

15 NOISE

15.1 Introduction

15.1.1 This chapter, prepared by Brookbanks Consulting Limited (BCL), assesses the noise and vibration impacts of the proposed development. It considers

- the potential effects of noise and vibration from the construction of the proposed development on existing sensitive receptors;
- the potential impact of existing and proposed noise sources on the proposed noise sensitive areas of development.

15.1.2 In the context of the current legislative regime the chapter describes;

- the methods used to assess the impacts
- the baseline conditions currently existing at the site
- the potential direct and indirect impacts of the development arising from noise and vibration
- any mitigation measures required to prevent, reduce or offset the impacts
- the residual impacts

15.2 Location and Proposals

15.2.1 The area of assessment is located north of Birstall on the northern edge of the Leicester "Principal Urban Area". At the outset land in three quadrants formed by the intersection of the A6 and A46 were included in the assessment. As a consequence of the Charnwood Local Plan Core Strategy process and iterative masterplanning the final proposals confine built development to the area west of A6 and north of A46. Therefore conclusions on the assessment of noise issues relate to the final Framework Masterplan.

15.3 National Planning Policy Framework (2018)

15.3.1 The National Planning Policy Framework (NPPF) sets out the Government's National Planning Policies for England and how these can be applied by local communities when developing their local plans or deciding planning application to best reflect the needs and priorities of the local communities. Current planning law requires Local Authorities to determine planning applications in accordance with the local development plan unless there are material considerations which require them to reach a different decision.

15.3.2 Paragraph 170 indicates that Planning policies and decisions should contribute to and enhance the natural and local environment by:

- Preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans.

15.3.3 Paragraph 180 indicates that Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life.
- identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

15.3.4 NPPG Noise Exposure Hierarchy

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not noticeable	No Effect	No Observed Effect (NOEL)	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly effect the acoustic character of the area but not such that there is a perceived change in the quality of life	No Observed Adverse Effect	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, 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)			
Perception	Examples of Outcomes	Increasing	Action

		Effect Level	
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.	Unacceptable Observed Adverse Effect	Avoid
Noticeable and Very Disruptive	Extensive and regular changes in behaviour and / or inability to mitigate effect of noise leading to psychological stress or psychological effects eg regular sleep deprivation/ awakening; loss of appetite, significant medically definable harm - including auditory and non-auditory	Unacceptable Observed Adverse Effect	Prevent

15.3.5 Whilst this hierarchy is a useful description of relative noise effects it is subjective and does not set noise level criteria. The next section describes the scope of the noise assessment and its methodology.

15.3.6 NPPG also states that neither the National Policy Statement for England nor the NPPF (which reflects NPSE) expect noise to be assessed in isolation i.e. separately from the economic, social and environmental dimensions of the proposed development.

British Standard 8233:2014; Sound Insulation and Noise Reduction for Buildings

15.3.7 BS8233:2014 gives recommendations for the control of noise in and around buildings and suggests appropriate criteria and internal noise limits for habitable rooms of residential dwellings. In accordance with the requirements of BS8233, the following internal and daytime noise limits will need to be met within sensitive rooms of the residential dwellings:

- 35dB LAeq (16 hour) during the daytime in living rooms; and
- 30dB LAeq (8 hour) during the night time in bedroom areas.
- 55 dB LAeq,T for noise in external amenity areas.

Calculation of Road Traffic Noise

15.3.8 The Calculation of Road Traffic Noise is the standard UK procedure for defining measurement and calculation methods for assessing road traffic noise. The

procedures assume typical traffic and noise propagation conditions, which are consistent with moderately adverse wind speeds and direction during the specified periods.

- 15.3.9 All predicted noise levels are expressed in terms of LA10 (1-hour) or LA10 (18-hour) between 0600 and 2400. The LA10 (18-hour) is the arithmetic average of the values of LA10 hourly data for each of the eighteen 1-hour periods between 0600 and 2400.

British Standard 5228: Code of Practice for Noise and Vibration Control on Construction and Open Sites

- 15.3.10 BS5228: 'Code of Practice for Noise and Vibration Control on Construction and Open Sites' sets out the methodology to predict construction noise and the control of noise and vibration. It provides guidance on methods of predicting and measuring noise and assessing its impact on those exposed to it, and also recommendations for basic methods of vibration control.

- 15.3.11 The standard provides guidance for identifying the significance of noise and vibration levels from surface construction activity. Significance can be considered in relation to fixed limits for noise and vibration, or alternatively in considering the potential change in the ambient noise level with the addition of construction noise.

- 15.3.12 There are no national noise criteria for limiting noise from construction sites. BS 5228 Annex E gives guidance on the significance of noise effects from construction and recommends the ABC method to establish construction noise limits.

15.4 Noise Assessment Scope and Methodology

Scope

- 15.4.1. A formal request was made to Charnwood Borough Council in February 2014 to confirm the scope of environmental assessment. The Borough Council issued its Scoping Opinion in April 2014 in response to the submitted Environmental Statement Scoping Report. Both documents are included as part of the Broadnook planning application submissions.

