Technical Appendix 9.4: Site suitability

1.1 Method of Assessment

1.1.1 The likely effect of noise sources within the study area at the location of the proposed residential units within the Proposed Development has been predicted using the Cadna/A suite of noise modelling software. This software utilises standard acoustic principles in conjunction with approved prediction methodologies and is an industry method for predicting and assessing the impact of noise from a variety of sources.

1.1.2 The noise model considers the baseline and future 'with development' 2023 traffic flows (including background traffic growth in proximity to the Site) within the study area, based on traffic flow data provided by the Applicant's Transport Consultant, as detailed in the Road Traffic Noise section. Traffic flows for each link under each considered scenario are presented in full in Technical Appendix 9.6.

1.1.3 Noise levels have been predicted in accordance with the principles and guidance presented within CRTN. The noise model was initially used to calculate noise levels across the existing Site to ensure that the model is an accurate reflection of real world measured noise levels. Following this, the future 'with development' traffic flows were modelled to predict the noise levels at each façade of the proposed development as discussed in the following section.

1.1.4 Noise measurements were undertaken to quantify the noise produced by the safeguarded wharf, Riverside Wharf as described in Technical Appendix 9.2: Baseline Noise Survey. This wharf was the only safeguarded wharf that was considered in the assessment, due to its proximity to the application site and because it will not be screened from the Pavilions in Plot A. The noise levels were quantified and applied to the prediction model to determine the effect on the proposed development as discussed in the following section.

1.1.5 Plant noise from the adjacent industrial site Stone Foundries was also measured as it was identified as an existing source that could possibly affect the application site. The measured noise levels from this plant were also quantified and applied to the prediction model as discussed in the following section.

1.1.6 The Site was assumed to comprise acoustically reflecting '50% hard ground'. All buildings were assumed as acoustically reflecting. The model was set to consider one-order of reflection and to assume light downwind propagation in all directions. This is considered to represent a typical worst case in terms of noise propagation from the roads within the study area.

1.1.7 Outline façade glazing/cladding sound insulation specifications and ventilation strategies have been developed for each façade of the Development in relation to achieving the guideline internal noise levels in BS 8233:2014.

1.1.8 Site suitability for residential development is assessed by considering whether the BS 8233:2014 internal noise levels can be achieved in all proposed residential dwellings.

1.2 Calibration of Noise Sources

1.2.1 The following noise sources were identified as the dominant noise sources affecting the application site:

- Plant Noise from the industrial facility, Stone Foundries, adjacent to the eastern boundary of the application site;
- Operational Noise from Riverside Wharf, safeguarded wharf to the northeast of the application site; and
- Anchor and Hope Lane to the west of the application site.

1.2.2 Measurements were undertaken to quantify noise levels at each of these sources as described in Technical Appendix 9.2: Baseline Noise Survey.

1.2.3 All noise sources were applied to the 3D model. Each noise source was calibrated as follows:

Plant Noise from the Stone Foundries

1.2.4 The noise source was modelled in CadnaA as a point source with similar location and distances in terms of distance from the building façade and from the ground. The sound power level of the source was then adjusted until the sound pressure level predicted at a receiver placed in the 3D model matched the measured data. This receiver position was placed at a similar location within the 3D model as the measurement position. Figure 1 demonstrates a comparison between the model and the measurement location.

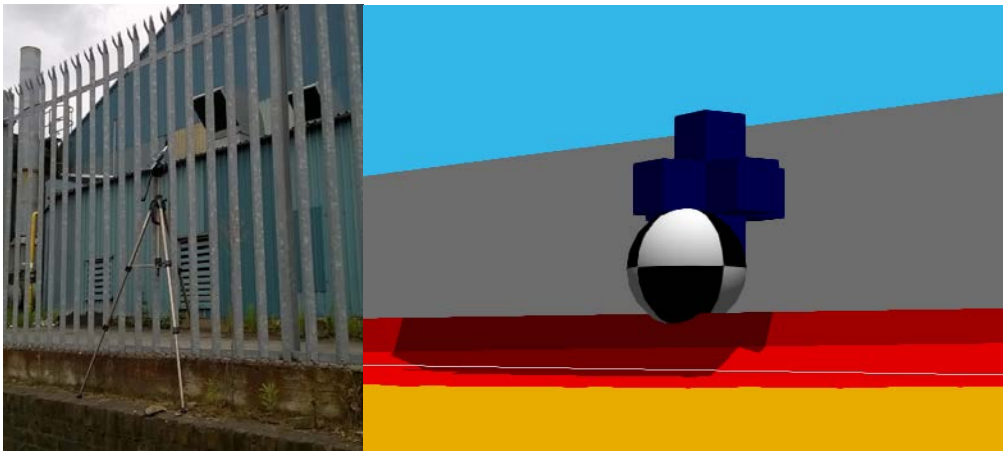

Figure 1 Comparison of model and measurement for plant source from Stone Foundries

Operational Noise from Riverside Wharf

1.2.5 Due to the landscape, a portion of the noise produced at the Riverside Wharf is screened from the application site. As a worst case scenario, the levels measured to quantify the operational noise from Riverside Wharf were modelled as a point source at the top of the structure of the asphalt plant, which is in full line-of-site from the proposed development and therefore, minimising the effects of screening. The sound power of this source was then adjusted to achieve a predicted sound pressure level measured at a similar location. Figure 2 demonstrates a comparison between the model and the measurement location.

