

Design Note

To: Stephen Vigar (RBC)

Cc: Alan Hughes, Angel Chen, Keith Brooks, Michael Dillon, Mark Wilkinson, Dean Jordan.

From: Tom Hills, Associate

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Project: Station Hill, Phase 1 – Plots E & F

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Station Hill, Phase 1 – Plots E & F.

Noise intrusion.

Planning Conditions.

As part of the granted planning permission for Station Hill, Reading, two planning conditions have been issued specifically relating to noise intrusion within residential dwellings of Plots E and F, as follows:

Planning Condition 42 (Application No. 151426) – Plot E.

“No commencement (other than demolition) shall take place for any building within a Plot containing residential dwellings before details of a sound attenuation scheme has been submitted to and approved in writing by the Local Planning Authority. The scheme shall be informed by an assessment of the current noise environment and seek to ensure that noise levels within residential properties within a relevant Plot do not exceed 30-40 dB $L_{Aeq,16hr}$ for living rooms within residential properties within a relevant Plot during the day, and 30-35 dB $L_{Aeq,8hr}$ and 45 dB L_{Amax} for bedrooms within residential properties within a relevant Plot at night (in accordance with BS 8233: 2014). Such measures as may be approved shall be implemented within a relevant Plot and a sample unit tested before any of the approved residential units within a relevant Plot are occupied. The scheme shall thereafter be retained for the lifetime of the residential uses hereby permitted.”

Planning Condition 42 (Application No. 151427) – Plot F.

“No Plot containing residential units shall be first Occupied before details of a sound attenuation scheme has been submitted to and approved in writing by the Local Planning Authority. The scheme shall be informed by an assessment of the current noise environment and seek to ensure that noise levels within residential properties within a relevant Plot do not exceed 30-40 dB $L_{Aeq,16hr}$ for living rooms within residential properties within a relevant Plot during the day, and 30-35 dB $L_{Aeq,8hr}$ and 45 dB L_{Amax} for bedrooms within residential properties within a relevant Plot at night (in accordance with BS 8233: 1999). Such measures as may be approved shall be implemented within a relevant Plot and a sample unit tested before any of the approved residential units within a relevant Plot are occupied. The scheme shall thereafter be retained for the lifetime of the residential uses hereby permitted.”

On the basis of the above Planning Conditions, internal noise levels within residential properties of Plot E and F shall be designed to achieve the criteria of BS 8233: 2014 and detailed overleaf in Table 1.

In addition, external noise levels within gardens / balconies shall be designed to achieve the criteria of the WHO Guidelines for Community Noise as detailed in Table 1 below.

Location	Daytime (0700 to 2300)	Night-Time (2300 to 0700)
Living room	35 dB $L_{Aeq,16hr}$	-
Bedroom	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$ & 45 dB $L_{Amax,T}$
External amenity	≤ 55 dB $L_{Aeq,16hr}$	-

Table 1: External noise intrusion criteria.

Environmental noise survey.

An acoustic survey has been carried out at the proposed development site in September 2018 to establish the prevailing noise conditions local to the site. The survey included the installation of three noise monitors across a fourteen-day period, in addition to attended noise measurements during the daytime and night-time.

Noise prediction model.

The results of the environmental noise survey have been used to predict the external noise levels at each façade of Plots E and F using Cadna/A environmental noise prediction and mapping software, which implements the environmental noise propagation prediction methodology set out in ISO 9613-2.

The noise model of the site was constructed and validated against the measured baseline conditions before modelling the proposed development in order to demonstrate how the proposed built form will influence noise conditions across the site. Figures 1 to 4 attached display a three-dimensional representation of the noise map prediction for each of the development façades.

Building envelope.

On the basis of the results of the noise model, calculations have been undertaken to determine the sound reduction requirements of the building envelope to ensure achievement of the internal noise criteria detailed in Table 1 above.

The calculations indicate that the non-glazed element on all façades is required to achieve a sound reduction of 46 dB $R_w + C_{tr}$. The required acoustic performance ($R_w + C_{tr}$) of all glazed elements (windows and doors including glass, frame, seals, mullions and transoms) on each façade, as identified in Figure 5, is provided in Table 2 overleaf.

