



Homes England

Harras Moor,

Whitehaven

Noise Assessment

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1.0 Introduction

1.0 Purpose of this Report

This report has been prepared by, WYG on behalf of the Homes England to inform an outline planning application for a proposed residential development at Harras Moor, Whitehaven, Cumbria.

A description of the existing noise environment in and around the site is provided. Noise surveys have been undertaken and the results used to verify predictions of the short-term and long-term effects of noise. The noise levels from the proposed development have been predicted at local representative receptors using CADNA noise modelling software which incorporates ISO 9613 and CRTN methodologies and calculations.

A list of acoustic terminology and abbreviations used in this report is provided in Appendix A and a set of location plans and noise contour plots relevant to the assessment are presented in Appendix B. An illustrative layout plan is presented in Appendix C and Report Conditions in Appendix D.

1.1 Legislative Context (England)

This report is intended to provide information relevant to the local planning authority and their consultees in support of a planning application for the above proposed development. Policy guidance with respect to noise is found in National Planning Policy Framework. With regard to noise and planning, NPPF (paragraph 123) states that planning policies and decisions should aim to:

- A. Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;*
- B. Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;*
- C. Recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and*
- D. Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.*

The Planning Practice Guidance: Noise (PPG-Noise) web-based resource was launched by the Ministry of Housing Communities and Local Government on 6 March 2014 to support the NPPF and make it more

accessible. The overall aim of this guidance, tying in with the principals of the NPPF and the Explanatory Note of the Noise Policy Statement for England (NPSE), is to, *'identify whether the overall effect of noise exposure is (including the impact during the construction phase wherever applicable), or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation'* (Ref: Paragraph: 003 Reference ID: 30-003-20140306).

A summary of the effects of noise exposure associated with both noise generating developments and noise sensitive developments is presented within the NPPG and repeated as follows:

Table 1.1 Noise Exposure Hierarchy

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not noticeable	No Effect	No Observed Effect	No Specific Measures Required
Noticeable and intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect (NOEL)	No Specific Measures Required
Lowest Observed Adverse Effect Level (LOAEL)			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; closing windows for some of the time because of the noise. Potential for non-awakening sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level (SOAEL)			
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. having to keep windows closed most of the time, avoiding certain activities during periods of intrusion. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Observed Adverse Effect	Prevent

The NPPF, NSPE and NPPG do not, however, present absolute noise level criteria which define SOAEL, LOAEL and No Observed Adverse Effect Level (NOEL) which is applicable to all sources of noise in all situations.



Therefore, within the context of the Proposed Development, national planning policy and appropriate guidance documents, including the 'BS 8233 – Guidance on sound Insulation and Noise Reduction for Buildings' (2014), Section 2.0 presents the noise level criteria used as a basis of this assessment.

The NPPG also states that '*neither the NPSE nor the NPPF (which reflects the Noise Policy Statement) expects noise to be considered in isolation, separately from the economic, social and other environmental dimensions of the proposed development*' (Ref: Paragraph: 002 Reference ID: 30-002-20140306).

2.0 Assessment Criteria

2.1 LOAEL and SOAEL Assessment Criteria

In order to enable the assessment of the proposed development in terms of LOAEL and SOAEL, Table 2.1 presents equivalent noise levels and associated actions with the target noise level criteria identified.

Table 2.1 Noise Level Criteria and Actions

Effect Level	Assessment	Noise Level Criteria	Action / Justification
No Observed Adverse Effect Level (NOAEL)	Proposed Residents	External Amenity Space (daytime) is less than 50 dB $L_{Aeq,16hours}$	No Action Required Within BS8233 / WHO /
Lowest Observed Adverse Effect Level (LOAEL)	Proposed Residents	Internal noise levels achieve: <i>Bedrooms (night-time) – 30 dB $L_{Aeq,8hours}$</i> <i>Living Rooms (daytime) – 35 dB $L_{Aeq,16hours}$</i> <i>External Amenity Space (daytime) is less than 55 dB $L_{Aeq,16hours}$</i>	None Within BS8233 / WHO Criteria
Significant Observed Adverse Effect Level (SOAEL)	Proposed Residents	Internal noise levels exceed: Bedrooms (night-time)– 35 dB $L_{Aeq,8hours}$ Living Rooms (daytime)– 40 dB $L_{Aeq,16hours}$ External Amenity Space (daytime) exceeds – 55 dB $L_{Aeq,16hours}$	Mitigate to achieve: Bedrooms – 35 dB $L_{Aeq,8hours}$ Living Rooms (With windows Open) – 40 dB $L_{Aeq,16hours}$ External Amenity Space – 55 dB $L_{Aeq,16hours}$ Within BS8233 / WHO Reasonable Criteria
Unacceptable Observed Adverse Effect Level (UOAE)	Proposed Residents	Internal noise levels exceed: Bedrooms (night-time) – 51 dB $L_{Aeq,8hours}$ Living Rooms (daytime) – 57 dB $L_{Aeq,16hours}$	Avoid Values correspond with PPG24 Category D (mixed sources), planning permission should normally be refused.

For the purpose of this assessment, the target noise level criteria is noted in italics in the above table.

Further commentary on the sources of noise at the site is presented in Sections 3 and 4. Given that noise levels at the site are predominantly influenced by road traffic noise and the nature of the types of premises within the Red Lonning industrial estate, where occasional vehicle / plant movements are the principal sources of noise, it considered that an assessment in accordance with the noise criteria presented within BS8233 is appropriate.

2.2 ProPG Planning and Noise

Professional Practice Guidance on Planning and Noise for new residential development (ProPG) was published in May 2017 by the Chartered Institute of Environmental Health (CIEH), the Association of Noise Consultants (ANC) and the Institute of Acoustics (IOA). The guidance has been published to provide practitioners with guidance on the management of noise within the planning system in England.

The guidance is specifically for '*new residential development*' that would be exposed predominantly to noise from existing transport sources and reflects the Government's overarching Noise Policy Statement for England (NPSE), the National Planning Policy Framework (NPPF), and Planning Practice Guidance (including PPG-Noise), as well as other authoritative sources of guidance.

The guidance provides advice for Local Planning Authorities (LPAs) and developers, and their respective professional advisers which complements Government planning and noise policy and guidance. In particular, the ProPG aims to:

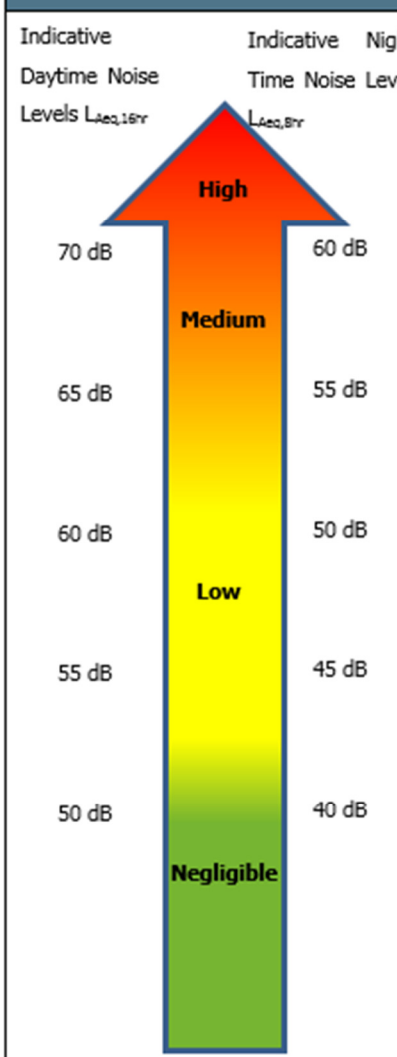
- Advocate full consideration of the acoustic environment from the earliest possible stage of the development control process;
- Encourage the process of good acoustic design in and around new residential developments;
- Outline what should be taken into account in deciding planning applications for new noise-sensitive developments;
- Promote appropriate noise exposure standards; and
- Assist the delivery of sustainable development (ADS).

There are two stages of the overall approach outlined in the ProPG:

- Stage 1 – an initial noise risk assessment of the proposed development site; and
- Stage 2 – a systematic consideration of 4 key elements which is underpinned by an Acoustic Design Statement.

With regard to Stage 1, the ProPG provides guidance for producing an initial site risk assessment, pre-mitigation, with regards to noise based on the prevailing daytime and night time noise levels across the site, from which the site (or areas thereof) can be allocated a Noise Risk as shown in Figure 2.1, overleaf. This shows the various Noise Risks Categories (NRC) together with their corresponding sound levels as referred to in the ProPG. It should be noted that the categories are not distinct which allows context to be included within the assessment with the purpose of the Stage 1 assessment to determine the likely acoustic challenges on the site.

