Our ref: NIA/5916/15/5697

23rd April 2015

Mr. Colin Muscroft
Battlefield Stud
Woodhouse
Belton
Doncaster
DN9 1QH

Sent by email only c/o: howard@howardjwroot.com

Dear Sir,

NOISE IMPACT ASSESSMENT FOR PROPOSED RESIDENTIAL DEVELOPMENT LAND AT 7 LAKES, EALAND, SCUNTHORPE, DN17 4JS

1.00 INTRODUCTION

1.01 Environmental Noise Solutions Ltd. (ENS) has been commissioned by Mr. Colin Muscroft to undertake a noise impact assessment for a proposed residential development on land at 7 Lakes, Ealand, Scunthorpe, DN17 4JS (hereafter referred to as the subject site).

1.02 The report has been completed in order to discharge Condition 5 of the planning approval (Reference : APP/Y2003/A/14/2221377). The objectives of the noise impact assessment were to:

- Determine the ambient noise climate at the application site;
- Assess the potential impact of the ambient noise climate on the proposed, residential development (with reference to the National Planning Policy Framework and other pertinent guidance); and
- Provide recommendations for a scheme of sound attenuation works, as necessary, to ensure that the future occupants of the proposed residential development do not experience any unacceptable loss of amenity due to noise.

1.03 This report details the methodology and results of the assessment and provides recommendations for the building envelope (fenestration and ventilation). It has been prepared to discharge Condition 5 of the planning approval for the proposed development.

1.04 This report has been prepared for Mr. Colin Muscroft for the sole purpose described above and no extended duty of care to any third party is implied or offered. Third parties making reference to the report should consult Mr. Colin Muscroft (developer), Mr. Howard Wroot (developer's agent) and ENS as to the extent to which the findings may be appropriate for their use.

1.05 A glossary of acoustic terms used in the main body of the text is contained in Appendix 1.

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2.00 SITE SETTING AND PROPOSED RESIDENTIAL DEVELOPMENT

2.01 The subject site is located on an undeveloped site at 7 Lakes (to the south west of the junction of the A161 and New Trent Street), Ealand, Scunthorpe, DN17 4JS (a site location plan is reproduced in Appendix 2 for reference). The subject site is bound by:

- An access road to the north, associated with the 7 Lakes holiday park opposite;
- Derelict, ex-industrial land to the east of Industrial Estate Road, with the A161, slightly elevated to the east with residential properties beyond;
- The Doncaster to Hull rail line to the south beyond undeveloped land; and
- The 7 Lakes holiday park to the west.

2.02 During the course of the noise survey, the ambient noise climate was dominated by road traffic noise and rail passes. No industrial noise sources were noted during the course of the survey.

2.03 Various passenger and freight rail passes were noted on the line to the south of the subject site. These rail passes consistently pass at a low speed with freight trains sounding their horns as they approach a level crossing at the Crowle Rail Station to the south east of the subject site. The developer's agent has confirmed that these freight trains do not sound their horns during the night time period (23:00 – 07:00 hours) as such horn noise has been excluded when considering rail passes at night.

2.04 The subject development proposals consist of 16 no. residential dwellings with associated gardens and a new access road taken from Industrial Estate Road, pre-existing at the application site (a site layout plan has been included in Appendix 3 for reference).

3.00 BASELINE NOISE SURVEY

3.01 In order to establish the noise climate at the subject site, a baseline noise survey was undertaken during the daytime on Thursday 2nd April 2015 (Measurement positions are identified in Appendix 2 for reference).

3.02 For the purpose of the assessment the following noise monitoring positions were adopted:

- MP1 was located circa 50 metres from the nearside kerb of the A161;
- MP2 was located circa 10 metres from the nearside kerb of the 7 Lakes access road;
- MP3 was located at the western boundary; and
- MP4 was located at the south western corner of the site.