Façade	Minimum required $R_w + C_{tr}$ (dB)	
	Living room	Bedroom
Friar Street	31	44
Block E Courtyard South	12	26
Block E East	17	30
Block E Courtyard North	14	19
Garrard Street	33	31
Block E West	20	25
Block F West	21	28
Block F East	10	19
Garrard Street South	26	22

Table 2: Minimum required $R_w + C_{tr}$ of glazed elements.

Examples of primary glazing configurations capable of achieving the minimum required $R_w + C_{tr}$ detailed above are provided below.

- $R_w + C_{tr}$ 25 dB – 4mm glass, 16mm air gap, 4mm glass.
- $R_w + C_{tr}$ 29 dB – 10mm glass, 16mm air gap, 4mm glass.
- $R_w + C_{tr}$ 31 dB – 10mm glass, 16mm air gap, 6mm glass.
- $R_w + C_{tr}$ 33 dB – 6mm glass, 16mm air gap, 8.8mm acoustic glass.
- $R_w + C_{tr}$ 44 dB – 10.8mm acoustic glass, 24mm air gap, 14.8mm acoustic glass.

It should be noted that the above glazing configurations are for illustrative purposes only. Final glazing configurations will be selected by the applicant that comply with the above acoustic requirements while considering all requirements (i.e. thermal, aesthetic etc.).

It should be noted that the above is based on a Stage 3 level design and further calculations will be required to be undertaken to determine refined octave band glazing requirements during subsequent design phases.

External amenity.

No balconies are proposed as part of the proposed development; however external resident's terraces are proposed at ground, first, sixth and eleventh floor level. Figure 6 attached shows the predicted noise levels 1.5m above each of the proposed roof terraces.

It can be seen from Figure 6 that the natural screening offered by the built form of the Proposed Development is sufficient to ensure that all external terraces are less than 50 dB(A) and therefore well below the recommended WHO limit of 55 dB(A) during the daytime.

Conclusions.

On the basis of the guidance provided above, adoption of the sound attenuation scheme will enable achievement of the internal noise levels stated within BS 8233: 2014 and therefore the requirements of Planning Condition 42 for both applications.

Final details of the sound attenuation scheme will be submitted to RBC for approval pursuant to the planning conditions at the appropriate time.

In addition, it is confirmed that all external resident's terraces shall achieve the recommended WHO limit for external amenity spaces during the daytime.

Building services plant.

Planning Conditions.

As part of the granted planning permission for Station Hill, Reading, two planning conditions have been issued specifically relating to noise from building services plant associated with Plots E and F, as follows:

Planning Condition 48 (Application No. 151426) – Plot E.

“No installation of any noise generating plant on (a) relevant building(s) within a Plot shall take place before a noise assessment of equipment has been first submitted to and approved in writing by the Local Planning Authority. The assessment shall be carried out in accordance with BS 4142: 2014 methodology. The predicted rating level, $L_{A,T,r}$ (specific sound level plus any adjustment for the characteristic of the sound) as measured at a point 1 metre external to sensitive façades at the nearest noise sensitive premises (i.e. the nearest residential property window) and shall be at least 10 dB below the existing background sound level, $LA_{90,T}$, when all plant / equipment (or any part of it) is in operation. The plant shall thereafter only be installed and maintained to the same approved standard.

Planning Condition 48 (Application No. 151427) – Plot F.

“No Plot shall be first Occupied until details of any noise-generating plant in relation to the building(s) in the relevant Plot has / have been first submitted to and approved in writing by the Local Planning Authority. The details shall include an acoustic assessment which shall demonstrate that the plant noise rating level will not cause an increase in the existing background noise level when measured / predicted in accordance with the methodology in BS 4142: 1997. For the avoidance of doubt, the noise levels shall be determined at the nearest noise-sensitive premises (i.e. the nearest residential property window). The plant shall thereafter only be installed and operated as approved in accordance with the assessment.”

Building services plant noise emission limits.