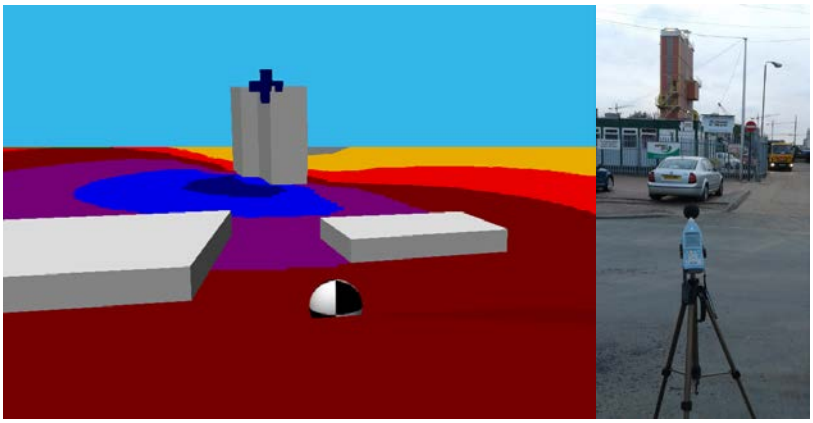

Figure 2 Comparison of model and measurement for operational noise from Riverside Wharf

Anchor and Hope Lane

The road traffic data provided in Technical Appendix 9.5: Road Traffic Data was input within the CadnaA model. First, the current baseline scenario flow data were modelled and the noise levels were predicted. These noise levels were then verified with measurements undertaken at location LT2 (as per Technical Appendix 9.2). Once the flow data was verified, the flow data for the future with development and cumulative effects was modelled. This scenario was then used for within the 3D model for the site suitability assessment.

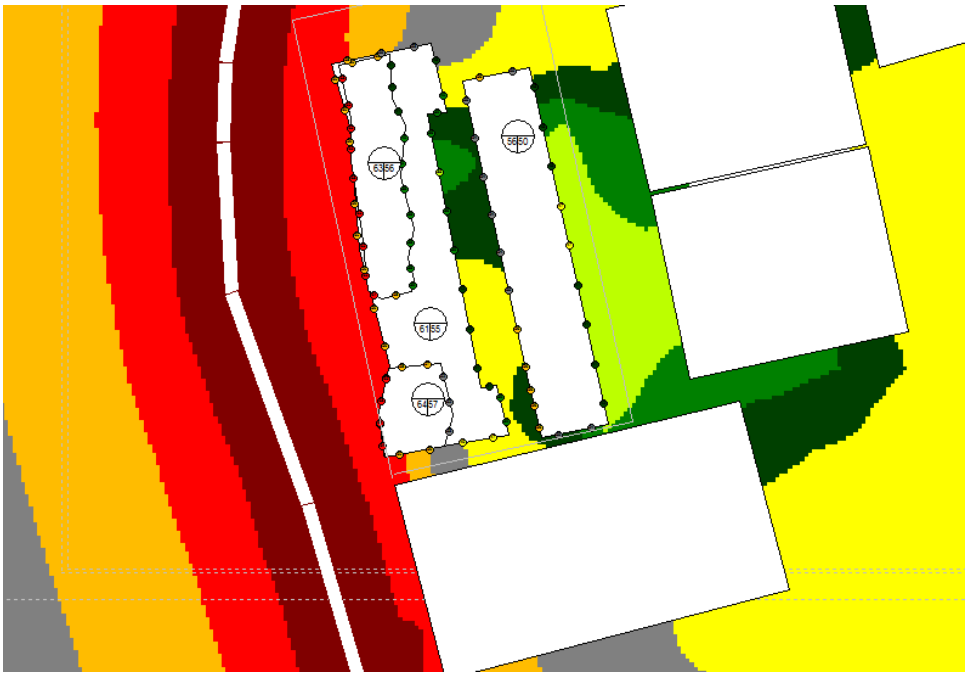

Figure 3 3D Model plan view showing Anchor and Hope Lane adjacent to Plot B

1.3 Assessment of Likely Effects

1.3.1 For internal ambient noise levels for dwellings, BS 8233 recommends a limit of 35 dBL_{Aeq} during daytime hours (07:00-23:00) for living rooms and bedrooms and a limit of 30 dBL_{Aeq} during night-time hours (23:00-07:00) for bedrooms.