3.03 Noise measurements were undertaken using a Bruel & Kjaer 2250 Type 1 integrating sound level meter. The measurement system calibration was verified immediately before the commencement of the measurement sessions and again at the end, using a Bruel & Kjaer Type 4231 calibrator. No drift in calibration level was noted. Weather conditions throughout the survey were appropriate for monitoring. Measurements consisted of A–weighted broadband parameters, together with linear octave band L_{eq} levels. All measurements were undertaken at a height of circa 1.5 metres above ground level in a free field environment.

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3.04 The following table contains a summary of the measurement noise data at the various noise monitoring positions, rounded to the nearest decibel.

Table 3.1 – Noise Measurement Data

Position	Date	Time	$L_{Aeq,T}$ (dB)	$L_{A90,T}$ (dB)	$L_{A10,T}$ (dB)	$L_{A1,T}$ (dB)	L_{AFMax} (dB)	Comment
MP1	02/04/15	10:00 – 10:30 11:00 – 11:30 12:02 – 12:30	56	46	59	64	82	Average level of 3 no. 30 minute samples Road traffic noise, Birdsong and Rail passes 82 dB L_{AFMax} associated with unusually loud non-serviced HGV
Daytime Ambient Noise Level = 56 dB $L_{Aeq\ (07:00-23:00)}$ based on CRTN Night Time Ambient Noise Level = 48 dB $L_{Aeq\ (23:00–07:00)}$ based on TRL Typical Maximum Noise Level Associated With A Vehicle Pass = 68 dB L_{AFMax}								
MP2	02/04/15	10:36 – 10:51	52	44	56	62	67	Road traffic noise Rail passes and Birdsong
Robust Daytime Ambient Noise Level = 53 dB $L_{Aeq\ (07:00-23:00)}$ Night Time Ambient Noise Level = $\leq$ 48 dB $L_{Aeq\ (23:00–07:00)}$ based on MP1 Typical Night Time Maximum Noise Level Associated With A Vehicle Pass = $\leq$ 64 dB L_{AFMax}								
MP3	02/04/15	11:36 – 11:51	49	44	51	60	69	Distant road traffic noise Rail passes and Birdsong
Daytime Ambient Noise Level = 49 dB $L_{Aeq\ (07:00-23:00)}$ Night Time Ambient Noise Level = $\leq$ 48 dB $L_{Aeq\ (23:00–07:00)}$ Based on MP1 Typical Night Time Maximum Noise Level Associated With A Vehicle Pass On The 7 Lakes Access Road = 57 dB L_{AFMax}								
MP4	02/04/15	12:42 – 13:12	42	38	44	48	61	Road traffic Birdsong and Aircraft
Ambient Noise Level = 42 dB $L_{Aeq\ (12:42–13:12)}$ Typical Maximum Noise Level Associated With A Vehicle Pass On The 7 Lakes Access Road = 51 dB L_{AFMax} Freight Train Pass Without Horn = 54 dB L_{AFMax}								

3.05 The principal noise sources at the application site are road traffic noise with frequent rail passes on the rail line to the south during the day and night time periods. This has been correlated with recent rail timetable information.

3.06 For the prediction of daytime road traffic noise, the Department of Transport's Memorandum on the Calculation of Road Traffic Noise (CRTN) explains that measurements of L_{A10} may be made during periods between 10:00 and 17:00 hours. Using measurements of L_{A10}, the $L_{A10\ (18\ hour)}$ can be calculated from the equation:

(i) $L_{A10\ (18\ hour)} = L_{A10\ (3\ hour)} - 1\ dB$

PPG24 further states that for road traffic noise:

(ii) $L_{Aeq\ (0700–2300)} \approx L_{A10\ (0600–0000))} - 2\ dB$

Substituting (ii) into (i) gives the following approximation:

(iii) $L_{Aeq\ (0700–2300)} \approx L_{A10\ (3\ hour)} - 3\ dB$

3.07 Although the procedure contained in CRTN has not been adopted, given the limited variation in road traffic noise observed during the course of the noise survey (as illustrated by the consistent L_{A10} level at MP1), the estimation of the daytime equivalent continuous noise level (dB $L_{Aeq\ (07:00–23:00)}$) from the $L_{A10\ (3\ hour)}$ is still considered valid for the purpose of establishing the ambient noise level at the western boundary of the application site.

