

## Technical Note

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Technical Note No:	01	MLM Project Manager:	Ondrej Suska
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## 1 Introduction

MLM Consulting Engineers Ltd has been commissioned by Barrat Davies Wilson Homes (Eastern Counties), to assess noise constraints at the proposed residential development at Cringleford, Norfolk.

This desktop assessment was based on re-using our historic noise data and updating our previous noise model for the adjacent site (planning references: 2013/1793, 2019/1389 and 2018/2200), located directly to the north-east. The assessment provides an Initial Noise Risk Assessment for the site and has been carried out in accordance with Stage 1 of ProPG: Professional Practice Guidance on Planning & Noise. The assessment also presents predictions of site-wide noise levels, assuming a typical layout of residential dwellings.

The aim of this Technical Note is to provide predictions of current site-wide noise levels and associated outline advice on good acoustic design options, in order for the LPA to consider the site area to be adopted into the local plan for residential use. Should an outline or full application be submitted, a detailed acoustic study will be required.

This assessment is based on a historic detailed environmental noise survey undertaken at the Site and the surrounding area, detailed in MLM's report issued 18 December 2017 (reference: '102076-MLM-ZZ-XX-RP-U-0001-REV01-Newfound Farm Cringleford'). A noise modelling exercise was undertaken to predict the noise levels across the site, taking into account of the measured levels.

## 2 Site Description

The site is located north-east of the A47 dual carrieway and east of Round House Way. The site is also located south-west of the consented scheme, known as Land South-west of Newfound Farm, Cringleford (planning references: 2013/1793, 2019/1389 and 2018/2200).

The site framework plan and red line boundary is shown in Figure 1 below.



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Figure 1: Site framework plan and red line boundary

### 3 Open Site Assessment (ProPG Stage 1: Initial Site Noise Risk Assessment)

#### 3.1 Section Overview

The results of the historic environmental noise survey and the noise modelling exercise have been used to determine the noise levels and the potential noise risk across the existing open site. It must be noted that, as required for a ProPG Stage 1 assessment, the results do not include the impact of any new or additional mitigation measures to be included in the development proposals. Dwellings associated with the consented scheme at Newfound Farm, Cringleford, have been included in the model, based on the latest assessed proposals.

Open site noise risk assessment maps for the daytime and night-time periods at 1.5 metres high and 4.5 metres high respectively are presented in Figures 2 and 3 below. This represents Ground and First Floor.



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Figure 2: Noise Risk Assessment with Open Site – Daytime (1.5m above ground level)



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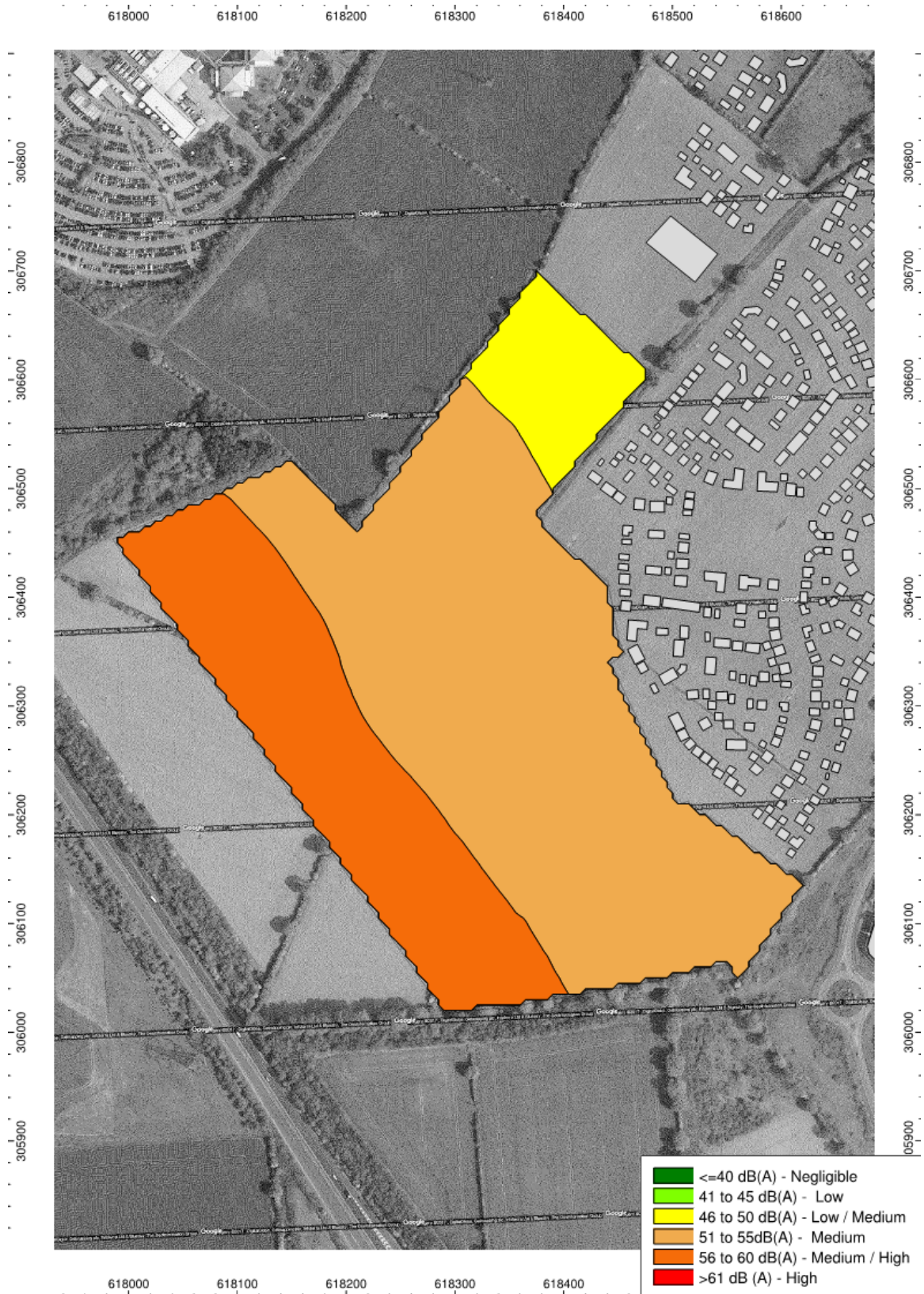