1.3.2 For the purpose of this assessment, the night-time noise levels are used because the night-time noise levels represent the worst case. Mitigation required to achieve the night time noise criteria will, by default, also achieve the daytime noise level criteria.

1.4 Noise Model

1.4.1 Figure 1 to Figure 6 show the results of the noise model in 3D views and plan view of the proposed development as affected by surrounding noise sources.

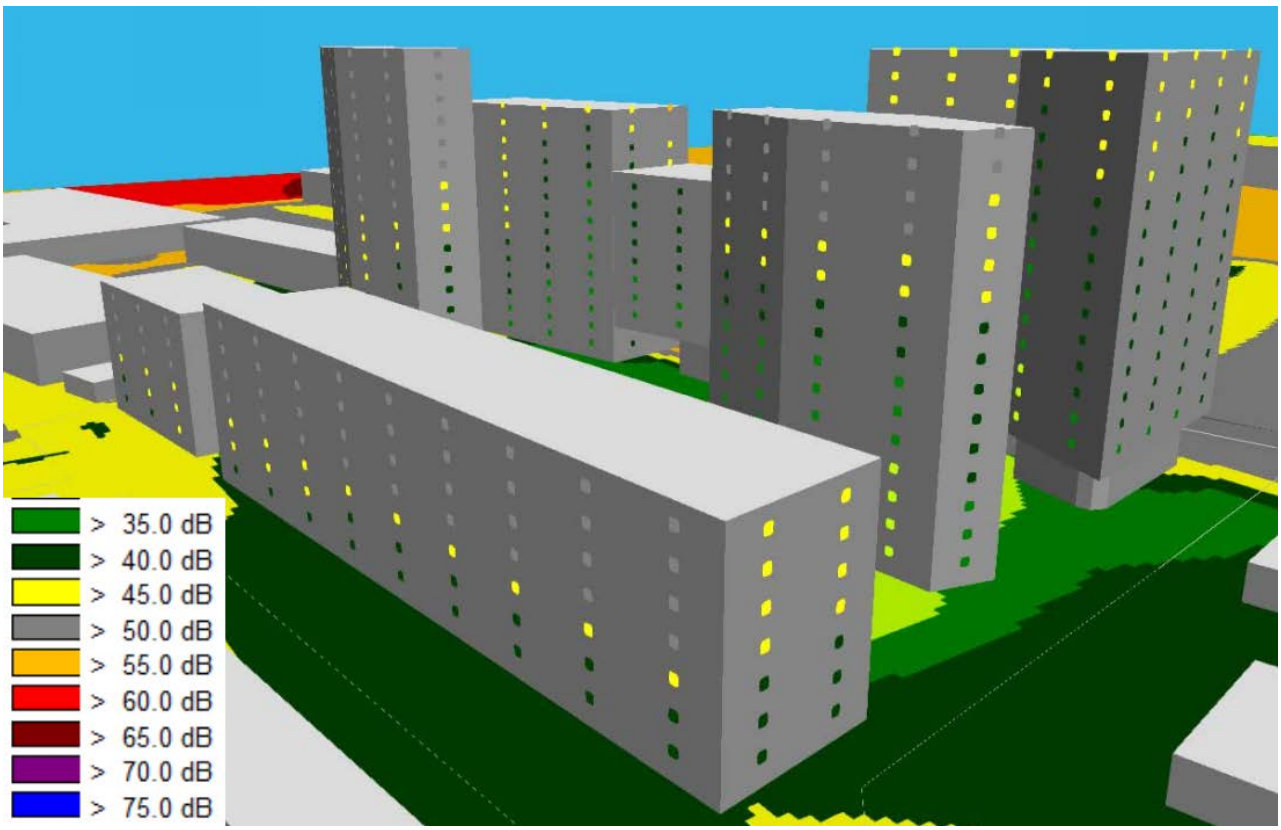

Figure 2 View of plot A of the proposed development from the southwest in CadnaA®

