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Environmental Associates

Noise Assessment

Proposed Residential Development, Nanny Marr Road, Darfield

Sept 2019

Partner Construction

Noise Assessment

Proposed Residential Development, Nanny Marr Road, Darfield

Client: **Partner Construction**

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1 INTRODUCTION

1.1 Background

1.1.1 NJD Environmental Associates Ltd was instructed by Partner Construction to undertake a noise assessment in support of the development of 41 no. residential units at a site to the east of Nanny Marr Road, Darfield. The site location is provided below in Drawing 1.

Drawing 1: Site Location

1.1.2 A noise report has been prepared in support of the planning application; with measurements taken of noise sources impacting the development, calculations performed using noise modelling software, and the results interpreted in accordance with the relevant standards.

2 ASSESSMENT METHODOLOGY

2.1 BS8233:2014 and WHO 1999 Guidance Levels

2.1.1 BS8233:2014 *'Guidance on sound insulation and noise reduction for buildings'* provides guidance for the control of noise in and around buildings. It applies to the design of new buildings, or refurbished buildings undergoing a change of use.

2.1.2 BS8233 refers to the World Health Organisation research and recommendations when defining acceptable and upper guidance noise levels within gardens during the day, and within habitable rooms in dwellings during the day and night-time periods as follows:

Table 1: Summary of BS8233 guidance noise levels

Activity	Location	0700 to 2300h	2300 to 0700h
Resting	Living room	35dB LAeq,16h	-
Relaxing	Gardens	55dB LAeq,16h	-
Dining	Dining room	40dB LAeq,16h	-
Sleeping (daytime resting)	Bedroom	35dB LAeq,16h	30dB LAeq,8h 45dB LAmax

2.1.3 The above levels have been adopted for the purpose of this assessment.

3 NOISE SURVEY

3.1 Introduction

3.1.1 On the 3rd to 4th December 2018, noise measurements were taken in the vicinity of the development site, in order to quantify noise from surrounding sources.

3.1.2 Measurements were taken using two Acoem 01dB Fusion sound level meters. The Class 1 instruments logged 1/3 octave levels throughout the measurements, in addition to audio recordings to aid subsequent analysis. The instruments were calibrated before and after the measurements to a reference level of 94dB, with no notable drift observed.

3.2 Monitoring Locations

3.2.1 Measurements were taken at the locations shown in Drawing 2 below.

Drawing 2: Noise monitoring locations

3.2.2 The monitoring locations were as follows:

- **ML1**: An area of grass and trees directly adjacent the south of the development site, approximately 5m from Barnsley Road.

  The measurement took place during the following dates and times:
  - 1330h on the 3rd to 0700h on the 4th December 2018.

- **ML2**: Elevated above an existing wall to the west the development site, approximately 5m from Nanny Marr Road.

  The measurement took place during the following dates and times:
  - 1330h on the 3rd to 0700h on the 4th December 2018.

3.2.3 Road traffic noise was found to be dominant at all locations, with noise from pedestrians also noticeable at both locations.

3.2.4 Weather conditions were dry and calm throughout the duration of the survey.

3.3 Existing Noise Levels

3.3.1 The noise levels from the identified monitoring locations are summarised in Tables 2 and 3 below.

Table 2: Summary of measured daytime noise levels (dBA)				
Location	**Daytime LAeq 0700 to 2300h**	**Daytime LA90 0700 to 2300h**	**Daytime LA10 0700 to 2300h**	**Daytime LAmax 0700 to 2300h**
ML1	55	46	57	82
ML2	68	52	72	81

Table 3: Summary of measured night-time noise levels (dBA)				
Location	**Night-time LAeq 2300 to 0700h**	**Night-time LA90 2300 to 0700h**	**Night-time LA10 2300 to 0700h**	**Night-time LAmax 2300 to 0700h**
ML1	45	35	47	71
ML2	59	36	61	82

3.3.2 Full details of the measurements are presented in Appendix 1.

4 CADNAA NOISE MODELS

4.1 Input Data

4.1.1 Topographic data of the site and surrounding land has been incorporated into the noise models, with buildings and roads positioned to reflect the proposed conditions.

4.1.2 For the purpose of these calculations, the ground absorption has been set to G=0.8 (which represents acoustically soft and absorptive ground around garden areas), with buildings and roads set to G=0 (acoustically hard and reflective), with two orders of reflection considered.

4.1.3 The models have been programmed to assess scenarios based on the daytime (0700 to 2300h) and night-time (2300 to 0700h) periods, with receiver and grid calculation heights set at 1.5m and 4m respectively.

4.1.4 Point and line sources have been set using the road traffic data measured from the monitoring locations.

4.2 Noise Model Results

4.2.1 The results from each scenario assessed are shown in Figures 1 to 3.

4.2.2 Table 4 summarises the highest levels expected at receptor locations nearest the roads to the south and west of the site during the respective periods.