Figure 3: Noise Risk Assessment with Open Site – Night-time (4.5m above ground level)



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## 3.2 Noise Risk Assessment

The noise maps identify that during the daytime (07:00 – 23:00) the majority of the site is at Low/Medium and Low. Small area of the site that is approximately within 210 metres of the A47 has been predicted to be at Medium risk.

During the night-time (23:00-07:00) the majority of the site is at Medium risk, with a small area in the north-east at Low/Medium risk. Areas of the site that are approximately within 70 metres of the A47 have been predicted to be at Medium risk, which equates to approximately a third of the total site area.

In addition to the above, measurements undertaken at Position 1 (located at 7.5 metres from kerb of A47) have shown that the tenth highest  $L_{AFmax}$  event is 88 dB at this Position, whilst the 8 hour  $L_{Aeq,night-time}$  noise level was 73 dBA. This indicates that the night-time internal ambient noise levels will be driven by the night-time  $L_{Aeq}$  and  $L_{AFmax}$  criterion equally.

From the initial noise risk assessment, the site is subject to moderate to relatively high levels, specifically during the night-time periods. However, it can be concluded that the majority of the site can be acceptable from a noise perspective, provided that a good acoustic design process is followed. Areas of the site closer to the A47 are deemed less suitable from a noise perspective, especially during the night-time periods. It is recommended that a good acoustic design process is undertaken and demonstrated in an Acoustic Design Statement (ADS) which would confirm how the adverse impacts of noise will be mitigated and minimised, and which would clearly demonstrate that significant adverse noise impact will be avoided in the finished development.

It must be noted that the above noise risk assessment considers open site and is aimed to provide outline advice on good acoustic design options. Once the built form of the development is considered, the noise effects within the site, away from the adjacent sources will be significantly reduced, as each layer of building adds acoustic screening.

## 4 Assessment Considering Typical Masterplan and Mitigation Options

Based on the latest information provided, this assessment considers a typical masterplan layout with residential dwellings located within the residential areas (beige), as identified on the Landscape plan in Figure 1. It should be noted that this layout has been produced solely to support this assessment, based on the approximate built-up density and typical height of dwellings.

### 4.1 Internal Noise Levels

In order to achieve appropriate noise levels within internal living spaces, the dwellings themselves need to be considered with regard to the level of façade mitigation required. BS 8233:2014 states internal noise level criteria of <35 dB(A) in living rooms and bedrooms during the daytime (07:00 – 23:00) and <30 dB(A) in bedrooms during the night-time (23:00 – 07:00). In addition, ProPG recommends for individual noise events not to normally exceed 45 dB  $L_{Amax,F}$  more than 10 times a night in bedrooms and no event higher than 55 dB  $L_{Amax}$ . It should be noted that our assessment has considered a +5 dB relaxation to the above levels in locations comprising of windows as a means of ventilation, which is in line with BS 8233:2014.