Figure 2.1 ProPG Stage 1, Noise Risk Assessment

Noise Risk Assessment	Potential Effect Without Noise Mitigation	Pre-Planning Application Advice
Indicative Daytime Noise Levels $L_{Aeq,16hr}$ Indicative Night-Time Noise Levels $L_{Aeq,8hr}$  70 dB 65 dB 60 dB 55 dB 50 dB 40 dB High Medium Low Negligible	 Increasing risk of adverse effect	High noise levels indicate that there is an increased risk that development may be refused on noise grounds. The risk may be reduced by following a good acoustic design process that is demonstrated in a detailed ADS. Applicants are strongly advised to seek expert advice. As noise levels increase, the site is likely to be less suitable from a noise perspective and any subsequent application may be refused unless a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigate and minimised, and which clearly demonstrates that a significant adverse noise impact will be avoided in the finished development. At low noise levels, the site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised in the finished development.
	No adverse effect	These noise levels indicate that the development site is likely to be acceptable from a noise perspective, and the application need not normally be delayed on noise grounds.

At Stage 2, which is not required to be progressed if the Stage 1 assessment determines a negligible risk, there are 4 elements which should be undertaken in parallel. These are:

- Good Acoustic Design Process
- Internal Noise Level Guidelines
- External Amenity Area Noise Assessment
- Assessment of Other Relevant Issues



There is then the requirement to present an ADS to provide sufficient evidence that the ProPG Stage 1 and Stage 2 Elements 1 to 4 have been followed. At this outline stage, a detailed site layout is not available and, therefore, an ADS is not required. However, outline design measures will be established on how the site could be brought forward with regard to the guidance provided in the ProPG.

3.0 Assessment Methodology

3.0 Noise Modelling Methodology

Three dimensional noise modelling has been undertaken based on the monitoring data to predict L_{Aeq} noise levels at a large number of locations both horizontally and vertically. CADNA noise modelling software has been used with the noise modelling undertaken based on the Department of Transport Calculation of Road Traffic Noise (CRTN) and ISO 9613 noise propagation methodology.

The modelling software calculates noise levels based on the emission parameters and spatial settings that are entered. Input data, assumptions and model settings as given in the table below have been used.

Table 3.1 Modelling Parameters Sources and Assumptions

Parameter	Source	Details
Horizontal distances – around site	Ordnance Survey	Ordnance Survey
Ground levels	Ordnance Survey / WYG	2m contours surrounding the site – onsite ground heights from topographical survey
Traffic data	WYGE Observations	Based on measured noise levels
Building heights – around site and surrounding area	WYGE Observations	8m height
Receptor positions	WYGE	1.5 m height for daytime model grid and monitoring locations for validation, 4.0 m for night-time model grid.
Absorbent Ground	CADNA	Frequency dependant ground absorption has been applied based on values specified in VDI 2714/16 clause 6.3
Site Layout	WYG	Parameters Plan A090070-410 004 Rev A

It is acknowledged that a number of these assumptions will affect the overall noise levels presented in this report. However, it should be noted that certain assumptions made, as identified above, are worst case.

3.1 Model Input Data

Noise models have been verified by modelling the monitoring locations for the 'existing' daytime and night-time scenarios. Based on observations made during the noise survey in general road traffic was the dominant noise source at the site with occasional noise from commercial premises to the north east of the site. The comparison between the monitoring and road traffic noise modelling results are shown in Tables 3.3. and 3.4. At LT2, noise from other sources including birdsong and occasional noise from a plant hire premises also influenced the noise measurements during the daytime period. Therefore, a further verification has been undertaken associated with a worst case $L_{Aeq,1hour}$ noise level during a period when plant was moving within the yard to the rear of the hire premises. The results are presented in Table 3.5.

Table 3.2 Road Traffic Noise Verification L_{Aeq} , daytime 07:00 – 23:00

Location	Monitored L_{Aeq}	Modelled L_{Aeq}	Difference between Monitored and Modelled Results
LT1	47.4	47.6	0.2
LT2	56.0	45.5	-10.5
LT3	59.8	59.7	-0.1
LT4	50.8	51.8	1.0
LT5	58.4	57.2	-1.2
LT6	54.7	52.2	-2.5
ST1	75.1	74.9	-0.2
ST3	46.0	46.0	0.0
ST4	66.3	63.2	-3.1
ST5	55.6	57.9	2.3
ST6	47.0	47.0	0.0

All values are sound pressure levels in dB re: 2×10^{-5} Pa

Table 3.3 Road Traffic Noise Verification L_{Aeq} , Night-time 23:00 – 07:00

Location	Monitored L_{Aeq}	Modelled L_{Aeq}	Difference between Monitored and Modelled Results
LT1	42.4	37.4	-5.0
LT2	37.6	35.2	-2.4
LT3	50.7	50.7	0.0
LT4	43.8	41.2	-2.6
LT5	53.3	50.4	-2.9
LT6	42.8	39.5	-3.3
ST1	68.3	68.1	-0.2
ST4	55.2	51.7	-3.5

All values are sound pressure levels in dB re: 2×10^{-5} Pa

Table 3.4 Daytime A-Plant Hire Noise Source Verification L_{Aeq} , daytime 07:00 – 23:00

Location	Monitored L_{Aeq}	Modelled L_{Aeq}	Difference between Monitored and Modelled Results
LT2	63.7	63.7	0.0

All values are sound pressure levels in dB re: 2×10^{-5} Pa

The verification points show a divergence between monitored and modelled results of generally within or around 3 dB. The greatest weight has been given to the long-term (LT) measurement locations with any greater differences at the short-term (ST) locations due to short term variations. All models are, therefore, assumed to be suitably verified.

With regard to noise from premises within the Red Lonning industrial estate, which were observed to operate during the daytime period only, there was limited noise audible during observations made during the attended noise survey and a review of audio recordings over the survey period.

Therefore, to present a worst-case scenario, the following noise sources have been applied with regard to noise generation from the adjacent commercial premises:

- Point sources in southern yard of A-Plant to account for plant movements (Sound power level – 97 dB(A))
- Point source in northern A-Plant Hire yard and within the yard of the warehouse unit to the north-east of the A-Plant Hire to account for potential external forklift truck loading (Based on previous WYG noise measurements: 76 dB $L_{Aeq,15mins}$ @3m, assumed 30 minute operating period over 1 hour: Sound power level – 86 dB(A)).
- Noise breakout through open roller shutter doors from the warehouse unit to the north-east of the A-Plant Hire premises assuming an internal reverberant noise level of 85 dB(A) and no attenuation through roller shutter doors positioned on the southern façade of the building.
- Point sources in contractors storage depot to the north of the A-Plant Hire premises. Reference source noise levels are based on verified A-Plant Hire measurements (Sound power level – 97 dB(A)). Sources have been included in the south-western, north-western and north-eastern parts of this area.

As noted previously, there were limited noise generating activities occurring within the Red Lonning industrial estate and the above assessment is considered to represent an over-estimation of existing and potential future noise generation from these premises.



3.2 Tranquillity Rating

An assessment of the existing tranquillity level of the site has been based on the mapping data published by Campaign to Protect Rural England (CPRE). This uses a colour coded system and a 500m assessment grid for the whole of England, and a tranquillity rating of between 1 and 10 is assigned (1 being least tranquil and 10 being most).

4.0 Noise Survey

4.0 Noise Survey Methodology

A monitoring survey was undertaken to characterise baseline ambient noise levels currently experienced on the site and to establish the relative local background and traffic noise levels.

Equipment used during the survey included:

Norsonic 118	Environmental Noise Analyser	s/n	28972
Norsonic 1251	Sound Calibrator	s/n	25010
Rion NL-52	Environmental Noise Analyser (WYG20)	s/n	253702
Rion NL-52	Environmental Noise Analyser (WYG22)	s/n	1021257
Rion NL-52	Environmental Noise Analyser (WYG27)	s/n	264490

The measurement equipment was checked against the appropriate calibrator at the beginning and end of the measurements, in accordance with recommended practice and no drift was observed. The accuracy of the calibrators can be traced to National Physical Laboratory Standards, calibration certificates for which are available on request.

A baseline monitoring survey was undertaken at twelve locations (as specified in the following table and shown in SK01 of Appendix B) from Friday 10th November 2017 to Wednesday 15th November 2017. Attended short term measurements were undertaken at six locations during the day, evening, peak and night-time periods with six additional locations being measured unattended over a 96-hour period. The raw data collected from the long-term monitoring is available upon request.

Measurements were taken in general accordance with BS 7445-1:2003 *The Description and Measurement of Environmental Noise: Guide to quantities and procedures*. Weather conditions during the survey period were observed as being dry with scattered showers. Anemometer readings confirmed that wind speeds were less than 5 ms⁻¹ at all times during the survey with a predominant westerly wind direction.