Table 4: Summary of highest modelled noise levels

Elevation	dB LAeq,16h	dB LAeq,8h	dB LAmax
Nanny Marr Road (north-west of site)	61	54	76
Nanny Marr Road (west of site)	50	45	69
Barnsley Road (south of site)	48	44	70

4.2.3 The modelled noise levels have been used with reference to the required standards to determine appropriate mitigation, as discussed in the following Sections.

5 BS8233 ASSESSMENT OF NOISE LEVELS IN GARDENS, LIVING ROOMS AND BEDROOMS

5.1 Gardens During the Daytime

5.1.1 In accordance with BS8233, the upper guidance noise level in gardens is 55dB LAeq,16h. Using the levels calculated in Figure 1, without mitigation, some gardens towards the western and southern perimeters of the site would exceed the upper guidance level.

5.1.2 The noise models have therefore been calculated with acoustic fencing at the perimeters of the affected plots.

5.1.3 The contours from Figure 1 demonstrate that with 1.8m high close boarded boundary fences at the positions shown, the external guidance levels in gardens can be achieved across the site.

5.2 Living Rooms and Bedrooms During the Daytime

5.2.1 During the daytime period, BS8233 recommends a guidance level of 35dB LAeq,16h inside living room and bedroom areas.

5.2.2 WHO (1999) indicates that with a window partially open for ventilation, approximately 15dB of attenuation from external noise sources should be achieved.

5.2.3 On this basis, some living rooms and bedrooms on the perimeters of the development facing onto the surrounding roads will not achieve internal guidance levels without the provision of some form of acoustic ventilation.

5.2.4 Appropriate mitigation measures are discussed in Section 6.

5.3 Bedrooms During the Night-time

5.3.1 During the night-time period, BS8233 recommends a guidance level of 30dB LAeq,8h and 45dB LAmax inside bedroom areas.

5.3.2 As per the daytime requirements, some bedrooms on the perimeter of the development overlooking the roads will not achieve the guidance levels with windows open.

5.3.3 Appropriate mitigation measures are discussed in Section 6.

6 MITIGATION MEASURES TO ACHIEVE INTERNAL GUIDANCE LEVELS

6.1.1 The receiving rooms subject to the highest potential impact are generally those with the greatest ratio of window area to room volume, in closest proximity to the dominant noise sources surrounding the development.

6.1.2 The rooms most exposed to noise ingress during the daytime and night-time periods were found to be those overlooking Nanny Marr Road in the north-west of the site.

6.1.3 Based on the results from Figures 1 to 3 (summarised in Table 4), the level of attenuation required to achieve the internal guidance levels on each elevation has been calculated.

6.1.4 As part of the assessment, reference has been made to appropriate literature to provide an estimate of the typical noise attenuation that could be expected from existing and retained building elements.

6.1.5 BS8233 and BS EN12354-3 provide equations for performing detailed noise break-in for composite facades and individual façade elements such as ventilators. The equations are shown below.

$$L_2 = L_{1,in} - R + 10 \times Log\,(S/V) + 10 \times Log(T) + 11$$

$$L_2 = L_{1,in} - D_{n,e} - 10 \times Log\,(V) + 10 \times Log(T) + 21$$

6.1.6 The calculation uses dimensions of glazing and façade elements from the plots experiencing the highest noise impact in combination with the highest glazing to

internal room volume ratio.

6.1.7 With reference to Table E.2 of BS8233:1999, it could reasonably be expected that the walls of the dwellings will achieve sound insulation in the range of 45 to 50dB DnT,w.

6.1.8 Adopting the lower figure for the purpose of a robust assessment, a glazing and ventilation scheme can be recommended across each elevation to help achieve internal guidance levels.

6.1.9 Table 5 shows an example of the calculation process for bedroom 3 of Plot 1 in the north west of the site, overlooking Nanny Marr Road.

Table 5: Detailed noise break-in calculation for Bedroom 3 of Plot 1

External Noise Level	**125**	**250**	**500**	**1000**	**2000**	**Total**
Broadband + Ctr Spectrum	62	66	69	72	70	76.0
Broadband + Ctr Spectrum	62	66	69	72	70	76
Attenuation	**125**	**250**	**500**	**1000**	**2000**	**Total**
6/14/8mm	28	28	34	40	41	38
Greenwood EAR42W	33	39	39	43	50	42
Element Contribution	**125**	**250**	**500**	**1000**	**2000**	**Total**
Glazing	31	35	32	29	26	39
Ventilation	38	36	39	38	29	44
Internal Noise Level	**125**	**250**	**500**	**1000**	**2000**	**Total**
Combined	39	39	40	39	31	45

Room Volume	15.8
Glazing Area	1.4
Wall Area	4.1
R/T	0.5
Number Vents	2

6.1.10 The calculation shows that based on the measured dimensions of the receiving room and façade elements, the internal LAmax guidance level will be achieved with the following glazing and ventilation:

- 6/14/8mm double glazing
- Greenwood EAR42W through frame acoustic ventilation

6.1.11 As per the example calculation provided in Table 5 above, detailed noise break-in calculations have been performed for the most exposed noise sensitive rooms at plots across the site, with the results and recommendations for glazing and ventilation summarised in Table 6 below.