On the basis of the results of the acoustic survey undertaken at the proposed development in September 2018 and in accordance with the requirements of Planning Conditions 48, noise due to building services plant serving the proposed development shall achieve the following limits. These are based on the lowest background noise levels measured.

Period	Lowest prevailing background noise level $LA_{90,T}$ dB	Noise Emission Limit Calculation $L_{A,T,r}$ dB
Daytime (0700 to 2300)	43	33
Night-Time (2300 to 0700)	36	26

Table 3: Building services noise emission limits.

Each of the limits stated above are the combined operational noise levels of plant at 1m from the nearest noise sensitive façade.

Whilst finalised details of the proposed plant are not known at this stage, all plant shall be designed, selected and provided with suitable attenuation and / or screening methods so that the criteria detailed in Table 3 are achieved with due consideration to the characteristic / tonality of the proposed plant.

Conclusions.

On the basis of the guidance provided above, building services plant shall be designed to achieve the requirements of Planning Condition 48 for both applications.

Final details of the building services plant and acoustic mitigation will be submitted to RBC for approval pursuant to the planning conditions at the appropriate time.

Noise within building – sound insulation.

Environmental health comments.

As part of the feedback received from Reading Borough Council, the following comments were made:

“A residents’ gym, other D2 uses, A3 (restaurant), A4 (drinking establishment) and A5 (hot food takeaway) uses are proposed directly adjacent or below residential flats. The noise assessment submitted with the application must demonstrate that both airborne and structure-borne noise will not harm the residential amenity of these dwellings.”

Residential to commercial separation.

Consideration has been given to the construction of the separating floors and walls to provide an enhanced level of sound insulation over the minimum requirements of Approved Document E in order to minimise noise transference between the ground floor commercial units and adjacent residential apartments.

All separating constructions (walls and floors) between all commercial units and residential apartments will provide a minimum 15 dB improvement than the Approved Document E sound insulation requirements (i.e. $D_{nT,w} + C_{tr}$ 60 dB) in order to ensure that operation of the commercial units does not impact on occupants of the residential apartments. In addition, any columns that pass through the commercial units shall be lined using an independent wall lining system in order to prevent structure-borne noise transfer.

In order to prevent impact transmission from users of the gym transmitting into the structure and impacting on the residential dwellings, a floating floor shall be provided within the gym. The floating floor will ensure that structure-borne noise does not impact on the residential apartments.

Conclusions.

On the basis of the guidance provided above, the separating structure between the commercial units and residential dwellings shall be designed such that airborne and structure-borne noise will not impact on occupants of the residential apartments.

Noise – delivery hours / waste collection.

Environmental health comments.

Feedback provided by Reading Borough Council stated the following:

“Condition 44 of 151426 limited deliveries to between 0800-2200 Mon-Sat and 1000-1800 Sundays / Bank Holidays.

Proposed measures for controlling noise disturbance from commercial deliveries and waste collections to nearby residential properties (within permitted hours) should be submitted at application stage as this may have implications for the layout or design of the buildings.”

Noise from commercial deliveries / waste collections.

It is proposed that all servicing and delivery for the residential element of the development is to be accessed from Garrard Street and the retail element will be undertaken from a combination of Friar Street and Garrard Street. We understand that a total of 25 daily delivery and servicing trips are expected to be generated by the residential units (12 daily trips accessed from Garrard Street) and retail / community floor space (13 daily trips access from a combination of Friar Street and Garrard Street).

Data provided within the *Transport & Waste Matters* report indicates that at present 60 delivery vehicles were observed to utilise Friar Street and 26 delivery vehicles were observed to utilise Garrard Street over a 24-hour period. With regards to road traffic noise, in accordance with CRTN a 3 dB increase in noise level due to road traffic would require a 100% increase in traffic flow. It is clear that the



total number of delivery vehicles will only increase by approximately 50% on Garrard Street and 20% on Friar Street due to the proposed development and therefore the noise impact associated with increased traffic movements on these roads will be negligible.