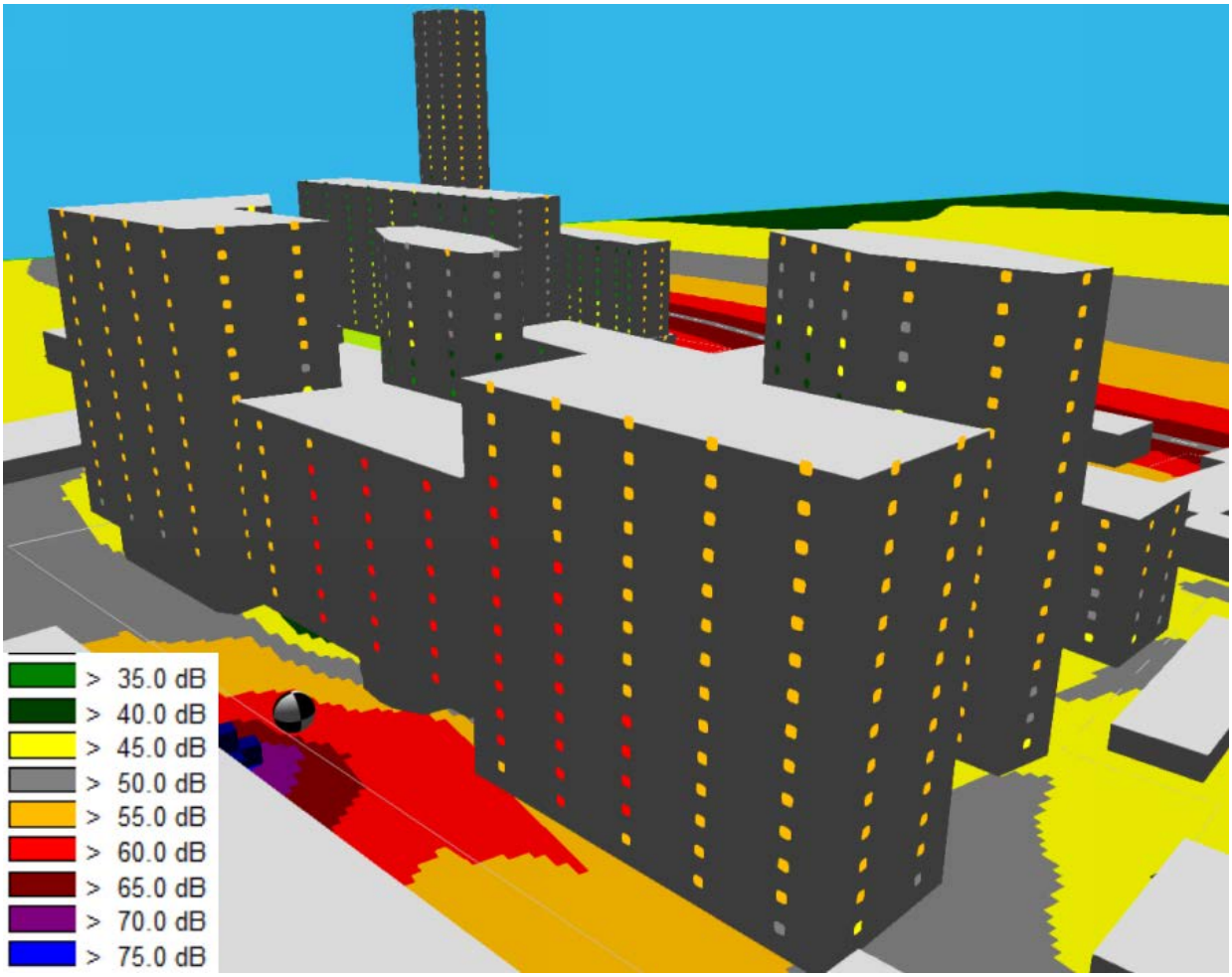

Figure 3 View of plot A of the proposed development from the northeast in CadnaA®