Table 4.1 Noise Monitoring Locations

Ref	Description
LT1	Eastern side of the site, to the west of the industrial estate
LT2	Eastern side of the site, to the south of the industrial estate
LT3	Eastern boundary of the site on Red Lonning
LT4	Eastern side of the site, to the north of the industrial estate
LT5	Eastern side of the site, to the west of the industrial estate
LT6	South west corner of the site

Ref	Description
ST1	Western side of the site, on A595/Park Drive
ST2	Highfields, southern side of the site
ST3	Laurel Bank, western edge of the site
ST4	Harras Road, north eastern edge of the site
ST5	Caldbeck Road, eastern side of the site
ST6	Eastern side of the site, to the west of the industrial estate

4.1 Noise Survey Results

The noise climate around the area is dominated by road traffic from the A595, Harras Road and Red Lonning. Occasional mobile plant movement was also audible from within the industrial estate.

Ambient and background noise levels are usually described using the L_{Aeq} index (a form of energy average) and the L_{A90} index (i.e. the level exceeded for 90% of the measurement period) respectively. Road traffic noise is generally described using the L_{A10} index (i.e. the level exceeded for 10% of the measurement period).

Table 4.2 Meteorological Conditions during the Survey

Survey Location/	Date & Time	Temperature	Wind Speed	Wind Direction	Cloud Cover (Oktas)	Dominant Noise Source
Day ST1	15/11/2017 07:30	6 °C	0-1 m/s	W	6	Traffic along A595
Day ST3	14/11/2017 16:51	10 °C	0-1 m/s	W	8	Distant road traffic noise from A595
Day ST4	14/11/2017 15:57	10 °C	0-1 m/s	W	6	Traffic along Harras Road
Day ST5	14/11/2017 14:35	10 °C	0-1 m/s	W	6	Traffic along Red Lonning
Day ST6	14/11/2017 15:17	10 °C	0-1 m/s	W	6	Traffic along Harras Road
Evening ST2	14/11/2017 21:54	9 °C	0-1 m/s	W	6	Distant road traffic noise from A595
Evening ST3	14/11/2017 21:28	9 °C	0-1 m/s	W	6	Distant road traffic noise from A595
Evening ST4	14/11/2017 22:46	9 °C	0-1 m/s	W	6	Traffic along Harras Road
Evening ST5	14/11/2017 22:18	9 °C	0-1 m/s	W	6	Traffic along Harras Road/Red Lonning
Night ST1	14/11/2017 23:37	6 °C	0-1 m/s	W	6	Traffic along A595
Night ST4	14/11/2017 23:01	9 °C	0-1 m/s	W	4	Traffic along Harras Road

The results of the statistical measurements and frequency measurements conducted during the survey are summarised in the following table. All values are sound pressure levels in dB (re: 2×10^{-5} Pa). For the LT

locations, the presented $L_{Aeq,T}$ and $L_{A10,T}$ are average noise levels whilst the L_{A90} is the modal noise level of each 5 minute measurement over the stated survey period.

Table 4.3 Results of Baseline Noise Monitoring Survey

Period	Duration (T)	Monitoring Date and Times	Location	$L_{Aeq,T}$ (dB)	$L_{Amax,T}$ (dB)	$L_{Amin,T}$ (dB)	$L_{A10,T}$ (dB)	$L_{A90,T}$ (dB)
Week Day 07:00 - 23:00	22 hours	13/11/2017 – 14/11/2017 07:00 - 12:30	LT1	47.4	81.3	35.6	50.0	46
Week Night 23:00 – 07:00	15 hours	13/11/2017 – 14/11/2017 00:00 - 07:00		42.4	67.8	25.1	41.9	30
Weekend Day 07:00 - 23:00	32 hours	11/11/2017 – 12/11/2017 07:00 - 23:00		46.1	78.8	29.1	48.2	40
Weekend Night 23:00 – 07:00	15 hours	11/11/2017 – 12/11/2017 01:00 - 00:00		39.1	63.1	22.6	40.3	32
Week Day 07:00 - 23:00	23 hours	13/11/2017 – 14/11/2017 07:00 - 14:00	LT2	56.0	94.3	26.8	52.3	42
Week Night 23:00 – 07:00	15 hours	13/11/2017 – 14/11/2017 00:00 - 07:00		36.8	61.3	22.8	37.0	34
Weekend Day 07:00 - 23:00	32 hours	11/11/2017 – 12/11/2017 07:00 - 23:00		47.7	83.0	24.1	47.0	38
Weekend Night 23:00 – 07:00	15 hours	11/11/2017 – 12/11/2017 01:00 - 00:00		37.6	58.9	19.6	38.6	32
Week Day 07:00 - 23:00	22 hours	13/11/2017 – 14/11/2017 07:00 - 13:00	LT3	59.8	86.0	35.2	63.0	47
Week Night 23:00 – 07:00	15 hours	13/11/2017 – 14/11/2017 00:00 - 07:00		50.7	75.1	24.7	45.0	39
Weekend Day 07:00 - 23:00	32 hours	11/11/2017 – 12/11/2017 07:00 - 23:00		58.0	84.6	26.9	61.2	46.0
Weekend Night 23:00 – 07:00	15 hours	11/11/2017 – 12/11/2017 01:00 - 00:00		50.3	76.4	22.1	46.5	30
Week Day 07:00 - 23:00	19 hours	14/11/2017 – 15/11/2017 14:20 - 09:30	LT4	50.8	77.8	27.1	53.1	44
Week Night 23:00 – 07:00	8 hours	14/11/2017 – 15/11/2017 23:00 - 07:00		43.8	75.4	18.1	39.6	21
Week Day 07:00 - 23:00	10 hours	14/11/2017 – 15/11/2017 13:50 - 07:50	LT5	58.4	85.3	36.7	59.9	53
Week Night 23:00 – 07:00	8 hours	14/11/2017 – 15/11/2017 23:00 - 07:00		53.3	67.0	35.1	50.6	36.0
Week Day 07:00 - 23:00	12 hours	14/11/2017 – 15/11/2017 07:00 - 23:00	LT6	54.7	89.5	23.4	52.6	49
Week Night 23:00 – 07:00	8 hours	14/11/2017 – 15/11/2017 23:00 - 07:00		42.8	65.8	18.4	38.2	20
Day 07:00 - 19:00	15 Mins	15/11/2017 07:30	ST1	75.1	82.9	52.8	78.0	66.9
	15 Mins	14/11/2017 16:51	ST3	46.0	60.3	39.3	47.7	42.5
	30 Mins	14/11/2017 15:57	ST4	66.3	90.0	39.2	70.5	48.4

Period	Duration (T)	Monitoring Date and Times	Location	L _{Aeq,T} (dB)	L _{Amax,T} (dB)	L _{Amin,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)
	15 Mins	14/11/2017 14:35	ST5	55.6	82.6	42.9	56.0	47.2
	15 Mins	14/11/2017 15:17	ST6	47.0	79.0	40.9	48.7	42.9
Evening 19:00 - 23:00	15 Mins	14/11/2017 21:54	ST2	40.4	59.4	25.0	39.7	27.5
	15 Mins	14/11/2017 21:28	ST3	36.7	61.4	25.8	34.5	28.2
	15 Mins	14/11/2017 22:46	ST4	56.4	81.4	23.6	55.1	25.8
	15 Mins	14/11/2017 22:18	ST5	36.7	61.4	25.8	34.5	28.2
Night 23:00 - 07:00	15 Mins	14/11/2017 23:37	ST1	68.3	89.4	27.3	69.1	29.7
	15 Mins	14/11/2017 23:01	ST4	55.2	80.0	24.7	55.3	27.8

All values are sound pressure levels in dB re: 2x 10⁻⁵ Pa

5.0 Assessment of Key Effects

5.0 ProPG Stage 1 Risk Assessment

Based on the verified daytime $L_{Aeq,16hours}$ and night-time $L_{Aeq,8hours}$, SK03 and SK04 present noise contour plots during the day and night-time periods which provides a representation of the range of noise levels at the site with regard to road traffic noise.

Table 5.1 Results of Baseline Noise Monitoring Survey (Average Levels)

Period	ProPg Stage 1 Risk Assessment Noise levels
Daytime $L_{Aeq,16hr}$	Negligible to Low
	Negligible to Low
Night-time $L_{Aeq,8hr}$	Low to High
	Low to High

All values are sound pressure levels in dB re: 2×10^{-5} Pa

On the basis of the above, the Stage 1 risk assessment shows that whilst the acoustic challenges at areas within the site are low to high risk, a good acoustic design process will be required to be followed.