3.08 Based on the above formula, the daytime ambient noise level is calculated as:

56 dB $L_{Aeq\ (0700-2300)}$ at MP1 (50 metres from A161)

3.09 A study prepared by TRL Limited on behalf of the Department for Environment, Food and Rural Affairs (DEFRA) entitled 'Converting the UK Traffic Noise Index $L_{A10\ (18\ hour)}$ to EU Noise Indices for Noise Mapping' presents a methodology for calculating night time road traffic noise levels based on daytime road traffic noise level based on the following formulae:

(iv) $L_{Aeq\ (2300–0700)} \approx 0.90 * L_{A10\ (18\ hour)} – 3.77$ (for non-motorways)

3.10 Based on the above formula, the night time ambient noise level is:

48 dB $L_{Aeq\ (2300\text{-}0700)}$ at MP1 (50 metres from A191)

3.11 With respect to railway noise at the southern site boundary, a freight train provided a maximum noise level of 54 dB L_{AFMax} without the use of a horn. Although a large number of trains are timetabled on the line during the night time period (circa 49 no.), a low ambient noise level has been calculated during the night time period utilising the measured SEL level of a typical train pass. In assuming:

- 49 no. train passes during the night time period (23:00 – 07:00); and
- an SEL level of 66 dB L_{AE} of a typical rail pass.

A night time ambient noise level associated with rail noise of:

- 66 – 10log(28800) + 10log(49) = **38 dB $L_{Aeq\ (0700\text{-}2300)}$**

This is significantly below the calculated night time ambient noise level measured / calculated across the site due to road traffic noise.

3.12 Based on the above measured / calculated noise levels, the following, worst case noise levels have been adopted for the purposes of the assessment:

- **56 dB $L_{Aeq\ (0700\text{-}2300)}$ across the application site during the daytime period;**
- **48 dB $L_{Aeq\ (2300\text{-}0700)}$ across the application site during the night time period; and**
- **68 dB L_{AFMax} across the application site during the night time period.**

4.00 NOISE IMPACT ASSESSMENT CRITERIA

4.01 The National Planning Policy Framework (NPPF), came into force on 27 March 2012 and is a material consideration in planning decisions. At the heart of the NPPF is a presumption in favour of sustainable development, and the policies in Paragraphs 18 to 219 of the NPPF, taken as a whole, constitute the Government's view on what sustainable development in England means in practice for the planning system.

4.02 The NPPF states that there are three dimensions to sustainable development, which include an economic role (contributing to building a strong, responsive and competitive economy), a social role (providing the supply of housing required to meet the needs of present and future generations) and an environmental role (which includes minimising waste and pollution).

4.03 The NPPF supersedes Planning Policy Guidance Note 24 (PPG 24). The main policy statement in relation to noise is Paragraph 123 of the NPPF, which states

Planning policies and decisions should aim to:

- *Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;*
- *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;

- *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*

- *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.*

4.04 In relation to 'adverse impacts', the NPPF refers to the Explanatory Note to the Noise Policy Statement for England (NPSE) for guidance.

4.05 The Noise Policy Statement for England (NPSE) and associated Explanatory Note were published by DEFRA in 2010 and set out the Government's noise management strategy to enable noise management decisions to be made within the wider context (i.e. guiding principles of sustainable development), in a cost-effective manner and in a timely fashion.

4.06 Fundamental to this approach is '*there is a need to integrate consideration of the economic and social benefit of the activity or policy under examination with proper consideration of the adverse environmental effects, including the impact of noise on health and quality of life. This should avoid noise being treated in isolation in any particular situation, i.e. not focussing solely on the noise impact without taking into account other related factors'*.

