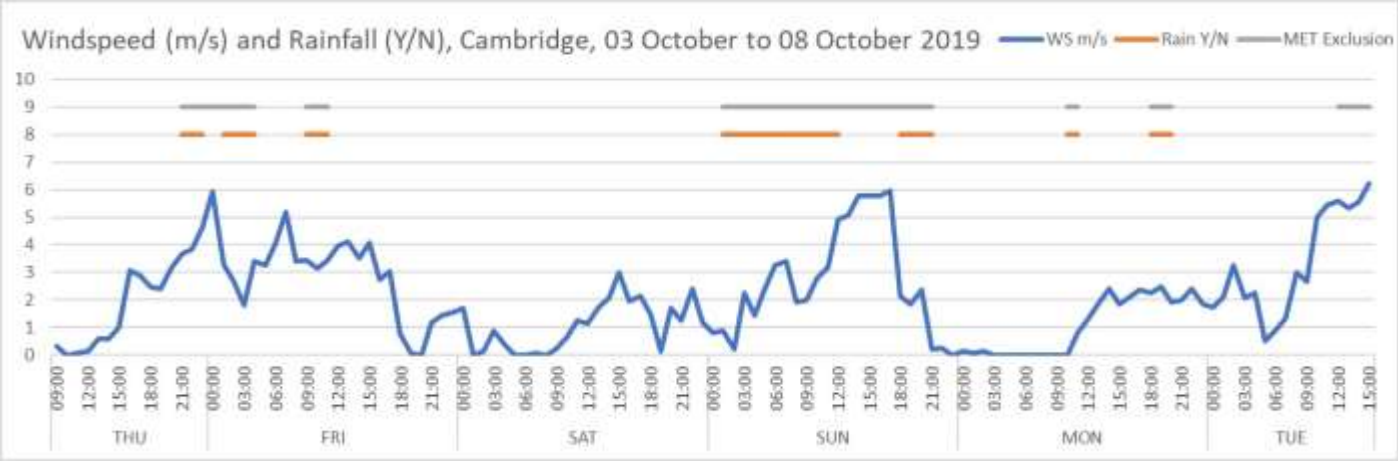
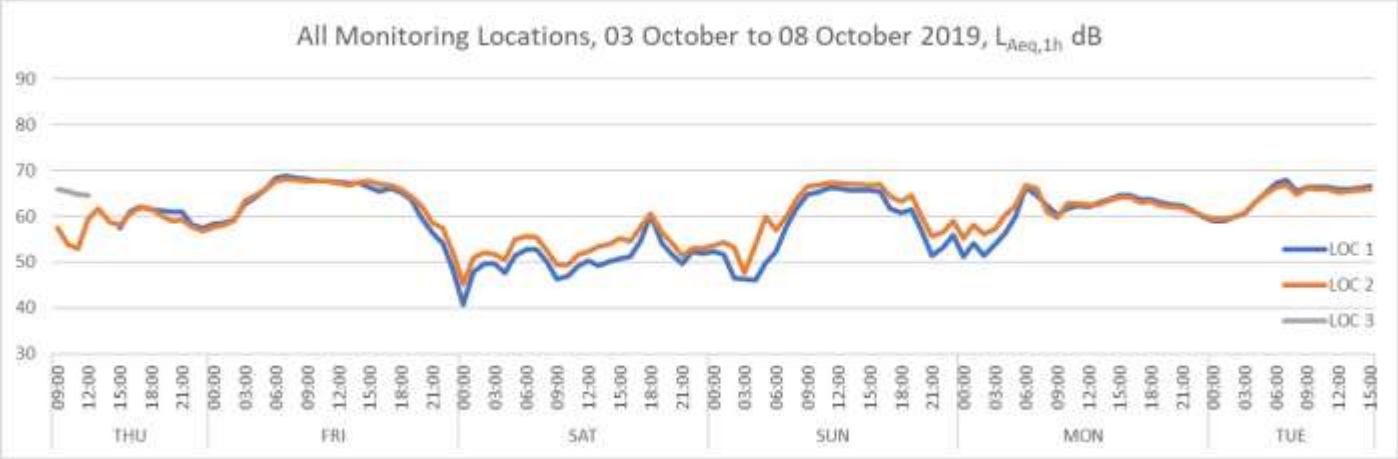


Figure 5 – Hourly Average Noise Data for All Monitoring Locations



Using the retained data from the weekday periods, representative noise levels were derived for each of the monitoring locations.