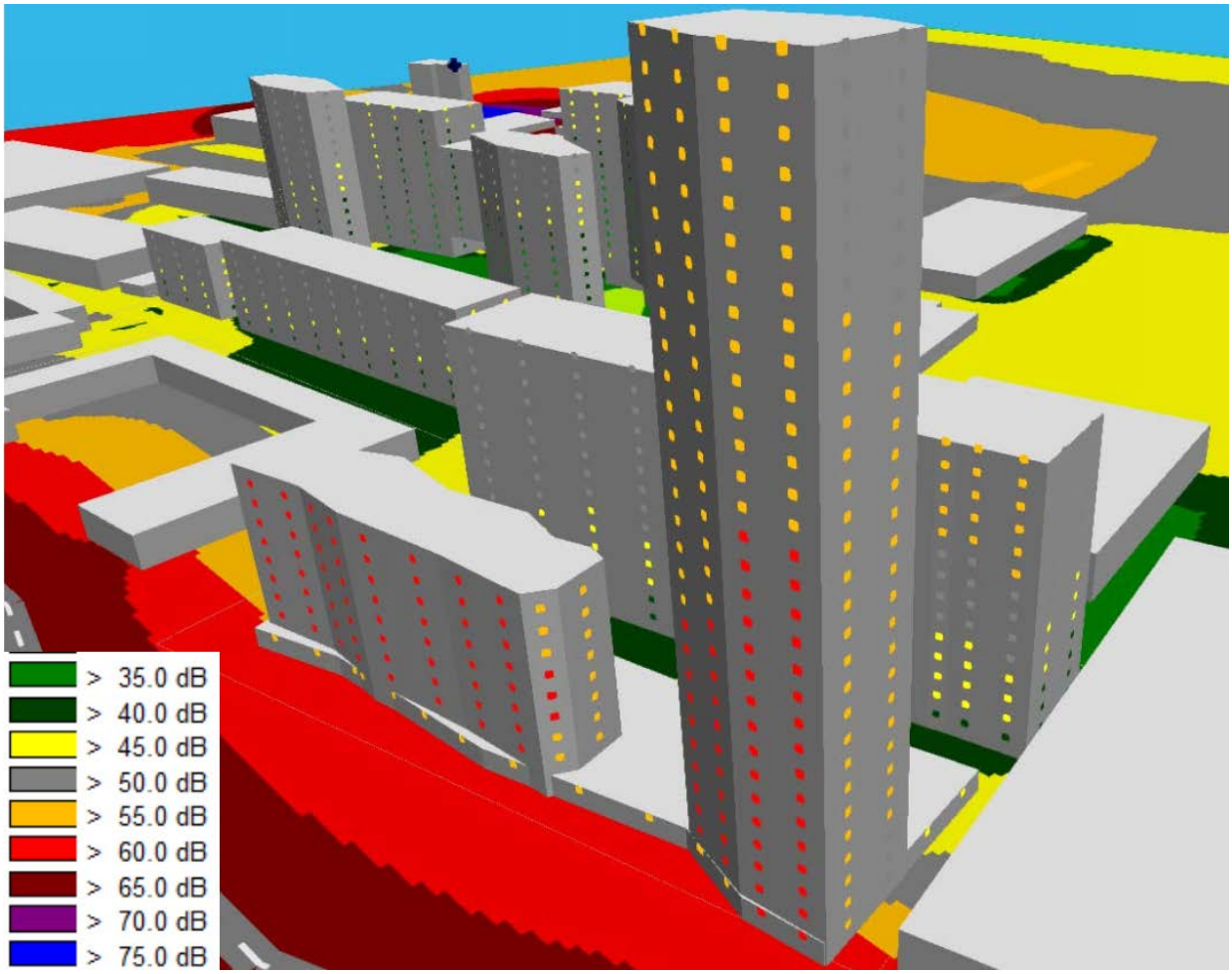

Figure 3 View of plot B of the proposed development from the southwest in CadnaA®