Table 6: Summary of noise break-in calculations based on worst case scenario for each elevation					
Plot	**Room**	**Floor**	**Orientation**	**Glazing**	**Vents**
Plot 1 (red line boundary)	Living	GF	Nanny Marr Road	4/12/4mm	Greenwood EAR42W
Plot 1 (red line boundary)	Bed 3	FF	Nanny Marr Road	6/14/8mm	Greenwood EAR42W
Plot 25 (red line boundary)	Living	GF	Nanny Marr Road	4/12/4mm	N/A
Plot 25 (red line boundary)	Bed 1	FF	Nanny Marr Road	4/12/4mm	Greenwood EAR42W
Plot 2 (blue line boundary)	Living	GF	Barnsley Road	4/12/4mm	N/A
Plot 2 (blue line boundary)	Bed 3	FF	Barnsley Road	4/12/4mm	Greenwood EAR42W

6.1.12 As the worst case-scenario has been assessed, the recommended glazing and ventilation will also be suitable for all other plots in those areas of the site.

6.1.13 Living rooms and bedrooms located away from the roads (i.e. to the east of the site), will experience noise levels significantly lower than those listed in Table 4, and will therefore achieve guidance noise levels with standard thermal double glazing with windows open.

7 OTHER NOISE SOURCES

7.1.1 An electricity substation is noted to the south-east of the site, adjacent Barnsley road. During the site survey, observations concluded that noise from this potential source was not audible at the boundary of the surrounding security fence.

7.1.2 As a result, no further assessment could be performed and the impact is therefore considered to be negligible.

7.1.3 It is noted that the 1.8m high close boarded boundary fence will also extend around the perimeters of Plots 24 and 25, and this will provide a physical barrier

separating the substation and nearest plots, reducing any noise from this source to a minimum.

8 ACOUSTIC DESIGN STATEMENT

8.1 Introduction

8.1.1 In accordance with the ProPG: Planning and Noise, an acoustic design statement has been prepared to supplement the noise assessment report.

8.1.2 The statement has been informed by the results presented in the previous sections of this report, and also based on the discussions, processes and limitations considered during the design of the development before submission of this planning application.

8.2 Gardens

8.2.1 Gardens, where possible, have been positioned on the screened side of the dwelling away from surrounding noise sources.

8.2.2 Attenuation provided by a 1.8m close boarded boundary fence surrounding the western and southern boundaries of the development has also been considered, with resultant noise levels shown to be below the guidance levels from BS8233 and WHO 1999.

8.3 Internal Guidance Levels

8.3.1 The ProPG recommends where it is not considered practical to achieve the internal noise level guidelines with windows open, justification should be provided to the LPA setting out the reasons for this.

8.3.2 Due to space limitations in and around the development, increasing the stand-off from the surrounding roads is not considered viable.

8.3.3 Therefore, aside from the introduction of perimeter fencing around the site as discussed for gardens, the only other viable means for reducing internal noise levels to an acceptable standard would be through either the reorientation of internal layouts (i.e. moving noise sensitive rooms away from the main noise sources) or through the use of an alternative means of ventilation.

8.3.4 Due to the proportion of plots affected, the reorientation of bedrooms would cause a significant and undue economic burden on the developer, and therefore is not considered a viable solution.

8.3.5 It is therefore recommended that the most practical solution to achieve internal guidance levels is through the reliance on some form of acoustic ventilation in noise sensitive rooms.

8.3.6 Where limiting factors exist that make achieving internal guidance levels with windows open impractical, acoustic ventilation is considered a suitable solution that meets the good acoustic design test, as per Paragraph 2.33 to 2.34 of the ProPG, which states:

"It should be noted that the acoustic performance of the building envelope will be reduced in the event windows are opened for ventilation or cooling purposes, typically reducing the insulation to no more than 10 to 15 dB(A).

Most residents value the ability to open windows at will, for a variety of reasons, and LPAs should therefore normally request that designers principally aim, through the use of good acoustic design, to achieve the internal noise level guidelines in noise-sensitive rooms with windows open. Where internal noise levels are assessed with windows closed the justification for this should be included in the ADS.

Where the LPA accepts that there is a justification that the internal target noise levels can only be practically achieved with windows closed, which may be the case in urban areas and at sites adjacent to transportation noise sources, special care must be taken to design the accommodation so that it provides good standards of acoustics, ventilation and thermal comfort without unduly compromising other aspects of the living environment.

In such circumstances, internal noise levels can be assessed with windows closed but with any façade openings used to provide "whole dwelling ventilation" in accordance with Building Regulations Approved Document F (e.g. trickle ventilators) in the open position (see Supplementary Document 2). Furthermore, in this scenario the internal LAeq target noise levels should not generally be exceeded."

8.3.7 It is felt that in this circumstance, with due consideration to the factors set out above, achieving the internal guidance levels through use of an alternative means of ventilation is a suitable solution that meets the good acoustic design test.