For ML1 and ML2, representative daytime and night time average ($L_{Aeq,16h}$ and $L_{Aeq,8h}$ respectively) levels were derived logarithmically from the data. For ML3, these levels were derived using the appropriate conversion factors set out in CRTN and TRL[2].

Representative night time maximum levels were derived for ML1 and ML2 based on the 90th percentile of 5-minute logged $L_{A,Fmax}$ values between 23:00 and 07:00. This metric correlates approximately with the ten highest $L_{A,Fmax}$ levels per night referenced in the ProPG[3]. These data are presented in Table 2.

[2] Converting the UK traffic noise index $L_{A10,18h}$ to EU noise indices for noise mapping 2002, TRL for Defra.
[3] Professional Practice Guidance on Planning and Noise – New Residential Development 2017. ANC, IOA and CIEH.

DATE:	24 February 2020	**CONFIDENTIALITY:**	Public
SUBJECT:	South West Cambridge: Land North of Barton Road – Initial Noise Assessment		
PROJECT:	70062442	**AUTHOR:**	Toby Lewis
CHECKED:	Steve Fisher	**APPROVED:**	Toby Lewis

Table 2 – Representative Noise Levels for Monitoring Locations, dB

ML	Weekday Day time $L_{Aeq,16h}$, dB	Weekday Night time $L_{Aeq,8h}$, dB	Night time $L_{A,Fmax}$, dB
1	64.6	62.6	65
2	64.1	62.8	66
3	63.8	57.2	74*

* Ninetieth percentile of five-minute $L_{A,Fmax}$ values logged between 09:05 and 13:10 03/10/2019.

NOISE MODELLING

The noise modelling was undertaken in the CadnaA® package running CRTN algorithms. Topography was sourced from Defra Lidar data. Traffic flow data were not used for this preliminary assessment. The north bound and south bound M11 carriageways were created as two road sources and adjusted until the predictions at ML 1 and 2 matched the day time and night time noise levels derived for those locations.

The resulting noise contribution (from the M11) predicted at ML3 was significantly lower than that had been derived from the monitoring data. As this point, a road source was added to the Barton Road alignment and the source level adjusted until the measured level was predicted at ML3. In this way, the model was verified at all three monitoring locations on the basis that all of the acoustic energy measured at these locations actually arose from these two road sources. Based on interviews with farm management, on-site observations and notes and an examination of the detailed time history this assumption (that all significant noise arose from the M11 and Barton Road) is credible.

A comparison of the model predictions with the levels measured at the three monitoring locations is provided in Table 3. The verified noise model plots for the day time and night time are presented at Figures 6 and 7 below.

DATE:	24 February 2020	**CONFIDENTIALITY:**	Public
SUBJECT:	South West Cambridge: Land North of Barton Road – Initial Noise Assessment		
PROJECT:	70062442	**AUTHOR:**	Toby Lewis
CHECKED:	Steve Fisher	**APPROVED:**	Toby Lewis

Table 3 – Representative Noise Levels for Monitoring Locations, dB

ML	Day time 07:00 – 23:00			Night time 23:00 – 07:00		
	Measured	Predicted	Model Difference	Measured	Predicted	Model Difference
1	64.6	62.9	-1.7	62.6	62.4	-0.2
2	64.1	63.8	-0.3	62.8	63.3	+0.5
3	63.8	65.2	+1.4	57.2	57.1	-0.1