Moreover, the daytime $L_{Aeq,16hr}$ associated with the additional deliveries per day will be very low and therefore well below the internal noise criteria of BS 8233. The L_{Amax} noise criteria of BS 8233 at dwellings is in relation to sleep disturbance, which is not applicable to deliveries as these will be carried out during daytime hours as limited by Planning Condition 44.

Conclusions.

On the basis of the guidance provided above, the noise impact associated with the increased number of commercial deliveries and waste collections will be negligible. In addition, it is noted that deliveries are limited to daytime hours only and therefore the criterion of BS 8233 in relation to sleep disturbance is not applicable.

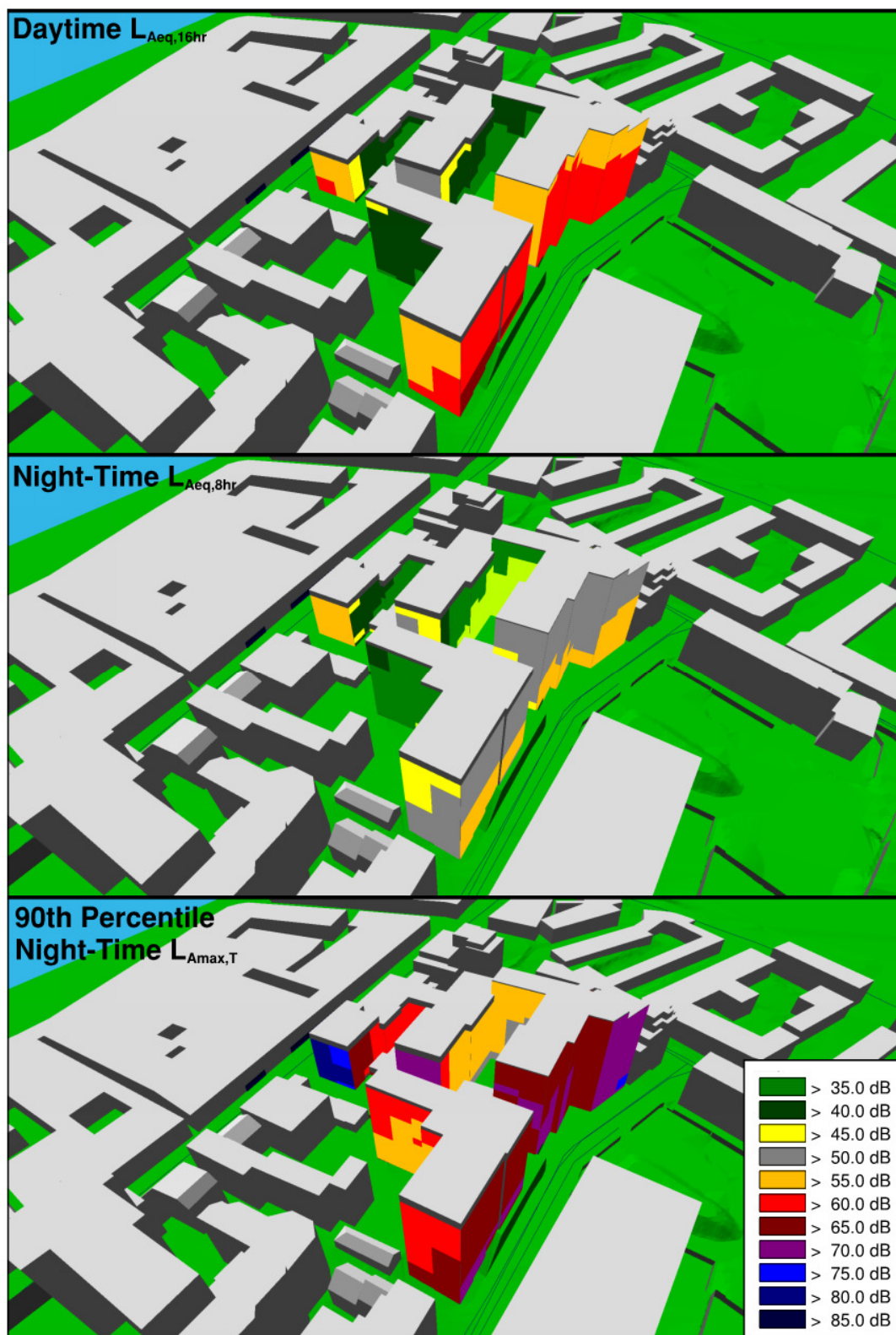


Figure 1: 3D noise map of proposed development from the north east (design development ongoing).