8.3.8 Table 7 below summarises the acoustic design recommendations:

Table 7: Glazing and ventilation requirements summary			
Location	**Glazing**	**Ventilation**	**Notes**
Bedrooms of Plots 1 and 2 overlooking Nanny Marr Road	6/14/8mm Double Glazing	Greenwood EAR42W through frame trickle vents	Glazing and acoustic vents should be properly fitted and well-sealed. Alternative ventilation such as AD-F system 4 (mechanical supply and extract with heat recovery (MVHR)) would also be suitable. If such a scheme is selected, care should be taken to ensure that noise from mechanical services does not exceed 30 dB(A) in bedrooms and living rooms, and does not exceed a limit of 35 dB(A) in kitchens when in operation.
Living Rooms of Plots 1 and 2 overlooking Nanny Marr Road, and; All other bedrooms overlooking Nanny Marr Road and Barnsley Road	4/12/4mm Double Glazing	Greenwoods EAR42W through frame trickle vents	
Gardens			
1.8m high close boarded boundary fence at the positions shown in Figures 4 and 5			

8.3.9 Figures 4 and 5 show the glazing and ventilation recommendations on a plot by plots basis.

9 CONCLUSIONS

9.1 Introduction

9.1.1 NJD Environmental Associates has undertaken a noise assessment in support of the development of 41 no. residential units at a site to the east of Nanny Marr Road, Darfield.

9.1.2 The assessment considered noise from the surrounding roads, with measurements taken of noise sources impacting the development, calculations performed using noise modelling software, and the results interpreted in accordance with the relevant standards.

9.2 BS8233 and WHO Assessment

9.2.1 The BS8233:2014 assessment found that a number of noise sensitive rooms will require double glazing and acoustic ventilation to achieve the internal guidance noise levels.

9.2.2 Noise break-in calculations have demonstrated appropriate schemes of glazing and ventilation that can be adopted, with the details summarised in Table 7 and shown on a plot by plot basis on Figure 4 and 5.

9.3 ProPG: Planning and Noise

9.3.1 The acoustic design statement concluded that based on the site context and limitations, reasonable measures have been taken to ensure the recommendations pass the good acoustic design test in accordance with the ProPG.

9.3.2 It is concluded that subject to the recommended mitigation measures being implemented, noise should not be a prohibitive factor in the determination of this planning application.