LAND NORTH OF BARTON ROAD -TECHNICAL NOTE

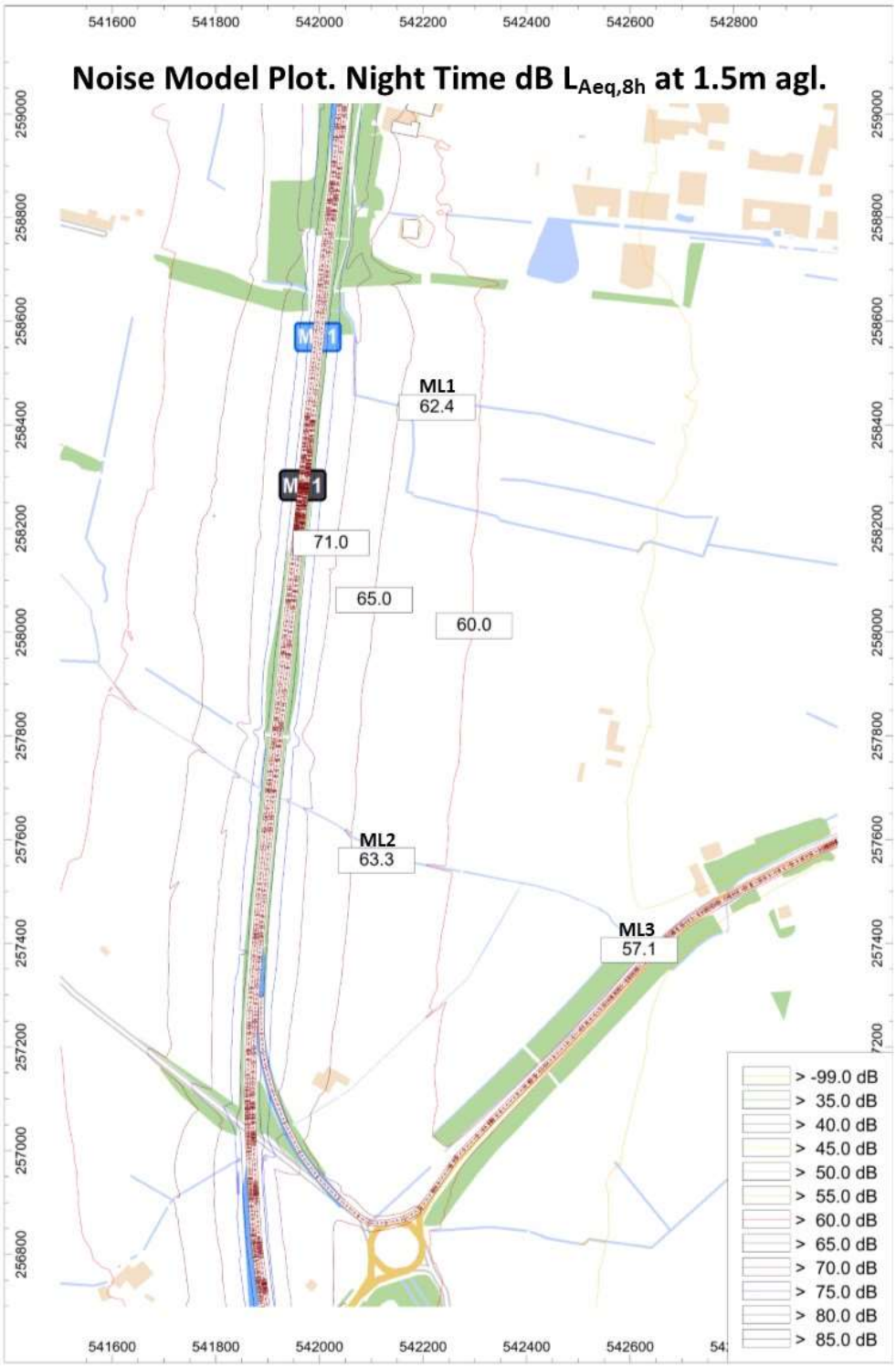
DATE:	24 February 2020	**CONFIDENTIALITY:**	Public
SUBJECT:	South West Cambridge: Land North of Barton Road – Initial Noise Assessment		
PROJECT:	70062442	**AUTHOR:**	Toby Lewis
CHECKED:	Steve Fisher	**APPROVED:**	Toby Lewis

Figure 6 – Initial Day Time Noise Model Plot, Grid Spacing 2m, Grid Height 1.5m, dB $L_{Aeq,16h}$

LAND NORTH OF BARTON ROAD -TECHNICAL NOTE

DATE:	24 February 2020	**CONFIDENTIALITY:**	Public
SUBJECT:	South West Cambridge: Land North of Barton Road – Initial Noise Assessment		
PROJECT:	70062442	**AUTHOR:**	Toby Lewis
CHECKED:	Steve Fisher	**APPROVED:**	Toby Lewis

Figure 7 – Initial Night Time Noise Model Plot, Grid Spacing 2m, Grid Height 1.5m, dB $L_{Aeq,8h}$



LAND NORTH OF BARTON ROAD -TECHNICAL NOTE

DATE:	24 February 2020	**CONFIDENTIALITY:**	Public
SUBJECT:	South West Cambridge: Land North of Barton Road – Initial Noise Assessment		
PROJECT:	70062442	**AUTHOR:**	Toby Lewis
CHECKED:	Steve Fisher	**APPROVED:**	Toby Lewis

SITE SUITABILITY AND MITIGATION

Average road traffic noise levels, arising from the use of the M11, are relatively high along the western edge of the development site such that residential development immediately adjacent to the M11 would be extremely challenging.

Along the south boundary of the development site, average and night-time maximum noise levels arising from the use of Barton Road are also material.