The above criteria is in agreement with our initial consultation for the site to the north-east with the South Norfolk Environmental and Health department, where assessing in accordance BS 8233:2014 was considered acceptable. As the first assessment has not been assessed in line with ProPG, this is the only addition, in this case. This should be considered acceptable, as it is considered a standard approach.



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Figures 4 to 5 below identify the predicted site-wide noise levels in the context of key internal amenity benchmarking criteria, as set out in BS 8233 for the daytime 16-hour (07:00 to 23:00) ground floor and night-time eight hour (23:00 to 07:00) first floor levels.

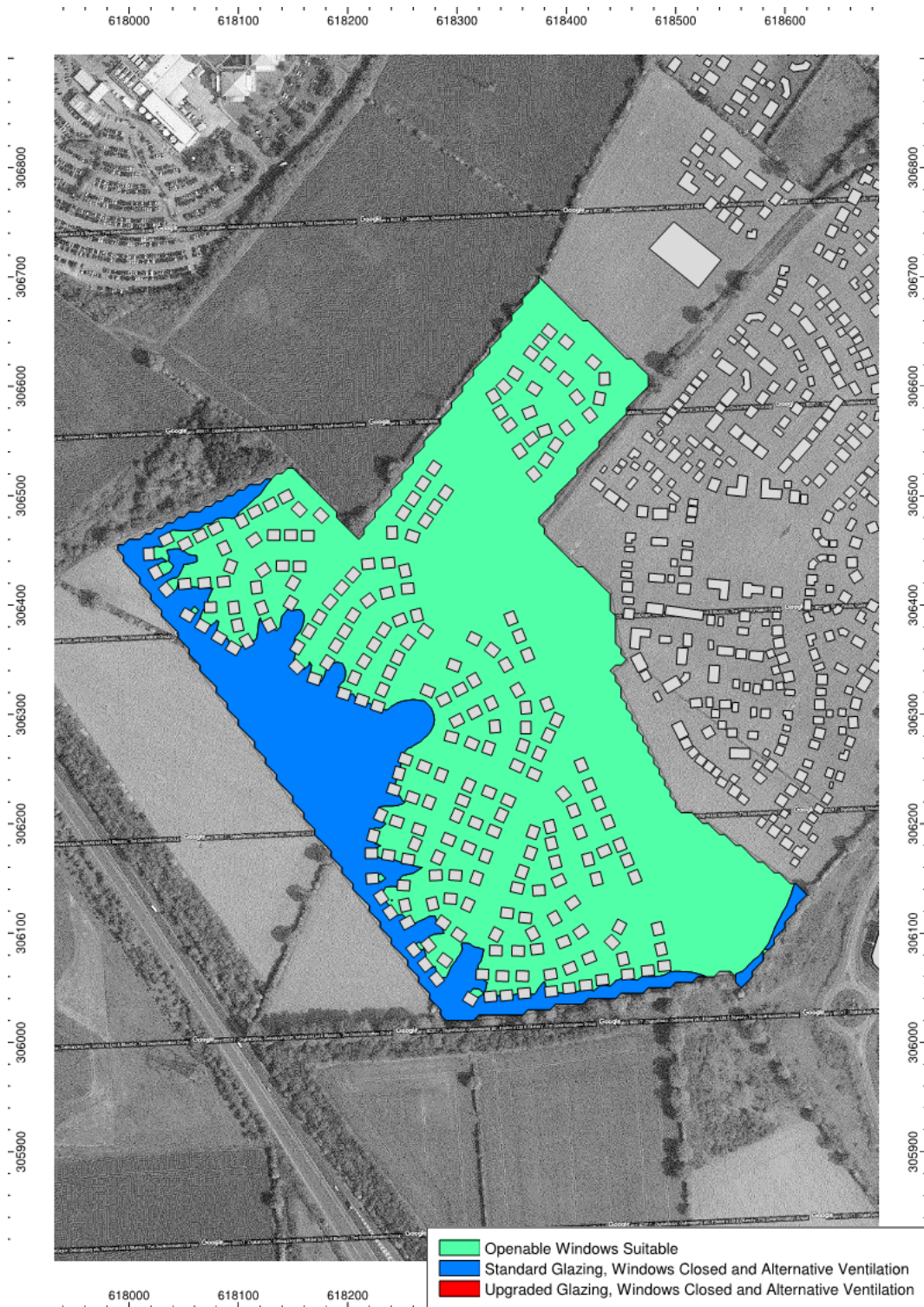


Figure 4: Daytime BS8233 Internal Amenity Constraints (Ground Floor)