4.07 The noise policy aims of NPSE are to (i) avoid significant adverse impact on health and quality of life, (ii) mitigate and minimise adverse impacts on health and quality of life, and (iii) where possible, contribute to the improvement of health and quality of life. The policy aims are always to be considered within the context of the Government's policy on sustainable development.

4.08 In relation to the mitigation and minimisation of adverse impacts, NPSE considers that '*in reality, although not always stated, the aim has tended to be to minimise noise 'as far as is reasonably practical'*. This is reinforced in Paragraph 2.24 of the Explanatory Note, which requires that '*all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development. This does not mean that such adverse effects cannot occur'*.

4.09 In relation to explaining the 'significant adverse' and 'adverse' effects quoted in the NPPF, NPSE uses the two established concepts from toxicology that are currently being applied to noise impacts, for example by the World Health Organisation (WHO), these are:

- NOEL – No Observed Effect Level. This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to noise.

- LOAEL – Lowest Observed Adverse Effect Level. This is the level above which adverse effects on health and quality of life can be detected.

4.10 The NPSE then extends these concepts to lead to a SOAEL – Significant Observed Adverse Effect Level. This is the level above which significant adverse effects on health and quality of life occur.

4.11 No specific criteria are presented in the NPSE, to provide the necessary policy flexibility until further evidence and suitable guidance is available. In lieu of specific criteria, for this assessment, ENS makes reference to existing guideline documents, which are summarised in the following paragraph(s).

4.12 BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings' (BS 8233) supersedes the 1999 version of the Standard, which has been withdrawn. BS 8233 sets guideline indoor ambient noise levels for dwellings, for steady external noise sources, which it is desirable are not exceeded. These levels are reproduced in Table 4.1 and are based on guidelines issued by the World Health Organisation (WHO). The Standard also states that

where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved. The Standard considers that for regular individual noise events, a guideline value may be set in terms of SEL or L_{AFmax} depending on the character and number of events per night. The WHO Guidelines on Community Noise (1999) considers that if negative effects on sleep are to be avoided, noise events exceeding 45 dB L_{Amax} should be limited.

Table 4.1 – Indoor Ambient Noise Levels in Dwellings (as recommended in BS 8233:2014)

Activity	Location	07:00 – 23:00	23:00 – 07:00
Resting	Living room	35 dB $L_{Aeq,16hour}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

4.13 For traditional external areas that are used for amenity space, such as gardens and patios, BS 8233 considers that it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. BS 8233 also states '*However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited'.*

4.14 With reference to the BS 8233 guidelines, by definition, 'reasonable internal conditions' cannot represent a significant adverse impact (the prevention of which is the 1st aim of NPSE). With cognisance to the 2nd aim of NPSE (to minimise noise impact), the internal ambient noise levels detailed in Table 4.1 are considered appropriate.

4.15 Likewise, for external amenity space, a design range of 50 to 55 dB $L_{Aeq,T}$ is considered appropriate to comply with the requirements of the NPPF. Furthermore, the BS 8233 guidance that in certain circumstance '*development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited',* is considered to be in keeping with the NPSE Explanatory Note, which requires that '*all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development. This does not mean that such adverse effects cannot occur*'.

4.16 On the basis of the above and based on the identified noise sources, for residential development of the subject site, the following criteria are considered to be in keeping with the aims of the NPPF:

- 35 dB $L_{Aeq(0700-2300)}$ in living rooms during the daytime.
- 30 dB $L_{Aeq(2300-0700)}$ in bedrooms at night.
- 45 dB L_{AFMax} not normally exceeded in bedrooms at night.
- Guideline range of 50 - 55 dB $L_{Aeq(0700-2300)}$ in gardens during the daytime and where this is not achievable, design to achieve the lowest practicable levels.