There are three key guidance documents and standards which provide context for the assessed noise levels in terms of understanding their policy and design implications. These are:

1. The Design Manual for Road and Bridges – LA111 Noise and Vibration (Highways England, November 2019) which quantifies the lowest observed adverse effect level (LOAEL) and significant observed adverse effect level (SOAEL) for which there are corresponding specific national policy objectives.
2. The Professional Practice Guidance on Planning and Noise: New Residential Development (the ProPG) (Association of Noise Consultants, Institute of Acoustics, Chartered Institute of Environmental Health May 2017) which provides a staged approach to noise assessment and acoustic design.
3. BS 8233:2014 Guidance on sound insulation and noise reduction for buildings which sets out acoustic design criteria for habitable rooms and external residential amenity.

The noise survey and modelling indicates that the daytime 63 dB $L_{Aeq,16h}$ contour, which is superficially aligned with the SOAEL, is generally around 225m east from the M11 and around 23m north from Barton Road, although the precise distances vary depending on the elevation of the roads and intervening topographic features. However, Highways England advise that the noise level aligned with the SOAEL should *'be modified where it is appropriate and merited by local circumstances'* with the primary consideration being reduced sensitivity due to *'good noise insulation'*.

In the context of new residential development, therefore, the 63 dB $L_{Aeq,16h}$ contour does not necessarily comprise the SOAEL on the proviso that good acoustic design is employed, in accordance with the ProPG, to provide high levels of noise insulation and commensurate screening of external amenity areas.

The noise risk assessment, which is undertaken as the first part of a ProPG assessment, indicates that those parts of the development site close to the M11 are medium to high risk. Under these circumstances the risk should be reduced by a process of good acoustic design which is demonstrated in an Acoustic Design Statement at the appropriate time.

This report comprises an initial study to inform early design considerations for the site development and, as such, is commensurate with the iterative process of good acoustic design which should start *'at an early stage of the development control process'* and take an integrated approach.

DATE:	24 February 2020	**CONFIDENTIALITY:**	Public
SUBJECT:	South West Cambridge: Land North of Barton Road – Initial Noise Assessment		
PROJECT:	70062442	**AUTHOR:**	Toby Lewis
CHECKED:	Steve Fisher	**APPROVED:**	Toby Lewis

The noise control options set out in the ProPG are:

i) Maximising spatial separation.

ii) Investigating the feasibility of reducing existing noise levels.

iii) Using existing topography.

iv) Incorporating noise barriers.

v) Using the layout of the scheme to reduce noise propagation across the site.

vi) Using the orientation of buildings to reduce the noise exposure of noise sensitive rooms.

vii) Using the building envelope to mitigate noise to acceptable levels.

The illustrative masterplan shown in Figure 8 below has evolved to respond to the road traffic noise constraints adopting a minimum stand-off of around 220m from the M11 and around 70m from Barton Road. Bunds or barriers positioned close to the M11 itself would be of very limited benefit to noise sensitive receptors within this development.

Relatively contiguous north-south aligned blocks parallel to the M11 will provide effective screening to the remainder of the site. The buildings in the illustrative layout have been designed and positioned so that they can act as effective barriers to protect external amenity areas from road traffic noise and this would be optimised where necessary during refinements to the designs. If these buildings were noise sensitive (residential for example) then façade mitigation would be necessary on those exposed elevations facing the M11 to ensure that acceptable internal acoustic conditions were achieved. It is anticipated that these measures would comprise acoustic glazing and an alternative means of ventilation which avoids the need to open windows.

CONCLUSIONS

The development site is exposed to significant road traffic noise from the M11. The southern edge of the development site is also exposed to road traffic noise from Barton Road such that it might comprise a design constraint to noise sensitive receptors proposed near it.

Noise mitigation via a roadside bund/barrier would not be practicable at this site. A roadside barrier would provide very limited benefits to noise sensitive receptors 200m or more away and it would negate the benefit of the acoustically absorbent ground attenuation that a green buffer would provide.

The use of the outer edges of the built development itself to screen the remainder of the development from noise comprises an effective solution on the basis that the illustrative masterplan is subject to further noise studies to inform its evolution and identify refine mitigation options. On this basis the site is suitable for a development which includes noise sensitive uses.

DATE:	24 February 2020	**CONFIDENTIALITY:**	Public
SUBJECT:	South West Cambridge: Land North of Barton Road – Initial Noise Assessment		
PROJECT:	70062442	**AUTHOR:**	Toby Lewis
CHECKED:	Steve Fisher	**APPROVED:**	Toby Lewis

Figure 8 – The Indicative Layout