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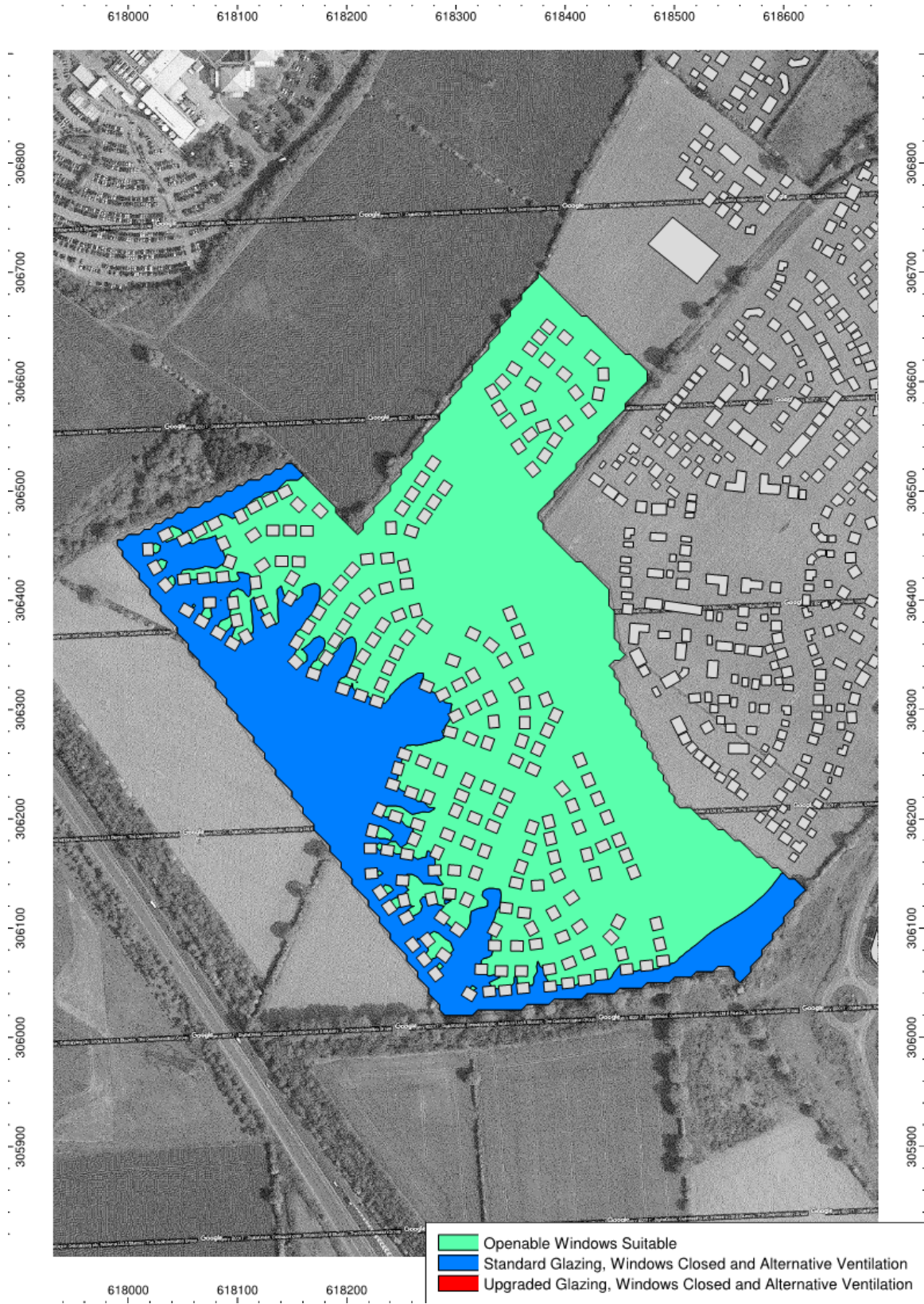


Figure 5: Night-time BS8233 Internal Amenity Constraints (First Floor)



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## 4.2 External Amenity Noise Levels

BS 8233: 2014 states that; 'for traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB  $L_{Aeq,T}$  with an upper guideline value of 55 dB  $L_{Aeq,T}$ '.