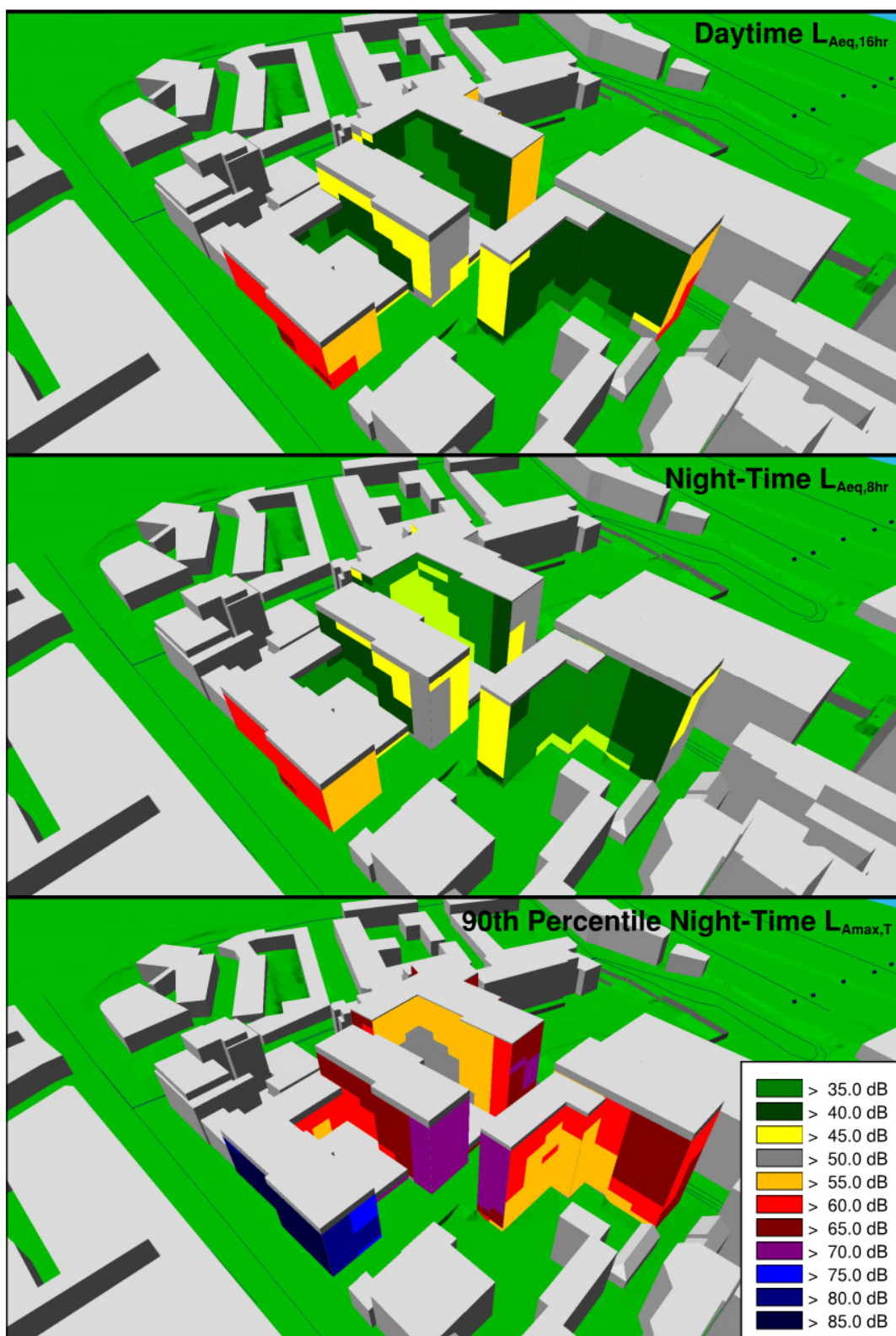


Figure 2: 3D noise map of proposed development from the south east (design development ongoing).