With regard to the ProPG Stage 2 requirements, at this outline stage, a detailed site layout is not available and, therefore, an ADS is not formally included. However, noise design measures will be established on how the site could be brought forward with regard given to the guidance provided within the ProPG. Assessments of noise from all sources with regard to noise levels in proposed internal sensitive rooms and private external amenity areas have been undertaken in Section 5.2 and 5.3.

With regard to Good Acoustic Design, a constraints assessment was undertaken to inform the illustrative masterplan. Recommendations were made for including a stand-off from the Red Lonning industrial estate as well as the A595 and Red Lonning. These measures have been incorporated into the illustrative layout with a further design measure to including, where practicable, buildings fronting onto the Red Lonning industrial estate which would then provide additional mitigation in the form of a barrier to gardens positioned to the rear of the buildings.

The following Sections establish predicted noise levels at receptor locations determined from the illustrative masterplan which takes into account these design measures.

5.1 Noise Intrusion Assessment

Internal noise levels at the proposed development, based on the existing ambient noise climate, have been assessed both with windows open, where a reduction from a partially open window of 15 dB has been used, and with windows closed where an assumption of standard double glazing (4mm / 16mm / 6mm) with a sound reduction of 26 dB R_{tra} has been used. The predicted noise levels at the assessed receptors locations (as presented in SK02a) are presented in Tables 5.2 and 5.3 below based on all sources as stated in Section 3. The daytime and night-time L_{Aeq} noise contour plots are presented in SK05 and SK06.

Table 5.2 Daytime Noise Intrusion Levels $L_{Aeq,16hr}$

Ref	External $L_{Aeq,16hr}$ Daytime	Internal $L_{Aeq,16hr}$ Daytime (Windows Open)	Internal $L_{Aeq,16hr}$ Daytime (Windows Closed)	BS 8233 Target Criteria L_{Aeq}	Below SOAEL	Mitigation Required
R1	60.2	45.2	34.2	35	No (Windows Open)	Yes See below
R2	52.8	37.8	26.8	35	No (Windows Open)	Yes See below
R3	52.0	37.0	26.0	35	No (Windows Open)	Yes See below
R4	51.3	36.3	25.3	35	No (Windows Open)	Yes See below
R5	51.9	36.9	25.9	35	No (Windows Open)	Yes See below
R6	52.9	37.9	26.9	35	No (Windows Open)	Yes See below
R7	51.3	36.3	25.3	35	No (Windows Open)	Yes See below
R8	54.0	39.0	28.0	35	No (Windows Open)	Yes See below
R9	54.3	39.3	28.3	35	No (Windows Open)	Yes See below
R10	54.0	39.0	28.0	35	No (Windows Open)	Yes See below
R11	53.1	38.1	27.1	35	No (Windows Open)	Yes See below
R12	53.7	38.7	27.7	35	No (Windows Open)	Yes See below

All values are sound pressure levels in dB re: 2×10^{-5} Pa.

Table 5.3 Night-time Noise Intrusion Levels $L_{Aeq,8hr}$

Ref	External $L_{Aeq,8hr}$ Night-time	Internal $L_{Aeq,8hr}$ Night-time (Windows Open)	Internal $L_{Aeq,8hr}$ Night-time (Windows Closed)	BS 8233 Target Criteria L_{Aeq}	Below SOAEL	Mitigation Required
R1	50.5	35.5	21.5	30	No (Windows Open)	Yes See below
R2	42.9	27.9	13.9	30	Yes	No
R3	40.1	25.1	11.1	30	Yes	No
R4	37.4	22.4	8.4	30	Yes	No
R5	37.3	22.3	8.3	30	Yes	No
R6	36.1	21.1	7.1	30	Yes	No
R7	35.2	20.2	6.2	30	Yes	No

Ref	External L _{Aeq,8hr} Night-time	Internal L _{Aeq,8hr} Night-time (Windows Open)	Internal L _{Aeq,8hr} Night-time (Windows Closed)	BS 8233 Target Criteria L _{Aeq}	Below SOAEL	Mitigation Required
R8	36.9	21.9	7.9	30	Yes	No
R9	43.9	28.9	14.9	30	Yes	No
R10	46.2	31.2	17.2	30	No (Windows Open)	Yes See below
R11	45.8	30.8	16.8	30	No (Windows Open)	Yes See below
R12	47.9	32.9	18.9	30	No (Windows Open)	Yes See below

All values are sound pressure levels in dB re: 2x 10⁻⁵ Pa.

As shown in Tables 5.2 and 5.3 above, internal noise levels are predicted to be below the target internal noise criteria levels set out within the BS8233 when windows are closed assuming standard double glazing.

With windows open, internal noise are predicted to be slightly greater than the target criteria in parts of the site most exposed to road traffic noise and, based on reasonable worst-case assumptions, the Red Lanning industrial estate. Therefore, alternative means of ventilation will need to be considered for some habitable rooms within the site. Alternative ventilation can be provided in several ways from acoustic trickle vents (which need to have the same acoustic performance as the glazing), other passive ventilation systems or mechanical ventilations systems. Locations where alternative ventilation are required would be identified as part of a reserved matter application when a detailed site layout is available.

5.2 External Amenity Assessment

Table 5.4 below presents predicted noise levels within selected gardens based on the illustrative layout. The receptor locations are presented in SK02 and a daytime noise contour plot (in the absence of barriers) is presented in SK03.

Table 5.4 External Noise Levels (No barriers)

Ref	External Noise Levels L _{Aeq,16hours}	Target Criteria L _{Aeq}	Within Criteria
R1	60.2	55	No
R2	52.8	55	Yes
R3	52.0	55	Yes
R4	51.3	55	Yes
R5	51.9	55	Yes
R6	52.9	55	Yes
R7	51.3	55	Yes
R8	54.0	55	Yes
R9	54.3	55	Yes
R10	54.0	55	Yes
R11	53.1	55	Yes

Ref	External Noise Levels $L_{Aeq,16hours}$	Target Criteria L_{Aeq}	Within Criteria
R12	53.7	55	Yes

All values are sound pressure levels in dB re: 2×10^{-5} Pa.

In general, predicted noise levels fall below 55 dB $L_{Aeq,16hours}$ and below the LOAEL. At R1 (positioned 5m from the site boundary), where the residential development area extends to Victoria Road, noise levels of greater than 55 dB $L_{Aeq,16hours}$ are predicted. Therefore, barriers using either the building façade or close boarded fence will need to be considered during the detailed design. Further noise modelling has been undertaken to include the installation of a 1.8m close boarded fence to act as a barrier to Victoria Road with the findings presented in Table 5.5. In addition, consideration has been given to the installation of a 2.5m close boarded fence around the A-Plant Hire yard and the contractors depot within the Red Lonning industrial estate should this be practical. A plan showing where barriers have been considered as part of this assessment is presented in SK07 in Appendix B.

Table 5.5 External Noise Levels (with barriers)

Ref	External Noise Levels $L_{Aeq,16hours}$	Target Criteria L_{Aeq}	Within Criteria
R1	52.6	55	Yes
R2	52.2	55	Yes
R3	50.5	55	Yes
R4	48.7	55	Yes
R5	49.4	55	Yes
R6	50.1	55	Yes
R7	47.7	55	Yes
R8	49.7	55	Yes
R9	54.2	55	Yes
R10	53.6	55	Yes
R11	52.6	55	Yes
R12	53.7	55	Yes

All values are sound pressure levels in dB re: 2×10^{-5} Pa.

With the introduction of barriers, noise levels are predicted to be below 55 dB $L_{Aeq,16hours}$ at all receptors and below the LOAEL.

Where barriers are proposed, these will be required to be of solid construction with no gaps and a minimum mass of 10kg/m^2 .



5.3 Tranquillity Assessment

An assessment of the existing tranquillity level of the site has been based on the mapping data published by Campaign to Protect Rural England (CPRE). This uses a colour coded system and a 500m assessment grid for the whole of England, and a tranquillity rating of between 1 and 10 is assigned (1 being least tranquil and 10 being most). By reference to these maps the development is assessed as falling into Zones 3-5 and not prized in terms of tranquillity value. There are no public rights of way across the site and therefore, access to areas of greater tranquillity will not be disrupted.

6.0 Conclusions

This report presents the findings of a noise assessment to inform an outline planning application for a proposed residential development at Harras Moor, Whitehaven, Cumbria. The assessment has been assessed against the four test points within paragraph 123 of the NPPF. The findings are outlined below and it can be concluded that the site is suitable for residential development and there are no noise issues which preclude development.

NPPF 123 A & B

In considering the NPPF test in section 123, points A & B. The proposed development is not expected to have an 'adverse impact' on health or quality of life. Similarly, with regard to NPPF (123) point B, it is considered that all 'adverse impacts on health and quality of life' (relating to noise) are mitigated by the use of appropriate mitigation which is referenced below.