Figure 6 identifies the site-wide noise levels in the context of the guidance contained within BS 8233 for external amenity areas. The contours show noise levels at 1.5 metres above ground and show compliance, marginal noise compliance and definitive non-compliance.

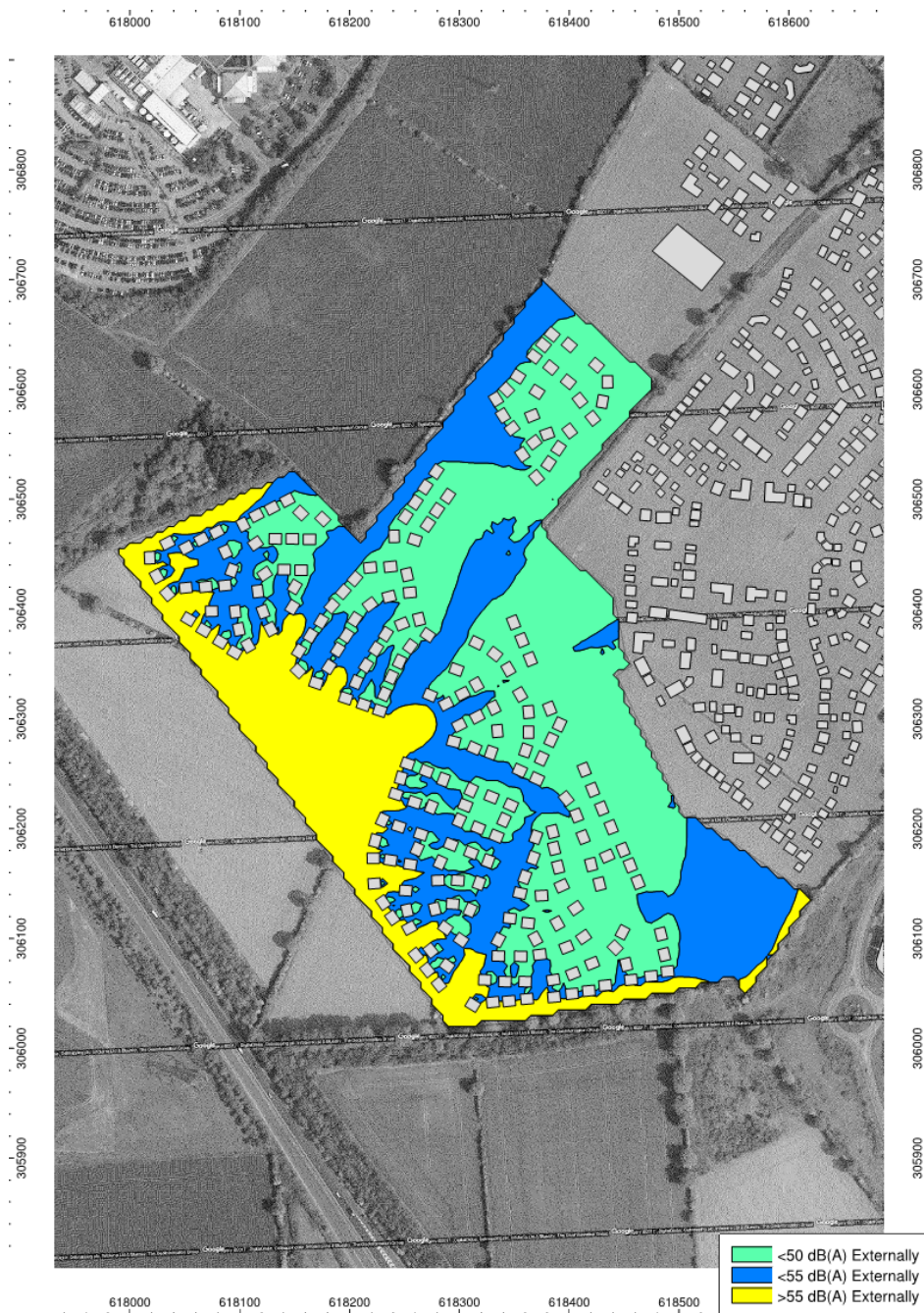


Figure 6: Daytime BS8233 External Amenity Constraints (Ground Floor)





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From inspection of Figure 6, it can be concluded that majority of the proposed development site would be expected to comply with the guideline values for external amenity spaces (<55 dBA). Areas fronting onto the A47 have been identified as subject to noise levels exceeding the guideline values. Bearing this in mind, every dwelling assumed in this exercise has been predicted to comprise an area that is subject to acceptable noise levels (<55 dBA) for external amenity spaces. For dwellings fronting onto the A47, locating private gardens along the opposite façade is suggested, in order to effectively utilize the screening of road traffic noise from the A47, provided by the dwellings. It should be noted, that any other structures, such as private garden fences, will further reduce the noise levels.