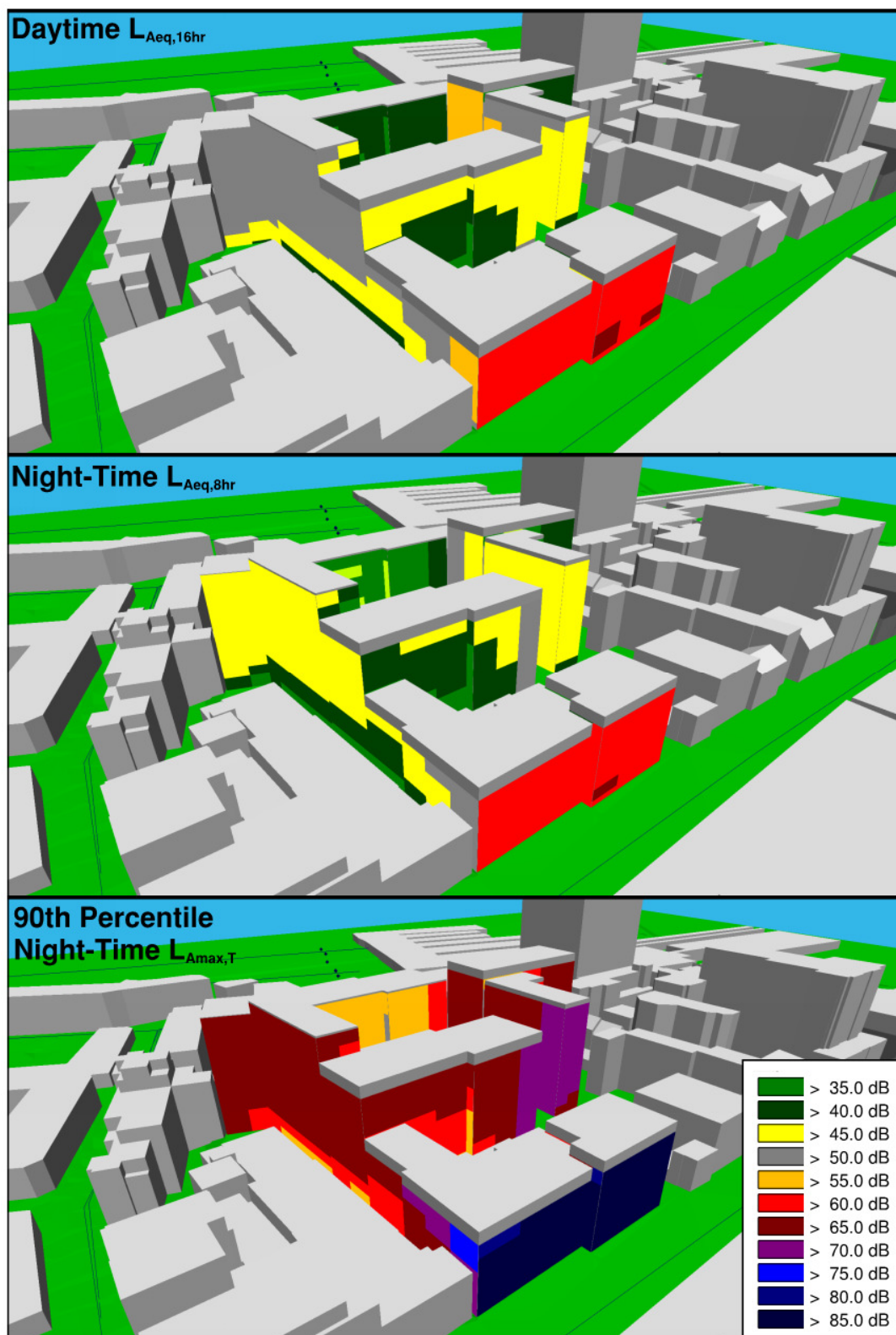


Figure 3: 3D noise map of proposed development from the south west (design development ongoing).