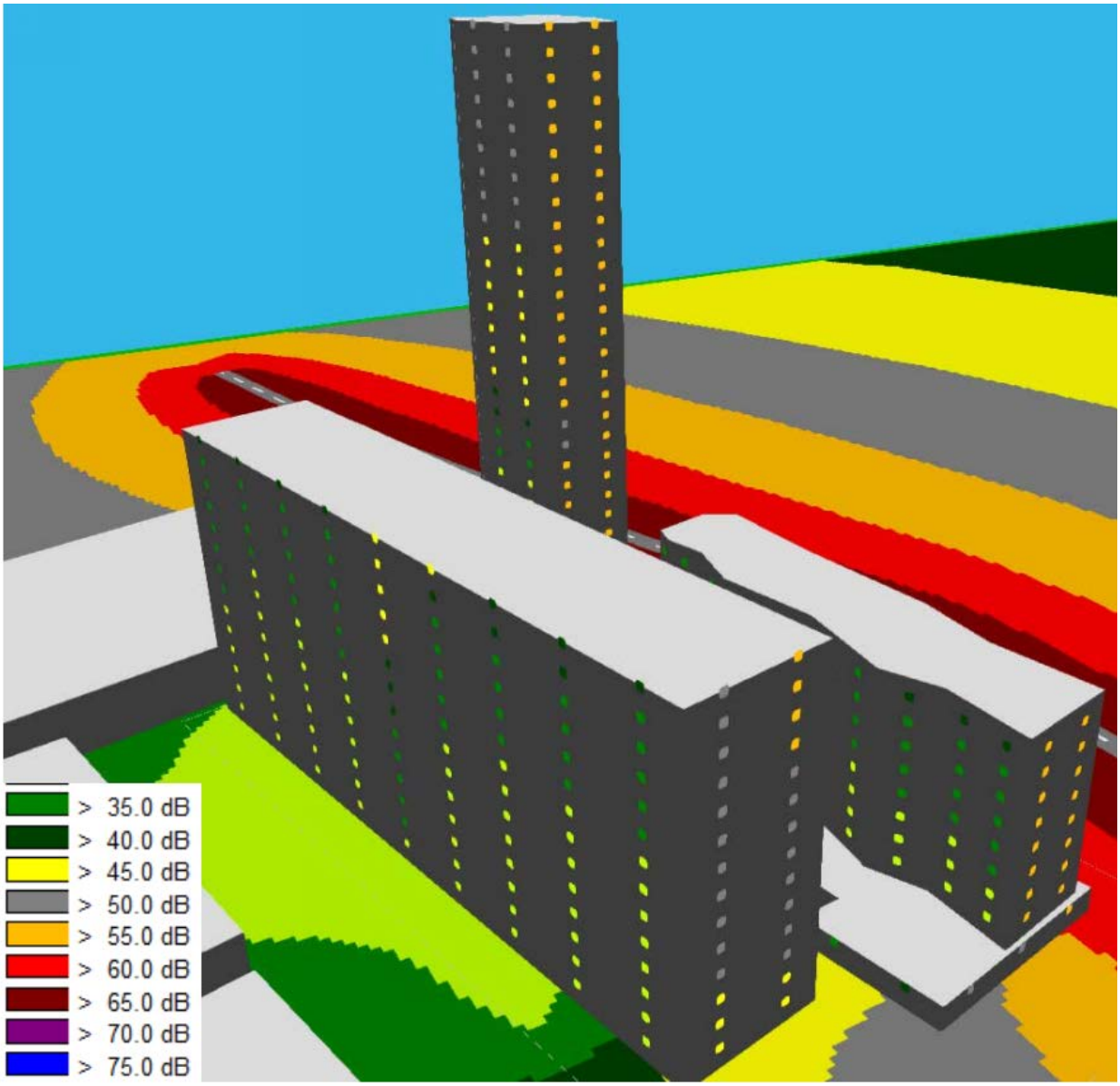

Figure 4 View of plot B of the proposed development from the northeast in CadnaA®