Standard double glazing (e.g. 4mm/16mm/4mm) will be acceptable throughout the site with alternative ventilation required for some living rooms and bedrooms. As a good acoustic design measure, the illustrative layout has included a stand-off to the A595, Red Lonning and the Red Lonning industrial estate. Barriers in the form of close boarded fences will also need to be considered during the detailed design with regard to minimising noise in external amenity areas along the extremities of the site.

NPPF 123 C & D

Based on the assessments undertaken it is not considered that any existing businesses wanting to develop would be restricted by the proposals. An assessment of the existing tranquillity level of the site undertaken and identified that the site is not highly prized for its tranquillity and recreational value in terms of noise.

Planning Practice Guidance: Noise

The noise mitigation in Section 5 of this report is sufficient to reduce the effects of identified sources of noise being currently emitted from the surrounding environment to prevent the adopted thresholds (within the context of BS 8233) of where the Significant Observed Adverse Effect Level (SOAEL) would be exceeded for future residents.

ProPG - Planning & Noise

The Stage 1 risk assessment shows that the site has a negligible to low risk during the day and low to high risk during the night in terms of acoustic challenges. The scheme proposals are currently illustrative and therefore, there is not the requirement to undertake a detailed Stage 2 assessment and provide an Acoustic Design Statement. However, noise has been considered at this stage of the planning process with this report,



outlining good acoustic design measures which have been considered within the illustrative layout. These measures should be taken into account within the detailed design of the site.



Appendices

Appendix A – Acoustic Terminology and Abbreviations

Acoustic Terminology

- dB** Sound levels from any source can be measured in frequency bands in order to provide detailed information about the spectral content of the noise, i.e. whether it is high-pitched, low-pitched, or with no distinct tonal character. These measurements are usually undertaken in octave or third octave frequency bands. If these values are summed logarithmically, a single dB figure is obtained. This is usually not very helpful as it simply describes the total amount of acoustic energy measured and does not take any account of the ear's ability to hear certain frequencies more readily than others.
- dB(A)** Instead, the dBA figure is used, as this is found to relate better to the loudness of the sound heard. The dBA figure is obtained by subtracting an appropriate correction, which represents the variation in the ear's ability to hear different frequencies, from the individual octave or third octave band values, before summing them logarithmically. As a result the single dBA value provides a good representation of how loud a sound is.
- L_{Aeq}** Since almost all sounds vary or fluctuate with time it is helpful, instead of having an instantaneous value to describe the noise event, to have an average of the total acoustic energy experienced over its duration. The L_{Aeq, 07:00 – 23:00} for example, describes the equivalent continuous noise level over the 12 hour period between 7 am and 11 pm. During this time period the L_{pA} at any particular time is likely to have been either greater or lower than the L_{Aeq, 07:00 – 23:00}.
- L_{Amin}** The L_{Amin} is the quietest instantaneous noise level. This is usually the quietest 125 milliseconds measured during any given period of time.
- L_{Amax}** The L_{Amax} is the loudest instantaneous noise level. This is usually the loudest 125 milliseconds measured during any given period of time.
- L_n** Another method of describing, with a single value, a noise level which varies over a given time period is, instead of considering the average amount of acoustic energy, to consider the length of time for which a particular noise level is exceeded. If a level of x dBA is exceeded for say. 6 minutes within one hour, then that level can be described as being exceeded for 10% of the total measurement period. This is denoted as the L_{A10, 1 hr} = x dB.
- The L_{A10} index is often used in the description of road traffic noise, whilst the L_{A90}, the noise level exceeded for 90% of the measurement period, is the usual descriptor for underlying background noise. L_{A1} and L_{Amax} are common descriptors of construction noise.
- R_w** The *weighted sound reduction index* determined using the above *measurement* procedure, but weighted in accordance with the procedures set down in BS EN ISO 717-1. Partitioning and building board manufacturers commonly use this index to describe the inherent sound insulation performance of their products.



Abbreviations

CADNA – Computer Aided Noise Abatement

DMRB – Design Manual for Roads and Bridges

HGV – Heavy Goods Vehicle

WYGE – WYG Environment

PPG 24 – Planning Policy Guidance 24

NPPF – National Planning Policy Framework

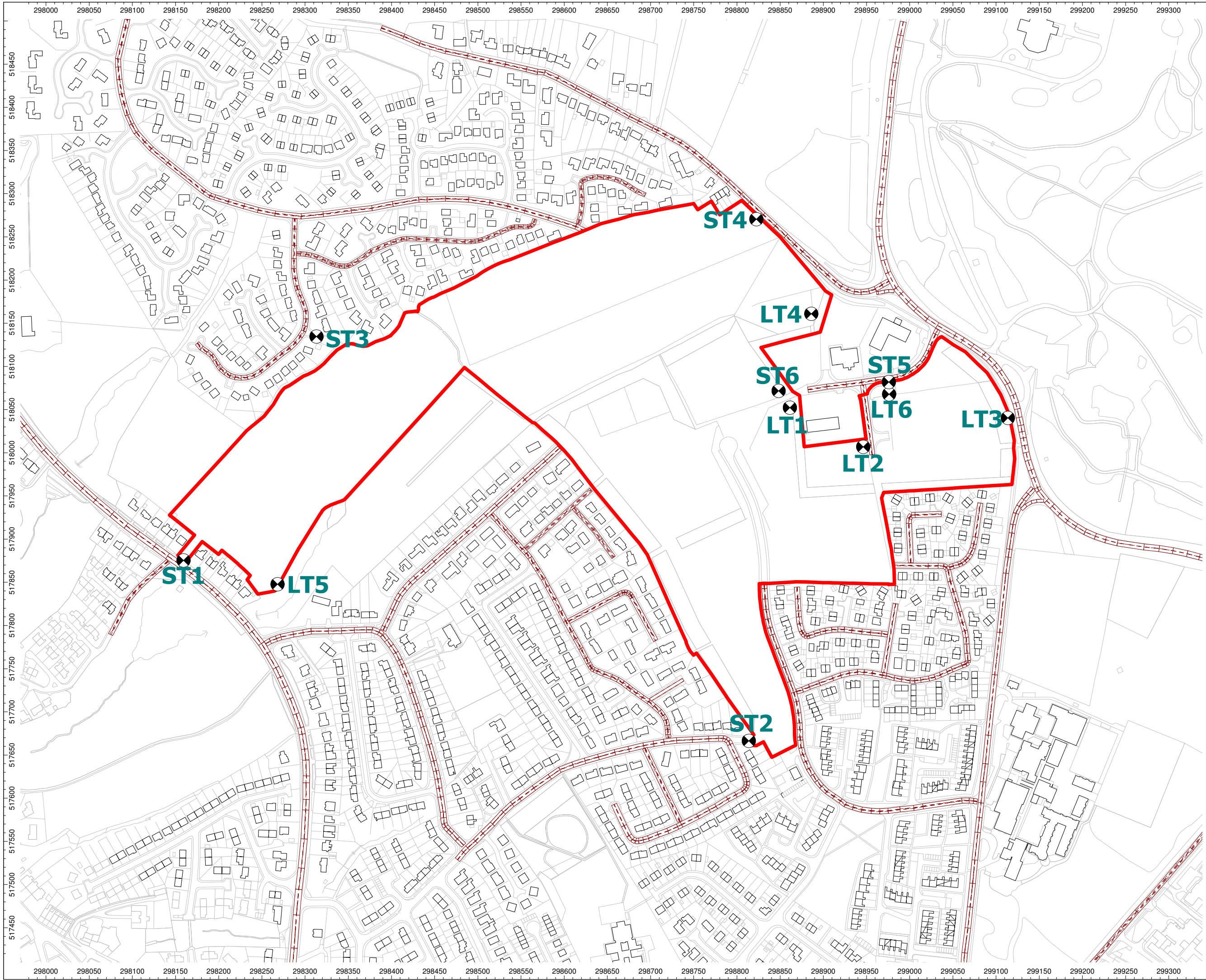
NPPG – National Planning Practice Guidance

SOAEL – Significant Observed Adverse Effect Level



Appendix B – Sketches

- SK01 Noise Monitoring Location Plan
- SK02 Receptor Location Plan (Façades)
- SK03 ProPG Stage 1 Proposed Daytime $L_{Aeq,16hr}$ Noise Contour Plot
- SK04 ProPG Stage 1 Proposed Night-time $L_{Aeq,8hr}$ Noise Contour Plot
- SK05 Noise Contour Plot Proposed Daytime $L_{Aeq,16hr}$
- SK06 Noise Contour Plot Proposed Night-time $L_{Aeq,8hr}$
- SK07 Assessed Barrier Location Plan