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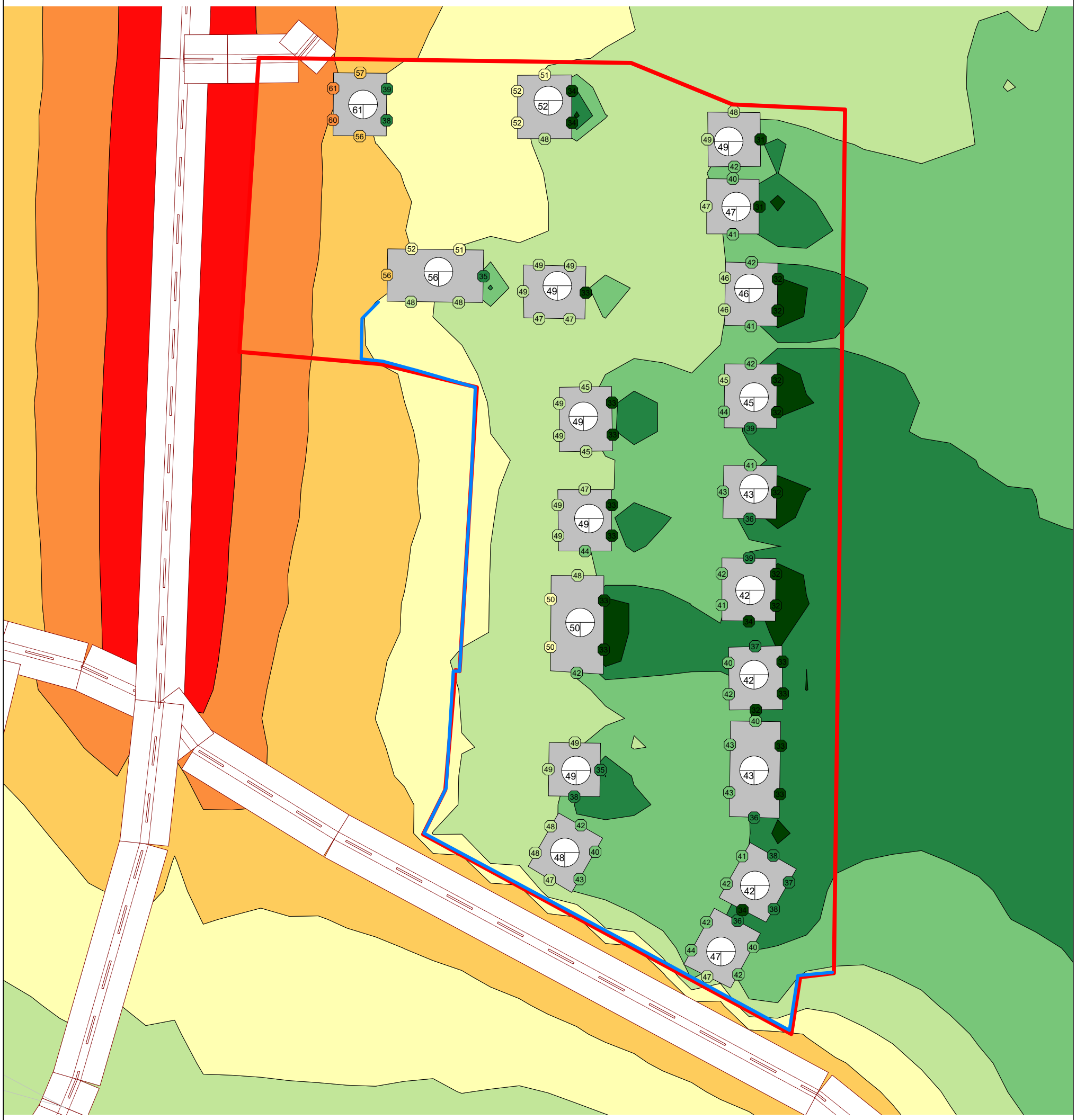
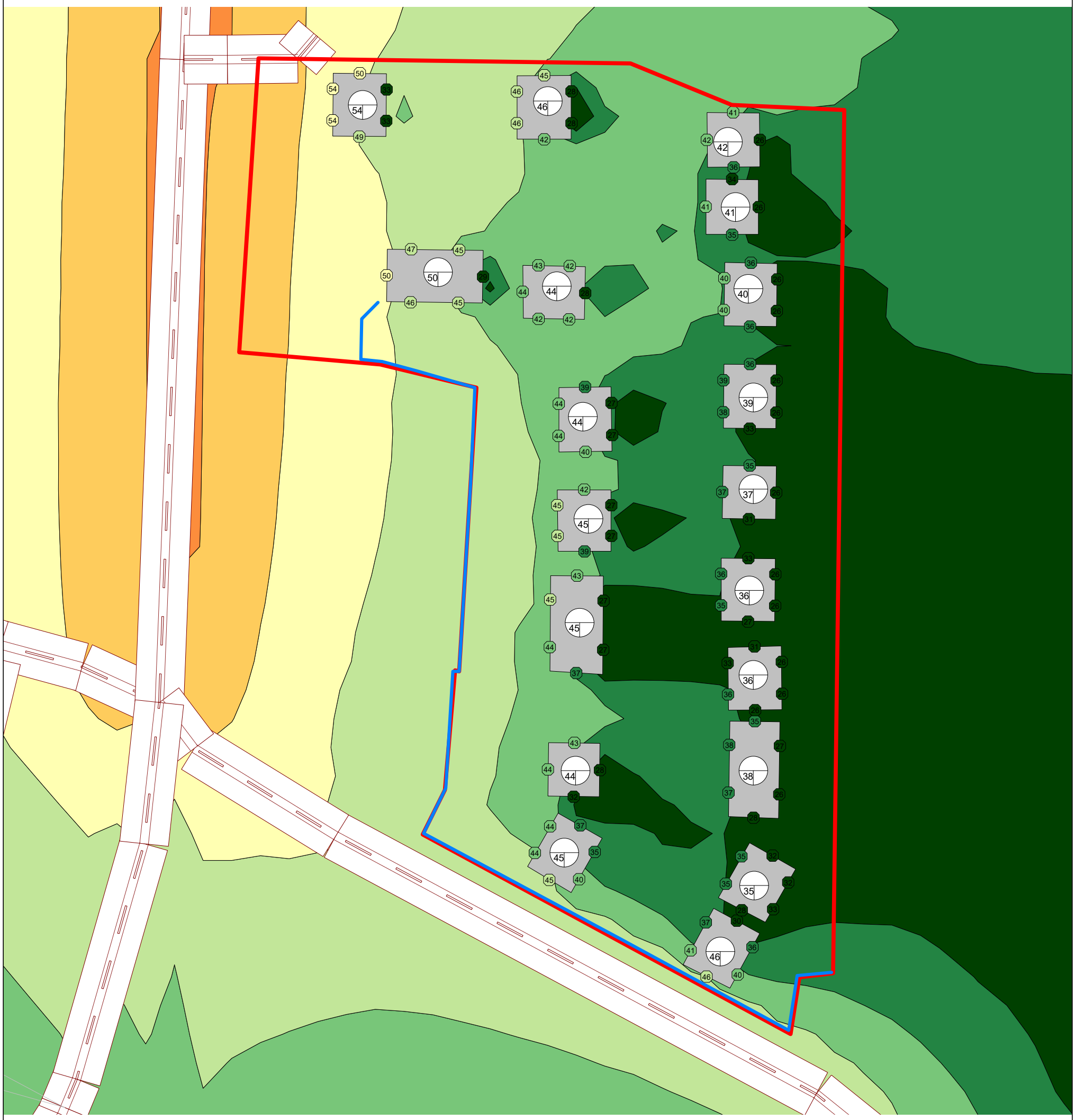
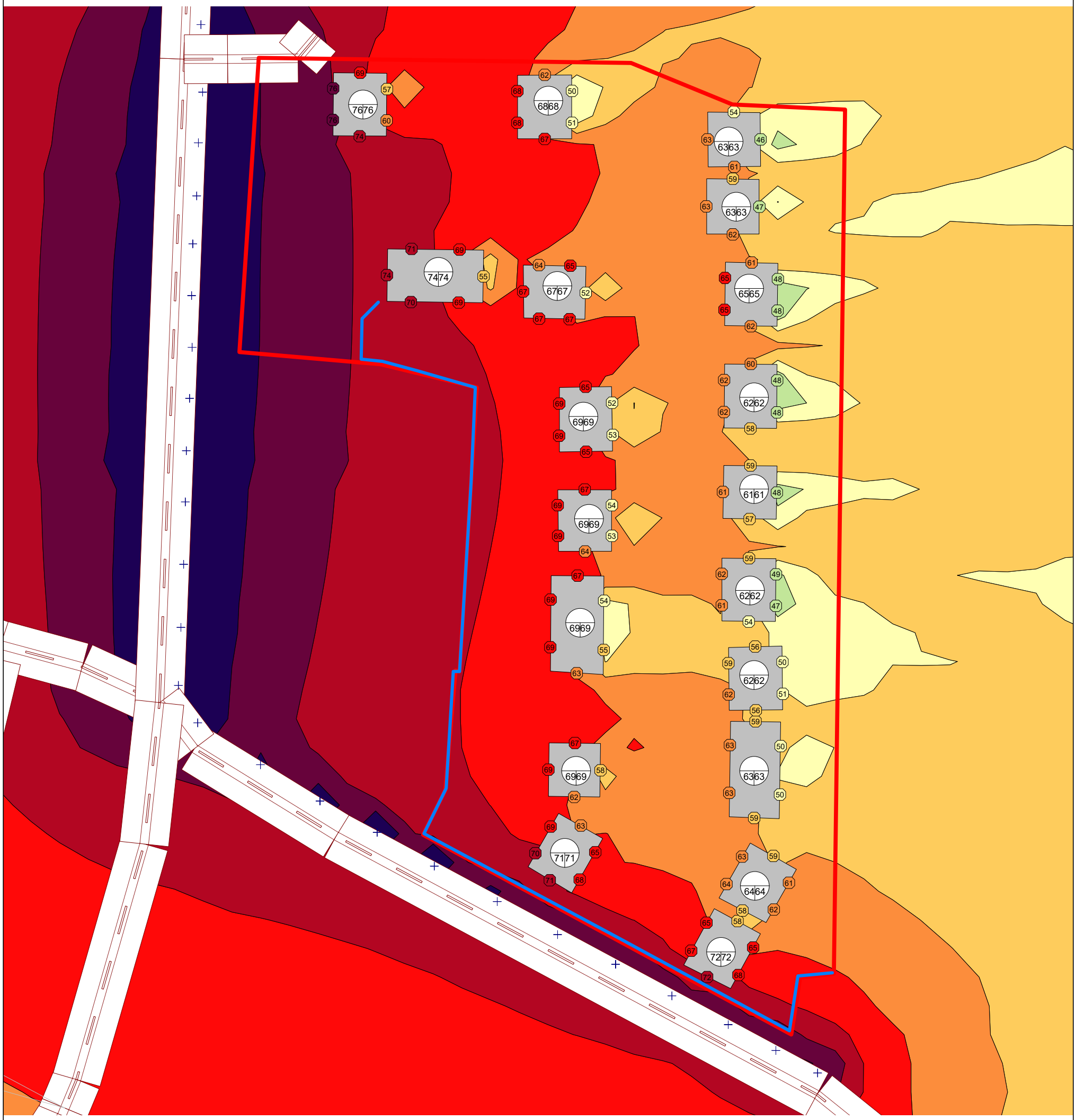