In addition, it had been identified that whilst any public space fronting onto the A47 will be subject to levels exceeding the guidelines for external amenity spaces, there are alternative areas near the north-eastern boundary of the site which comply with these guidelines and which the residents can use and.

### 4.3 Mitigation Options

As may be seen with reference to Figures 4 and 5 above, the assessment has shown that with the assumed typical masterplan layout, majority of the development area is subject to noise levels where standard thermal façade treatments and openable windows as a form of ventilation will be permissible. However, it has been identified that areas closer to the A47 are subject to noise levels where standard thermal façade treatments and an alternative ventilation strategy (typically a whole house mechanical system that does not require open windows or trickle vents) will need to be introduced. This affects primarily fronting dwellings facing the A47, along with a number of dwellings behind, as identified in Figure 4 and 5 above.

In order to reduce site-wide noise levels to allow for a ventilation system based on open windows only, our assessment has considered the introduction of an eight metre high noise barrier along the boundary of the site facing the A47. It should be noted that this barrier guarantees that all habitable rooms will be subject to noise levels allowing the use of openable windows as a means of ventilation.

The topography of the site has been identified as unfavourable, given the presence of a subtle dip in the middle of the south-western perimeter of this site and an elevated nature of the A47 south-east from the site. Whilst an eight metre height is not required along the entire length of the proposed barrier, it should be noted that this height provides enough attenuation in all areas, including the mentioned dip. It is proposed that should a barrier or embankment be considered to be a feasible mitigation option in this instance, emphasis should be given to the topography of the site in relation to the A47, which should feed into the design of the barrier. The barrier could be a bund or a fence or a combination of both.

Another option could include the introduction of a barrier or embankment along the A47, outside of the site's area. Whilst a potentially lower barrier height would be necessary, it is understood that this option might not be feasible, given it is outside of the red line boundary.

Figure 7 below shows the predicted mitigated site-wide noise levels in the context of key internal amenity benchmarking criteria, as set out in BS 8233 for the worst case night-time eight hour first floor (23:00 to 07:00) noise levels, considering the proposed 8 metre barrier (identified in red).



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Figure 7: Night-time BS8233 Internal Amenity Constraints (First Floor) – Mitigated site using 8 metre barrier



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Using the built-form of the development can be a very efficient form of reducing site-wide noise levels behind the first row of dwellings. The downside to this is that the building envelopes of the fronting dwellings will need to be appropriately mitigated, including alternative ventilation strategy as discussed. In this instance, given the requirements for a noise barrier in order to mitigate noise levels, it is proposed that introducing high density housing along the south-west site frontage to provide screening is the most appropriate option instead. These dwellings would indeed have to comprise alternative means of ventilation and ideally consider orienting habitable rooms along north-eastern façades, away from the A47. When considering the location of private gardens associated with the fronting dwellings, it is suggested that these are located away from the A47, making effective use of the screening provided by the dwellings.

## 5 Conclusion

MLM Consulting Engineers Ltd has been commissioned by Barrat Davies Wilson Homes (Eastern Counties), to assess noise constraints at the proposed residential development at Cringleford, Norfolk.

This desktop assessment was based on re-using our historic noise data and updating our previous noise model for an adjacent site, located directly to the north-east. The assessment provides an Initial Noise Risk Assessment for the site and has been carried out in accordance with Stage 1 of ProPG: Professional Practice Guidance on Planning & Noise. The assessment also presents predictions of site-wide noise levels, assuming a typical masterplan layout of residential dwellings.

The aim of this Technical Note is to provide predictions of current site-wide noise levels and associated outline advice on good acoustic design options, in order for the LPA to consider the site area to be permitted for residential use, when considering the Local Plan.

It has been identified that whilst small areas of the site are subject to relatively high noise levels, mitigation options are available in order to provide acceptable internal noise levels, and the site should therefore be considered acceptable for residential use.

It has been identified that acceptable noise levels can be achieved in external amenity spaces, with only a small area fronting onto the A47 exceeding the guideline values.