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5.00 SCHEME OF SOUND ATTENUATION

5.01 Based on measurements taken at numerous sites, a typical standard double glazed window with trickle vents in a building façade provides circa 27 dB(A) sound insulation (from external to internal). The reduction provided by standard double glazing and trickle vents will meet the internal noise level criteria for both living rooms and bedrooms.

5.02 Daytime ambient noise levels across the application site are relatively low at up to 56 dB $L_{Aeq\ (0700–2300)}$. It is considered that no mitigation is required to garden areas.

6.00 CONCLUSIONS

6.01 A noise impact assessment has been undertaken for an approved residential development consisting of 16 no. dwellings at 7 Lakes, Ealand, Scunthorpe, DN17 4JS

6.02 The ambient noise climate across the subject site is road and rail traffic noise.

6.03 A scheme of sound attenuation works has been developed to protect the proposed residential development from the local noise climate.

I trust the foregoing is sufficient for your needs. Should you have any queries regarding the above, please do not hesitate to contact me.

Yours sincerely,

Daniel Bailey

MIOA, Diploma in Acoustics and Noise Control, BSc (Hons)
Environmental Noise Solutions Limited

cc File

Appendix 1
Glossary of Acoustic Terms

Sound Pressure Level (L_p)

The basic unit of sound measurement is the sound pressure level. As the pressures to which the human ear responds can range from 20 µPa to 200 Pa, a linear measurement of sound levels would involve many orders of magnitude. Consequently, the pressures are converted to a logarithmic scale and expressed in decibels (dB) as follows:

$$L_p = 20 \log_{10}(p/p_0)$$

Where L_p = sound pressure level in dB; p = rms sound pressure in Pa; and p_0 = reference sound pressure (20 µPa).

A-weighting Network

A frequency filtering system in a sound level meter, which approximates under defined conditions the frequency response of the human ear. The A-weighted sound pressure level, expressed in dB(A), has been shown to correlate well with subjective response to noise.

Equivalent continuous A-weighted sound pressure level, $L_{Aeq, T}$

The value of the A-weighted sound pressure level in decibels of continuous steady sound that within a specified time interval, T, has the same mean-square sound pressure as a sound that varies with time. $L_{Aeq, 16h}$ (07:00 to 23:00 hours) and $L_{Aeq, 8h}$ (23:00 to 07:00 hours) are used to qualify daytime and night time noise levels.

$L_{A10, T}$

The A-weighted sound pressure level in decibels exceeded for 10% of the measurement period, T. $L_{A10, 18h}$ is the arithmetic mean of the 18 hourly values from 06:00 to 24:00 hours.

$L_{A90, T}$

The A-weighted sound pressure level of the residual noise in decibels exceeded 90% of a given time interval, T. L_{A90} is typically taken as representative of background noise.

$L_{AF\ max}$

The maximum A-weighted noise level recorded during the measurement period. The subscript 'F' denotes fast time weighting, slow time weighting 'S' is also used.

Sound Exposure Level (SEL or L_{AE})

The energy produced by a discrete noise event averaged over one second, no matter how long the event actually took. This allows for comparison between different noise events which occur over different lengths of time.

Weighted Sound Reduction Index (R_W)

Single number quantity which characterises the airborne sound insulation properties of a material or building element over a defined range of frequencies (R_W is used to characterise the insulation of a material or product that has been measured in a laboratory).