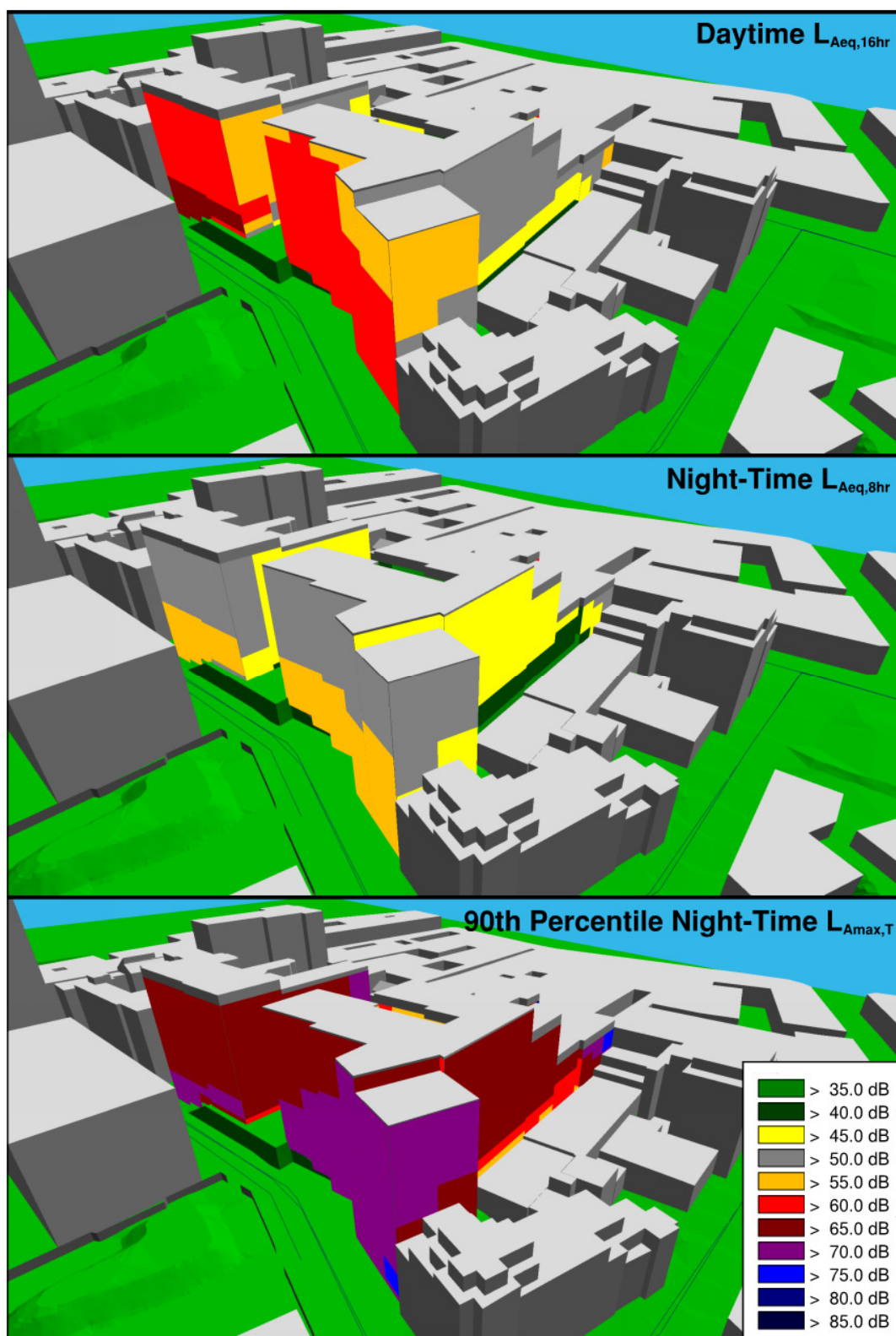


Figure 4: 3D noise map of proposed development from the north west (design development ongoing).