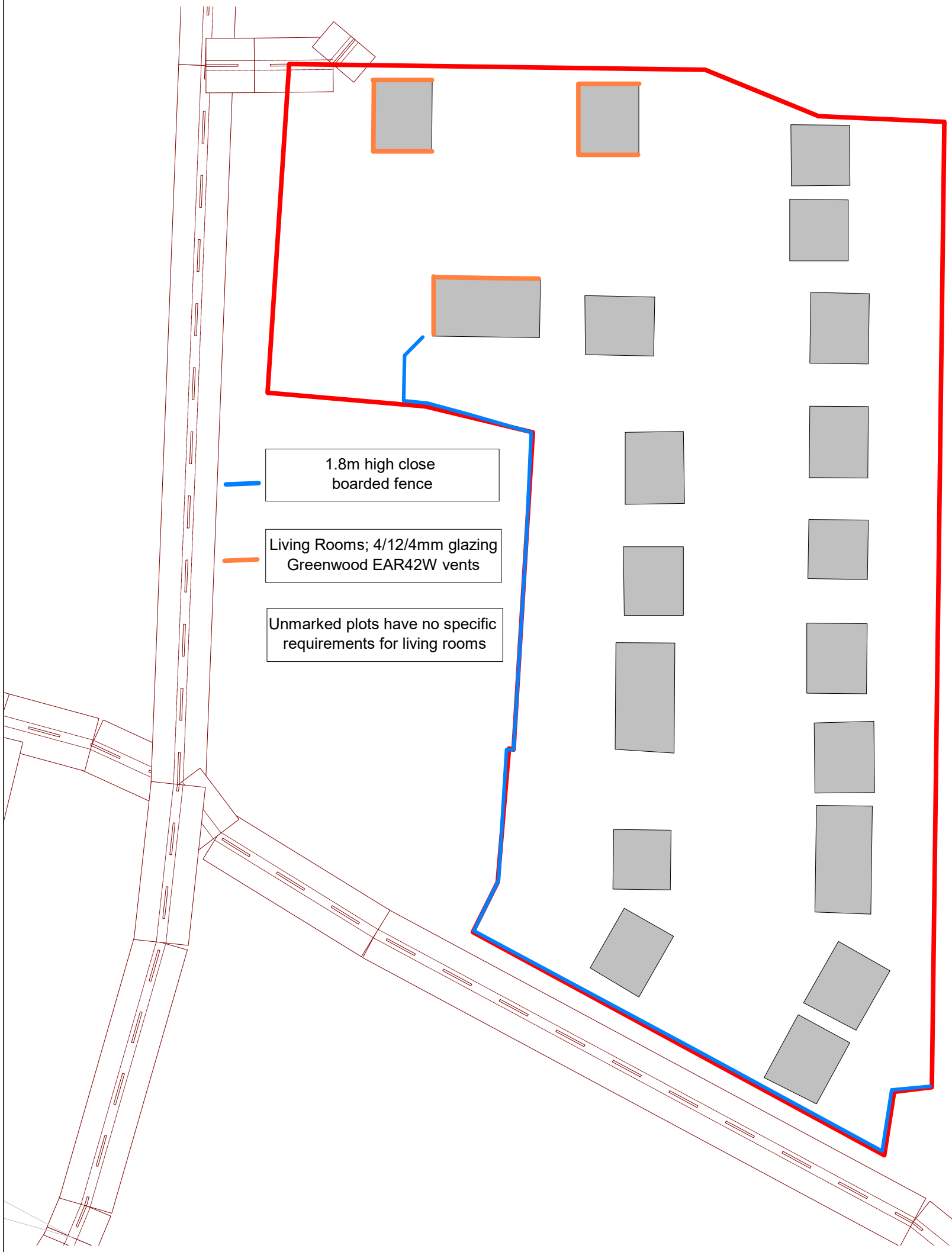
njd Environmental Associates	Client: Partner Construction	Figure 1: Daytime Noise Level (dB LAeq) (1.5m receptor height)		N
	Job Title: NJD18-0013-001R Nanny Marr Road, Darfield	Drawn By: NJ Dennon		Date: Dec 2018