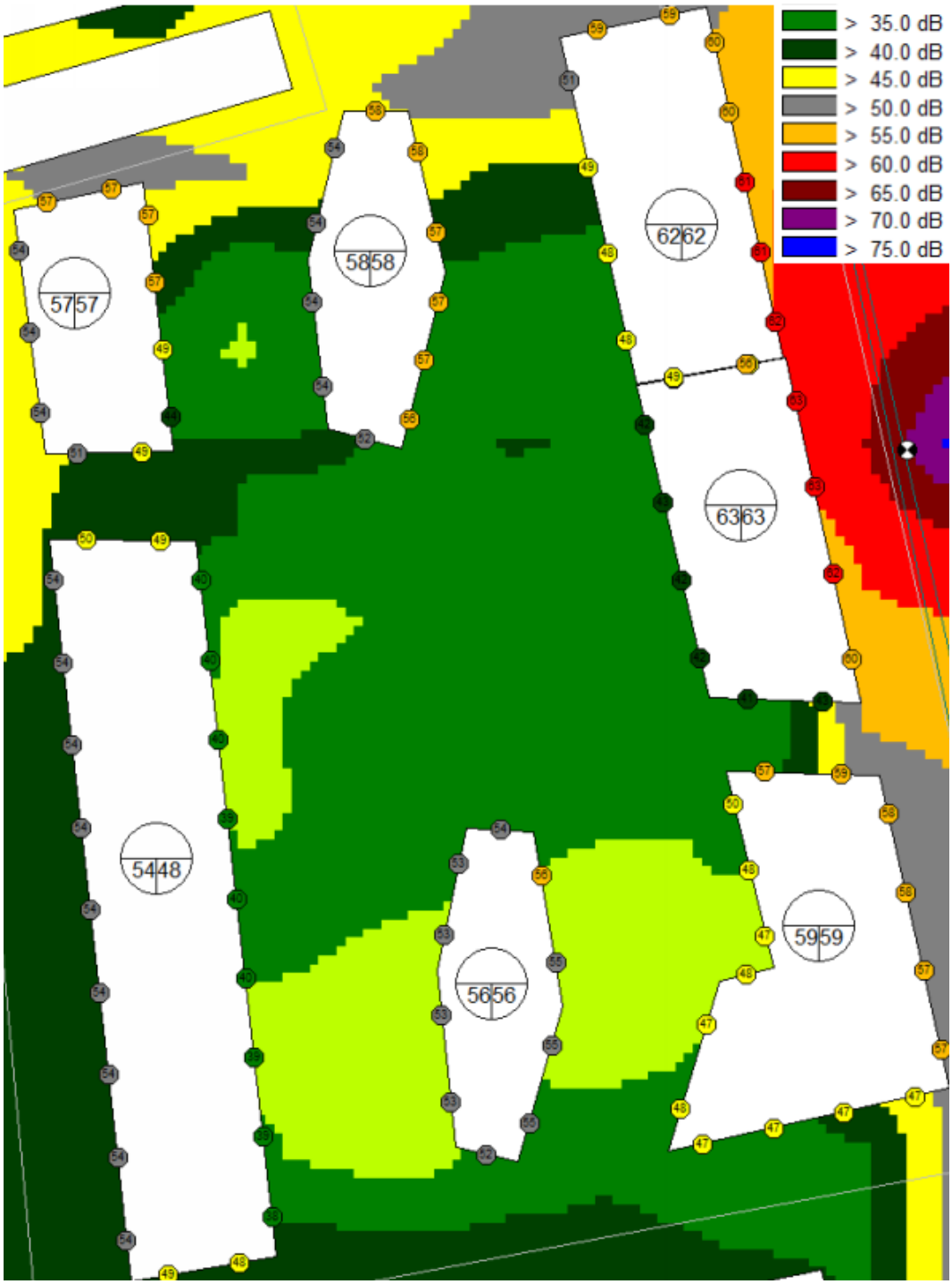

Figure 5 Plan view of plot A of proposed development in CadnaA®

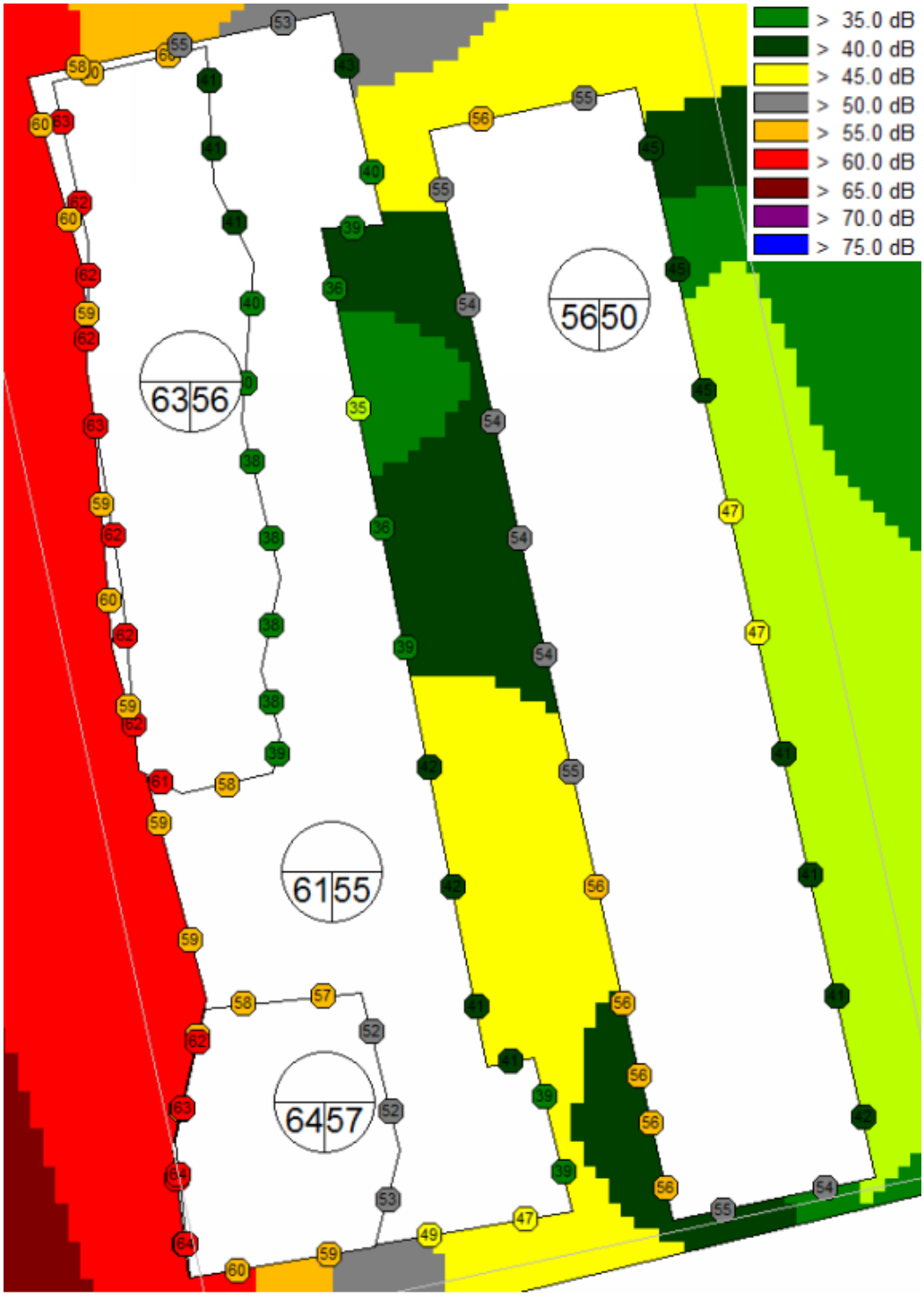

Figure 6 Plan view of plot B of proposed development in CadnaA®

1.5 Mitigation

1.5.1 In order to achieve the required level of sound reduction for each facade, the ventilation strategy, glazing and cladding have been designed to achieve the appropriate minimum performance standard.