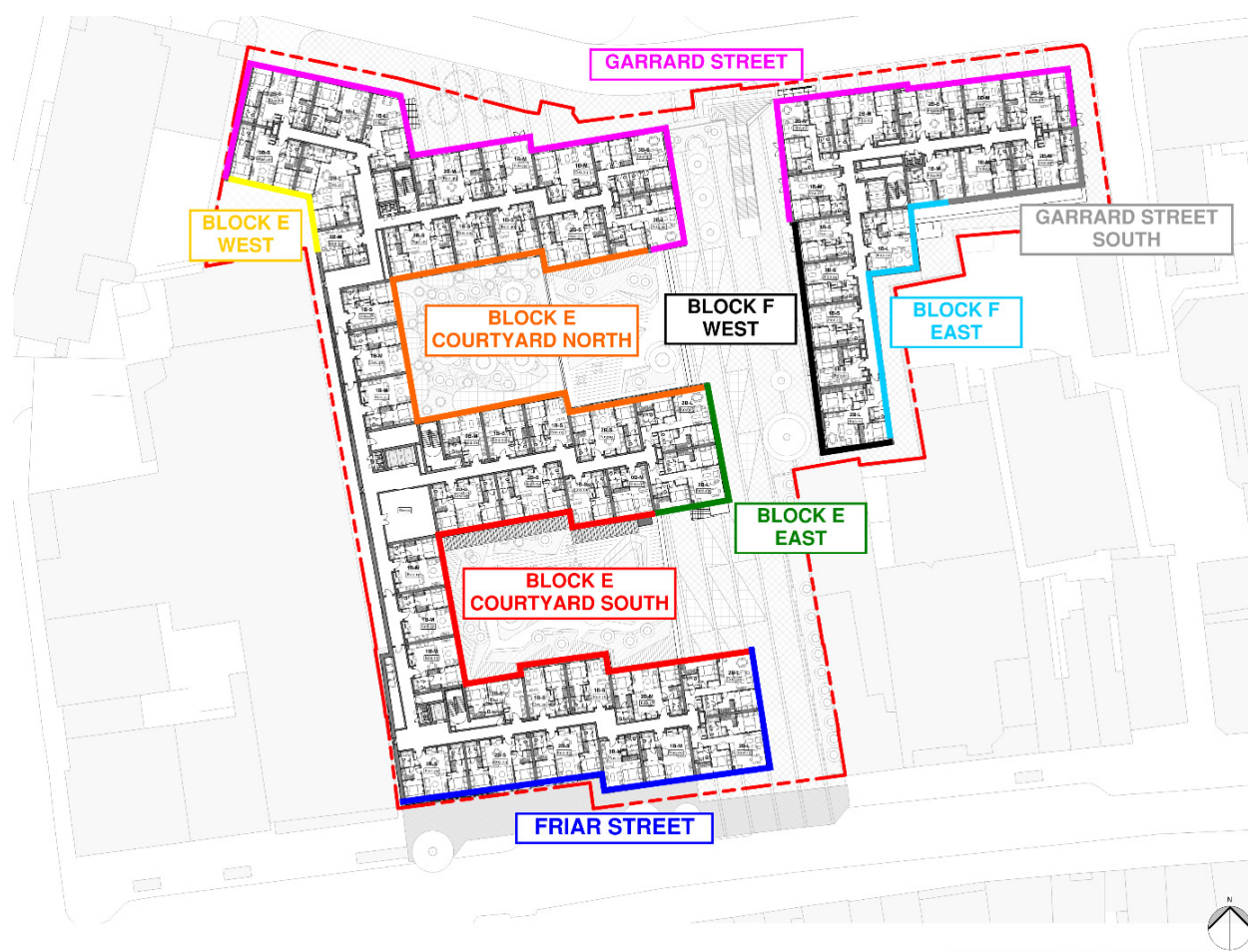


Figure 5: Façade locations (design development ongoing).



Figure 6: Predicted $L_{Aeq,16hr}$ daytime noise level at 1.5m above each external residential terrace.