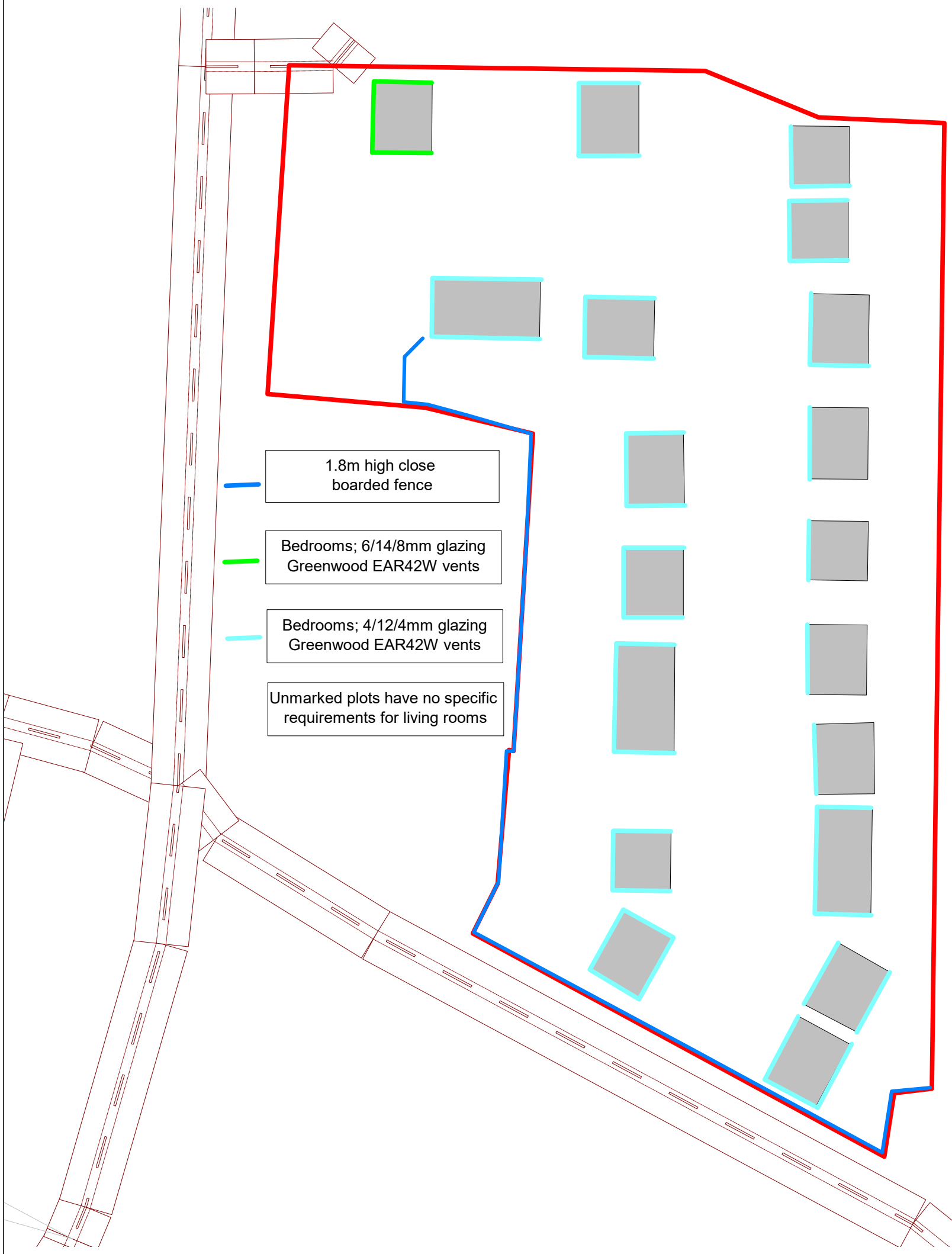
njd Environmental Associates	Client: Partner Construction	Figure 2: Night-time Noise Level (dB LAeq,8h) (4m receptor height)	0 <= ... < 35 35 <= ... < 40 40 <= ... < 45 45 <= ... < 50 50 <= ... < 55 55 <= ... < 60 60 <= ... < 65 65 <= ... < 70 70 <= ... < 75 75 <= ... < 80 80 <= ...
	Job Title: NJD18-0013-001R Nanny Marr Road, Darfield	Drawn By: NJ Dennon	Date: Dec 2018