Client:
Homes England

Project:
Harras Moor

Project Number:
A090070-410

Site Address:
Harras Moor, Whitehaven

Drawing Title / Scenario:
Noise Monitoring
Location Plan

Drawing Number:
SK01

Key:

Noise Monitoring
Locations: 

Site Boundary: 

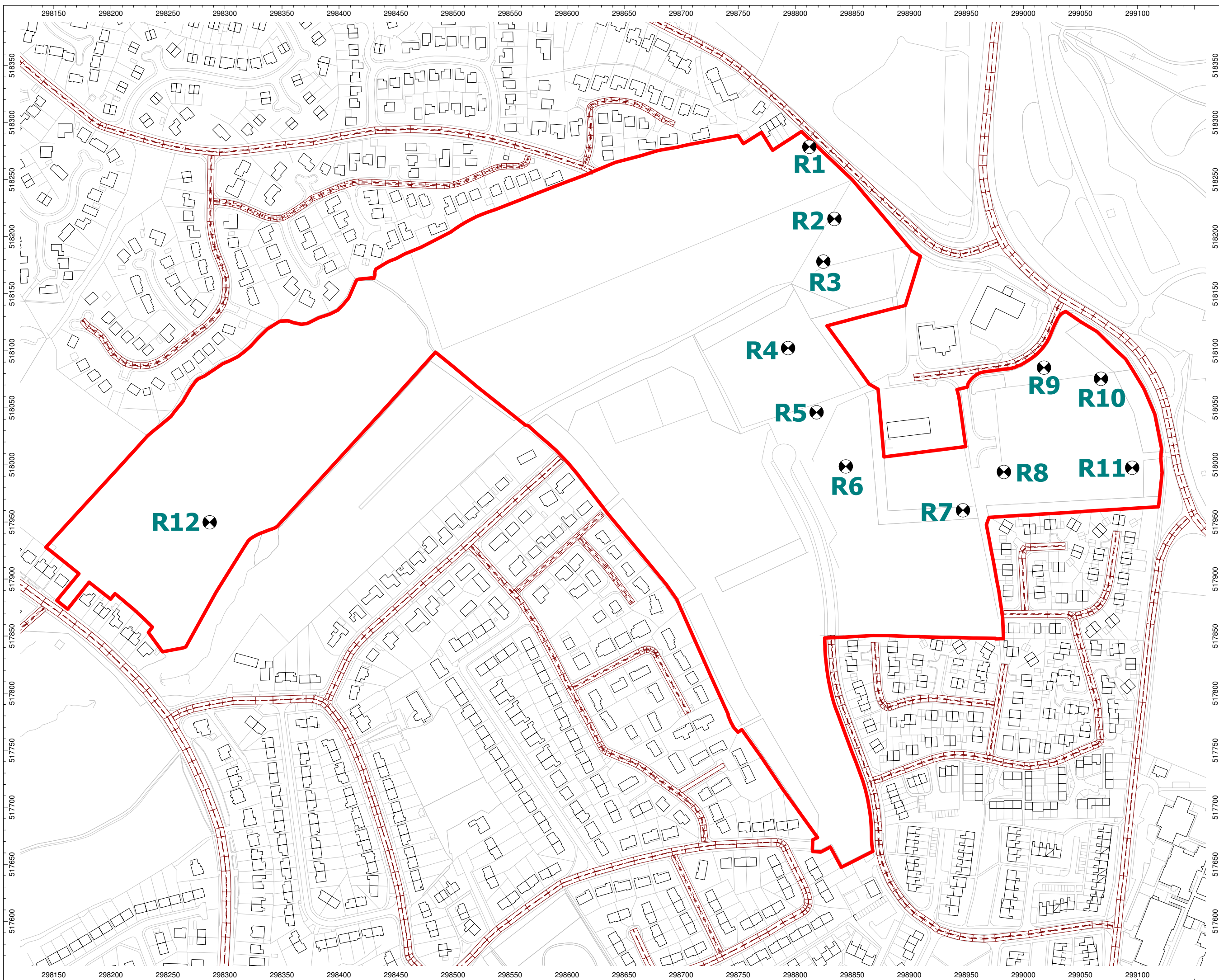
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Project Number:
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Site Address:
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Drawing Title / Scenario:
Receptor
Location Plan

Drawing Number:
SK02

Key:

Receptor Locations: 

Site Boundary:

Mobile Plant: +

Industrial Unit
Break Out: 

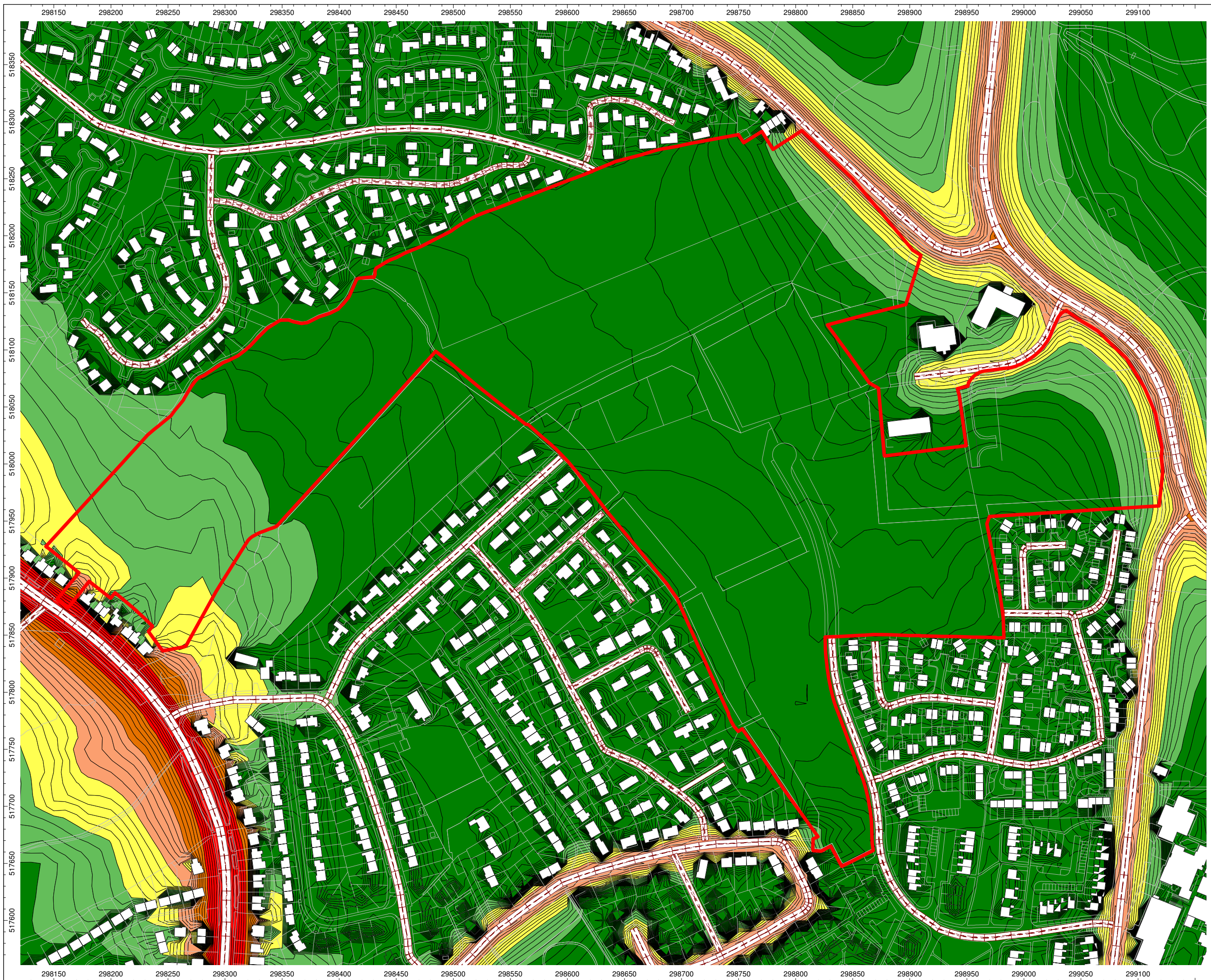
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Drawing Title / Scenario:
ProPG Stage 1
Daytime LAeq,16hour
Noise Contour Plot

Drawing Number:
SK03

Key:

Site Boundary:

	0.0 - 50.0 dB
	50.0 - 55.0 dB
	55.0 - 60.0 dB
	60.0 - 65.0 dB
	65.0 - 70.0 dB
	>70 dB

Contour plot for indicative purposes only.