1.5.2 Detailed calculations have not been undertaken at this stage, but Table 2 outlines the potential ventilation strategy and glazing performance which could be implemented to achieve the required level of attenuation.

Table 2 Recommendations for sound insulation performance of building façade

Required reduction in noise level (outside to inside)	Typical glazing sound insulation performance $R_w + C_{tr}$	Potential ventilation strategy
<20	27 dB	Standard trickle vents
20 - 30	27 - 35 dB	Acoustic trickle vents
30 - 40	35 - 45 dB	Mechanical whole-house ventilation

1.5.3 In general, cladding and any internal wall linings will be designed to ensure the glazing sound insulation is not undermined, This typically requires a sound insulation performance at least 10 dB better than the glazing sound insulation performance. The exact buildups and products to be used to meet the acoustic criteria will be developed during the detailed design.

1.5.4 Please note that Table 2 presents the minimum levels of sound insulation required. The developer intends to provide enhanced façades and glazing for areas overlooking the industrial facilities to provide a greater level of protection from environmental noise.

1.5.5 Based on the results of the modelling, and the enhancements to protect the proposed development from industrial noise sources, Figures 7 and 8 show the proposed glazing sound insulation performance and ventilation strategy at each façade of the proposed development.

Figure 7 Sound Insulation Requirements for Plot A of Application Site

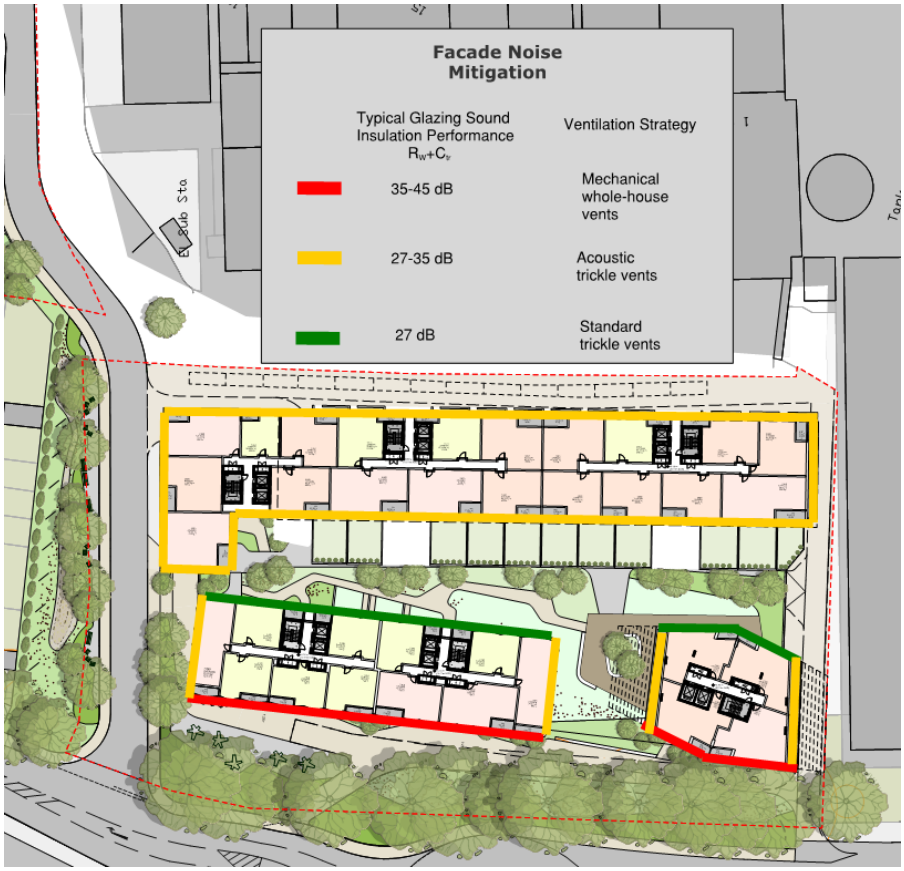

Figure 8 Sound Insulation Requirements for Plot B of Application Site

1.5.6 By comparing the façade strategy shown in Figure 7 and Figure 8 with the mitigation measures in Table 2, it can be seen that it should be possible to achieve the internal ambient noise level criteria using a combination of glazing upgrades and attenuated ventilation in all areas. However, the specific mitigation measures to be adopted will require detailed design during the next stage and may change as a result of other design factors.

1.5.7 Based on the predicted internal noise levels with the adoption of appropriate glazing upgrades and/or suitable ventilation strategies, the site is considered to be **suitable** for the proposed development and no significant adverse noise impact is predicted as a result of environmental noise break-in.