njd Environmental Associates	Client: Partner Construction	Figure 3: Night-time Noise Level (dB LAmax) (4m receptor height)	0 <= ... < 35 35 <= ... < 40 40 <= ... < 45 45 <= ... < 50 50 <= ... < 55 55 <= ... < 60 60 <= ... < 65 65 <= ... < 70 70 <= ... < 75 75 <= ... < 80 80 <= ...
	Job Title: NJD18-0013-001R Nanny Marr Road, Darfield	Drawn By: NJ Dennon	Date: Dec 2018



njd Environmental Associates	Client: Partner Construction	Figure 4: Mitigation Measures for Living Rooms	0 <= ... < 35 35 <= ... < 40 40 <= ... < 45 45 <= ... < 50 50 <= ... < 55 55 <= ... < 60 60 <= ... < 65 65 <= ... < 70 70 <= ... < 75 75 <= ... < 80 80 <= ...	N
	Job Title: NJD18-0013-001R Nanny Marr Road, Darfield	Drawn By: NJ Dennon		Date: Dec 2018



njd Environmental Associates	Client: Partner Construction	Figure 5: Mitigation Measures for Bedrooms	0 <= ... < 35 35 <= ... < 40 40 <= ... < 45 45 <= ... < 50 50 <= ... < 55 55 <= ... < 60 60 <= ... < 65 65 <= ... < 70 70 <= ... < 75 75 <= ... < 80 80 <= ...	N
	Job Title: NJD18-0013-001R Nanny Marr Road, Darfield	Drawn By: NJ Dennon		Date: Dec 2018

File	20181203_124622_124625_1.CMG			
Location	ML1			
Data type	Fast Inst			
Weighting	A			
Unit	dB			
Start	12/3/2018 1:30:00 PM			
End	12/4/2018 7:00:00 AM			
Period	Day (Ld)			
Time slots	Day 07:00 19:00 Kd = 0 dBA			
	Ld dB	Lmax dB	L90 dB	L10 dB
Level	54.7	81.8	46.2	57.1
Period	Night (Ln)			
Time slots	Night 23:00 07:00 Kn = 0 dBA			
	Ln dB	Lmax dB	L90 dB	L10 dB
Level	45.4	70.7	34.8	47.1

File	20181203_132859_000000_1.CMG			
Location	ML2			
Data type	Fast Inst			
Weighting	A			
Unit	dB			
Start	12/3/2018 1:30:00 PM			
End	12/4/2018 7:00:00 AM			
Period	Day (Ld)			
Time slots	Day 07:00 19:00 Kd = 0 dBA			
	Ld dB	Lmax dB	L90 dB	L10 dB
Level	67.6	81.1	51.9	71.5
Period	Night (Ln)			
Time slots	Night 23:00 07:00 Kn = 0 dBA			
	Ln dB	Lmax dB	L90 dB	L10 dB
Level	59.3	81.5	35.8	60.6