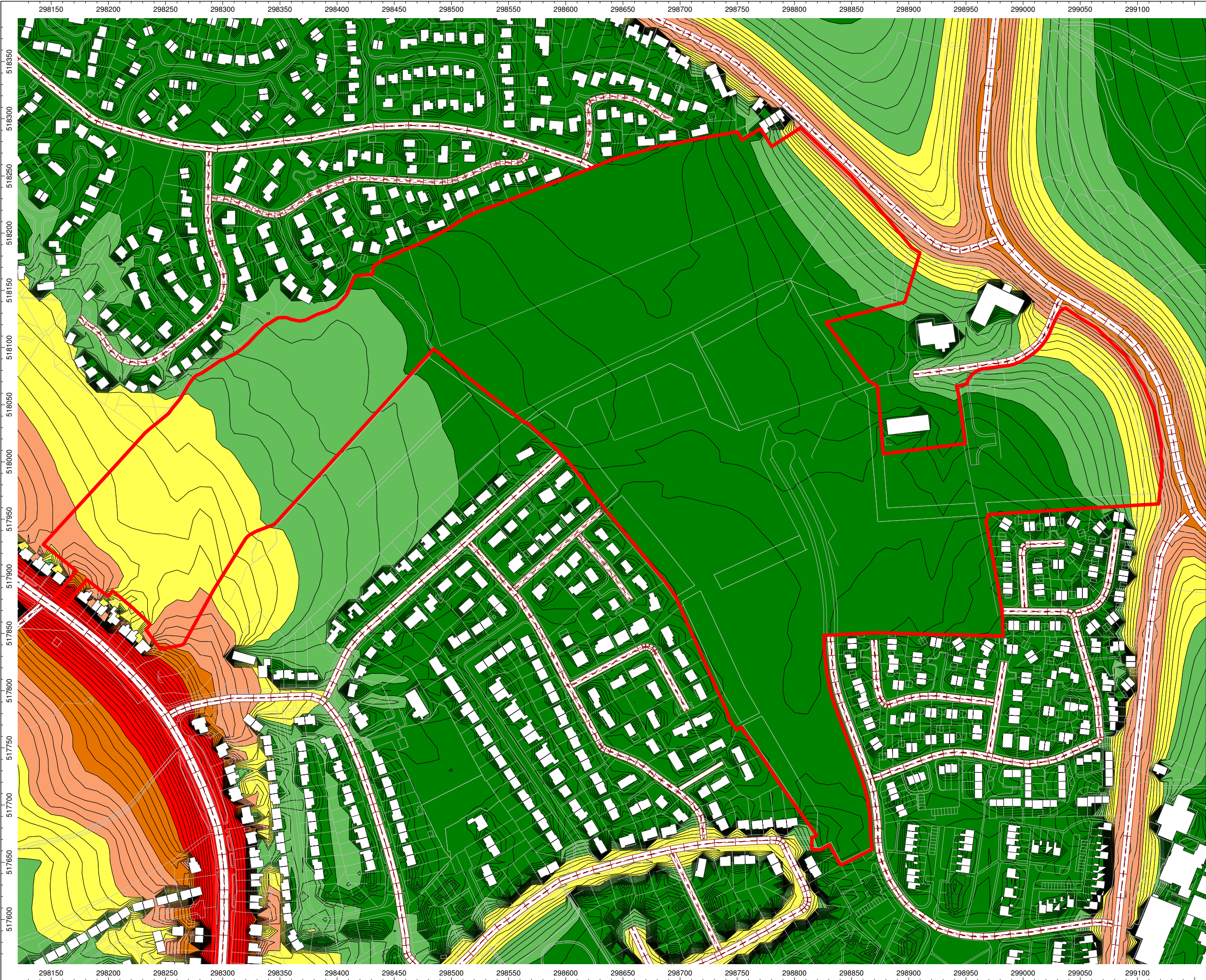
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Site Address:
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Drawing Title / Scenario:
ProPG Stage 1
Night-time LAeq,8hour
Noise Contour Plot

Drawing Number:
SK04

Key:

Site Boundary: 

 0.0 - 40.0 dB
 40.0 - 45.0 dB
 45.0 - 50.0 dB
 50.0 - 55.0 dB
 55.0 - 60.0 dB
 >60 dB

Contour plot for indicative
purposes only.

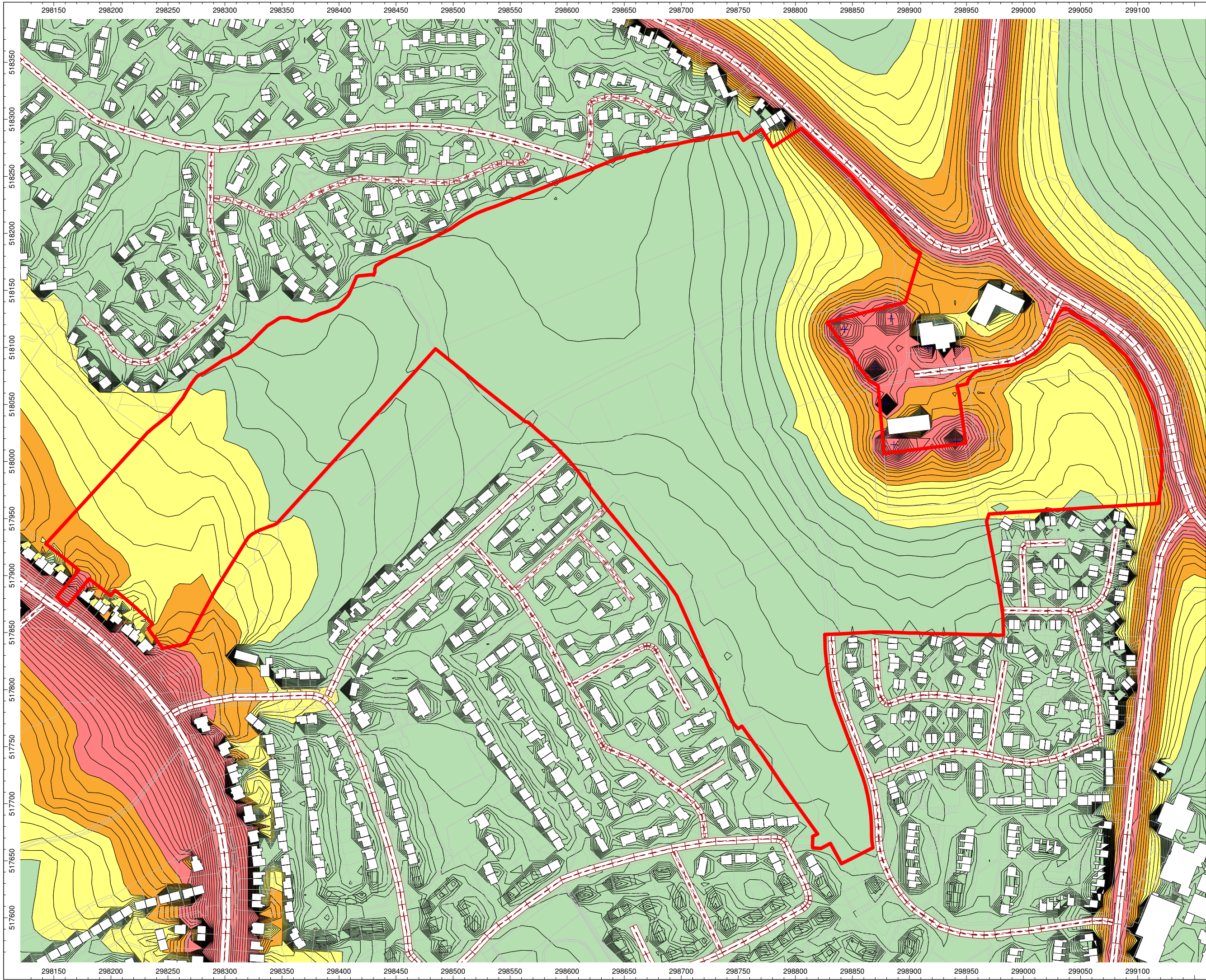
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Site Address:
Harras Moor, Whitehaven

Drawing Title / Scenario:
Daytime LAeq,16hour
Noise Contour Plot

Drawing Number:
SK05

Key:

Site Boundary: 

 0.0 - 50.0 dB

 50.0 - 55.0 dB

 55.0 - 60.0 dB

 >60.0 dB

Contour plot for indicative
purposes only.