Appendix 2
Approximate Noise Monitoring Positions & Site Location Plan

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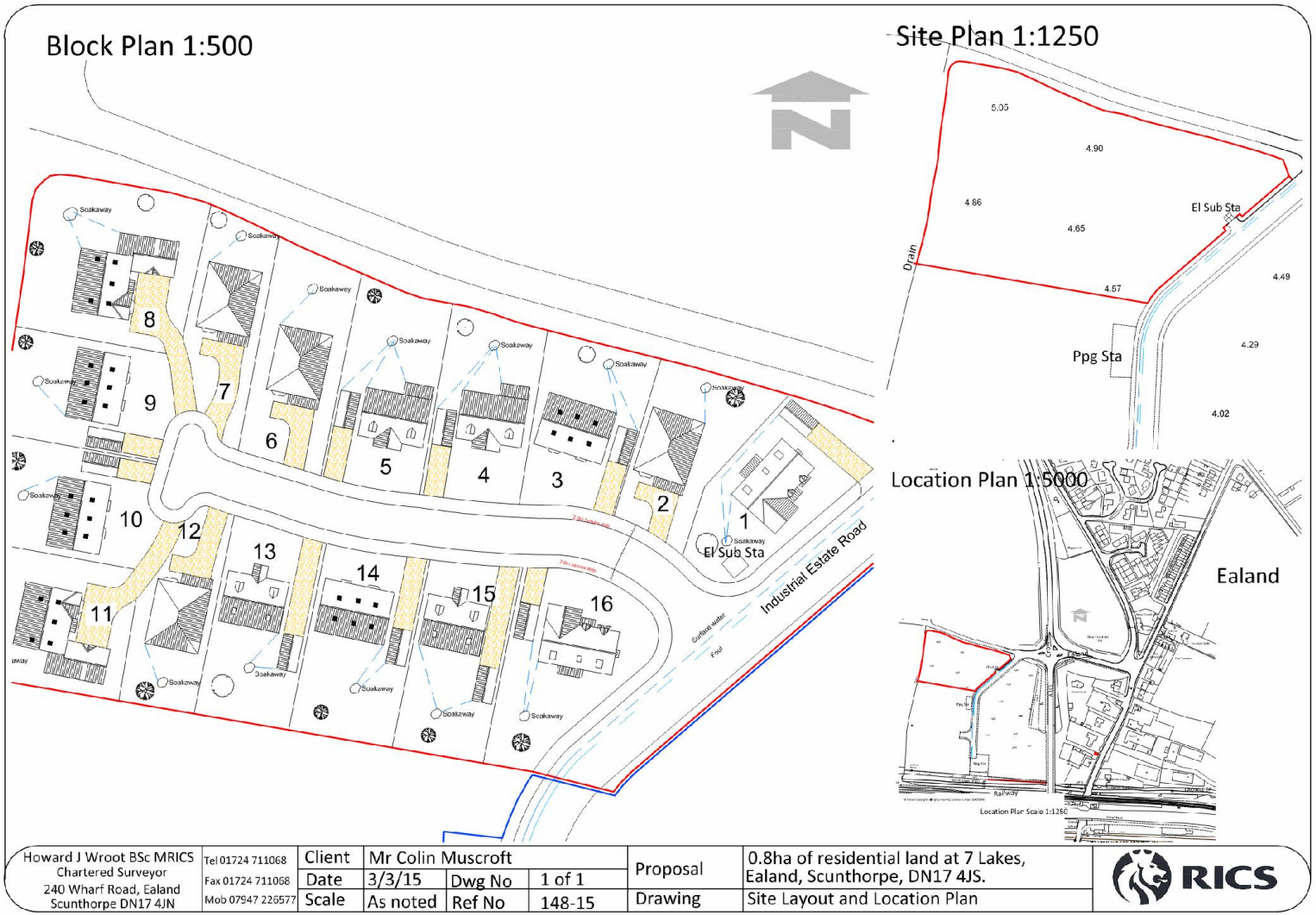
Appendix 3
Site Plan



Howard J Wroot BSc MRICS Chartered Surveyor 240 Wharf Road, Ealand Scunthorpe DN17 4JN	Tel 01724 711068 Fax 01724 711068 Mob 07947 226577	Client	Mr Colin Muscroft			Proposal	0.8ha of residential land at 7 Lakes, Ealand, Scunthorpe, DN17 4JS.
		Date	3/3/15	Dwg No	1 of 1		
		Scale	As noted	Ref No	148-15	Drawing	Site Layout and Location Plan