Contour Plot at 1.5m Height

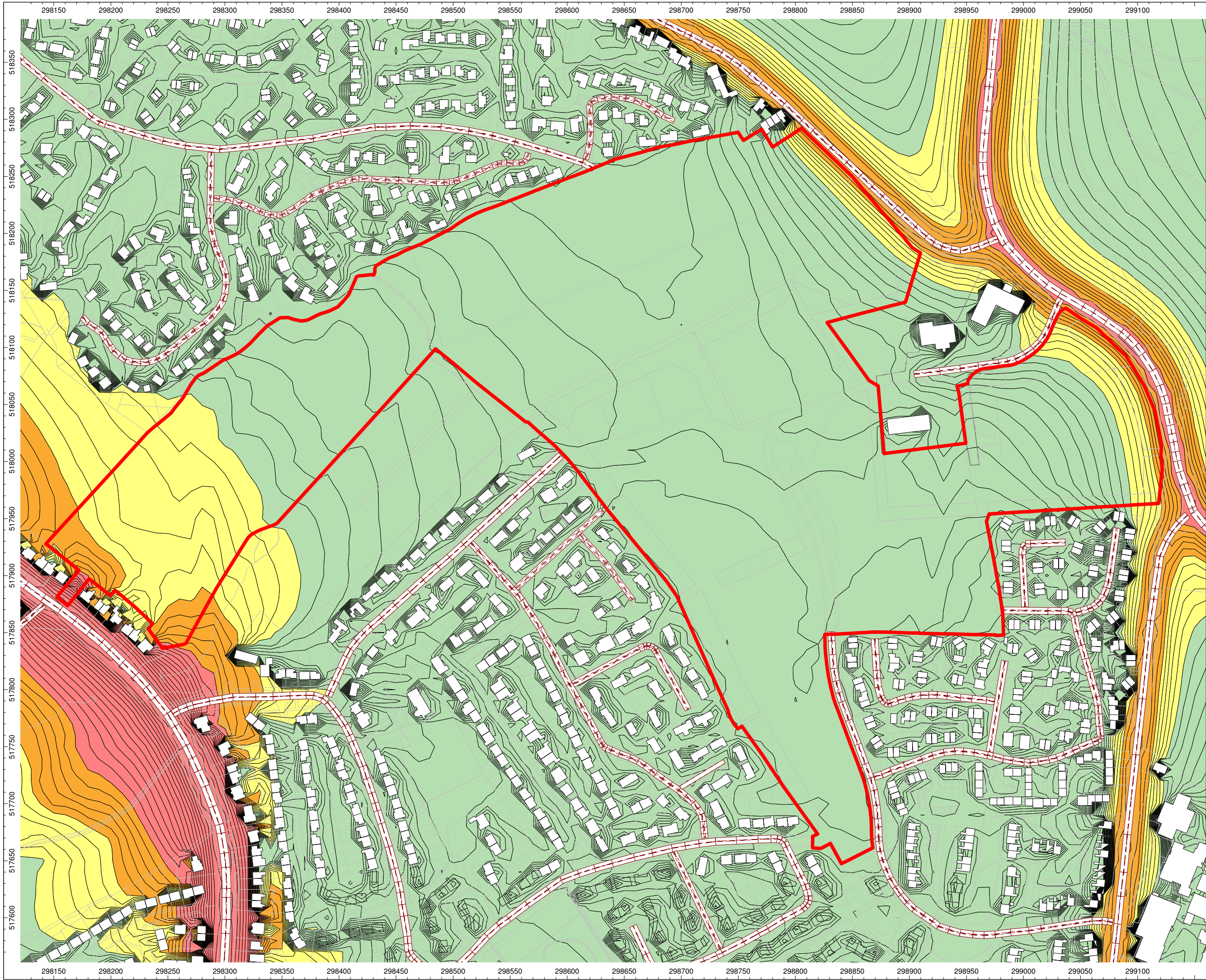
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Project Number:
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Site Address:
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Drawing Title / Scenario:
Night-time LAeq,8hour
Noise Contour Plot

Drawing Number:
SK06

Key:

Site Boundary: —

0.0 - 45 dB
45 - 50 dB(A)
50 - 55 dB(A)
>55 dB

Contour plot for indicative
purposes only.

Contour Plot at 4.0m Height

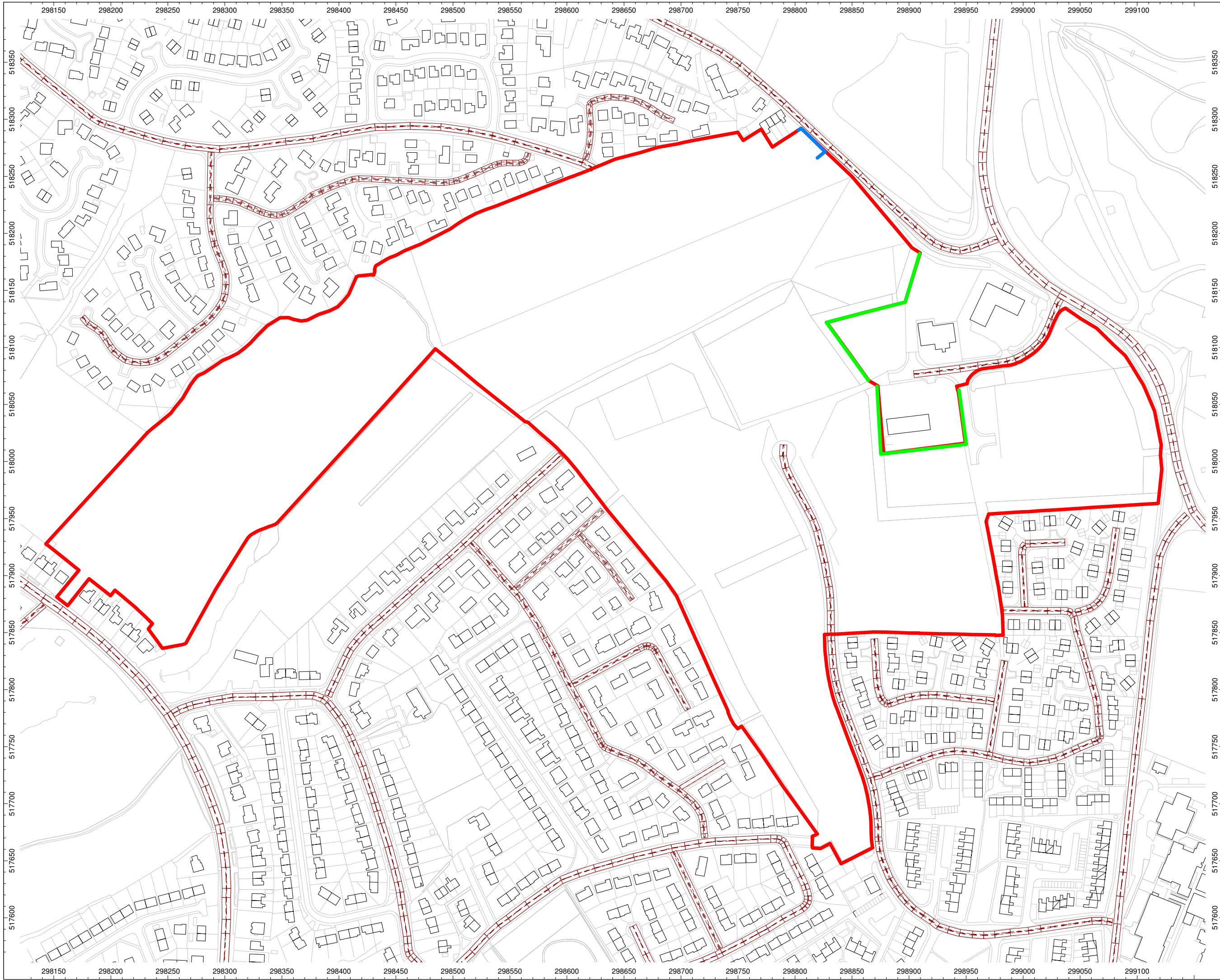
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Project Number:
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Site Address:
Harras Moor, Whitehaven

Drawing Title / Scenario:
**Barrier
Location Plan**

Drawing Number:
SK07

Key:

2.1m Barrier
Location: 

2.5m Barrier
Location: 

Site Boundary: 

Scale : Not to scale

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Appendix C – Parameters Plan



Legend

- Site boundary
- Proposed residential development up to 370 dwellings (16 DPH)
- Primary street (Indicative)
- Public open space (Indicative)
- Retained Ancient Woodland
- Ecological areas
- Proposed vehicular access
- Potential pedestrian access
- 15m buffer to Ancient Woodland
- Interface new to existing offset dwellings
- Proposed batter planting 5m depth
- Defensive screen planting
- Dwellings requiring potential additional offset



Project Site
Harras Moor

Parameters Plan

Dwg N^o: A090070-410 004 Rev: A

Drawn: KC Checked: SP

Date: 13/03/18

Scale: A2: 1:2500





Appendix D – Report Conditions

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