- 15.4.2 The scoping confirmed;

- a desk-based initial review had been concluded and had identified that the baseline noise conditions on the site are dominated by transportation sources on the A6, Loughborough Road and A46
- baseline conditions would be confirmed by a noise monitoring exercise completed following liaison with the Borough Council's Environmental Protection Team. Ann Green of the Borough Council has advised in this regard
- construction activities are a potential, albeit temporary source of noise and vibration. British Standard (BS) 5228-1 (2009) contains detailed advice on

'best practicable means' for controlling noise and minimising impacts during construction

- having established the prevailing local noise environment both ambient and generated noise will be assessed in relation to existing and proposed noise sensitive receptors
- if justified noise mitigation measures will be identified
- information from the Transport Assessment will be used to inform road traffic noise level predictions
- no source of operational vibration was identified. Therefore vibration impacts during the operational phase of the proposed development have been scoped out

Methodology

15.4.3 The assessment therefore considers the following potential noise impacts;

- (i) potential noise impact from construction activities on existing sensitive receptors in the vicinity of the proposal – assessed in accordance with British Standard 5228-1 2009 *“Code of Practice for Noise and Vibration Control on Construction and Open Sites”*
- (ii) the potential impact of existing and any future sources of noise across the proposed noise sensitive parts of the garden suburb – the residential areas.

These have been assessed with reference to;

- National Planning Policy Framework
- Planning Policy Guidance 24 (PPG 24) - whilst superseded by NPPF Charnwood Borough Council has requested an assessment in relation to PPG24 Noise Exposure Categories (NECs)
- British Standard 8233:2014 *“Sound Insulation and Noise Reduction for Buildings – Code of Practice”*
- (iii) the potential impact of noise from development – generated vehicles on existing and proposed sensitive receptors on and in the vicinity of the proposed development. Existing and future traffic noise levels both with and without development in place have been predicted using the calculation procedures set out in the Department of Transport Memorandum *“Calculation of Road Traffic Noise”* (CRTN) 1988

15.5 Noise from Earthworks and Construction Phase Activities

15.5.1 Construction works will have the potential to generate noise and create an impact on the area of activity and surroundings.

15.5.2 Guidance on the predictions and assessment of noise from development sites is set out in **British Standard 5228-1 : 2009** *“Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1 : Noise”*.

15.5.3 Annex C of the guidance presents a range of current sound level data on typical site equipment and common site activities.

15.5.4 Construction noise can have disturbing effects. The effects are varied and by their very nature site works will be characterised by noise sources which will change location and construction methods. The duration of site operations and by phase are also important considerations. The temporary and dynamic nature of the operations may mean that higher noise levels can be acceptable.

15.5.5 The Broadnook proposal has clear boundaries, two of which are the primary dual carriageways of A6 and A46. The western boundary is formed by the Great Central Railway. The northern boundary is defined within an extensive area of “green infrastructure” – parkland, woodland and agriculture. For the purposes of this assessment the occupants of residential property in the vicinity of the site are considered to be the receptors most likely to be affected by the construction phases of the development. There are a total of three on-site dwellings, with two being adjacent to the A6 dual carriageway. These properties have an ambient noise level generated by high traffic volumes on the A6.

15.5.6 In terms of the control of construction activities Charnwood Borough Council recommends that construction operations take place between the following hours:

- | | | |
|------|-----------------------|------------------------|
| i) | Monday – Friday | 07.00 – 18.00 |
| ii) | Saturdays | 07.30 – 12.30 |
| iii) | Sundays/Bank Holidays | No work at these times |

15.5.7 In addition the Borough Council makes the following general recommendations in relation to noise generated on construction sites:

- (i) equipment should be silenced and where appropriate acoustic screens put in place
- (ii) equipment should meet EU noise emission standards
- (iii) where possible and options are available construction techniques should avoid very noisy activities
- (iv) site practices should meet BS 5228 which provides relevant guidance on noise control on construction
- (v) neighbours including residents should be advised well in advance of any particularly noisy activities. For significant projects and / or where relevant more formal liaison, contact and reporting procedures should be put in place to ensure effective and ongoing communications with any affected communities or group.

- (vi) working should be undertaken in the context of a Construction Environmental Management Plan (CEMP) submitted by the contractor to the Borough Council for approval under the terms of a planning condition should overall planning consent be granted. This will set the parameters for considerate construction and the context for ongoing control and monitoring.

15.5.8 If necessary or appropriate the Control of Pollution Act 1994 also enables local authorities to serve a notice under Section 60 to impose requirements on the way in which construction works are carried out. Such a notice can specify times of operations, maximum noise levels which should be emitted and the type of plant to be used.

15.5.9 British Standard 5228-1 provides guidance on significance criteria for assessing noise generated by earthworks and construction, by what is termed the ABC method. Ambient noise levels at each receptor location are recorded and rounded to the nearest 5dB (A) to determine the appropriate threshold value in accordance with the category value A, B or C as follows:

ABC Method of BS 5228-1

Thresholds of Significant Impact from Construction Noise at Residential Receptors

Assessment Category and Threshold Value Period (UAeq)	Threshold Value in Decibels (dB)		
	Category A	Category B	Category C
Daytime (0700 to 1900) hours) and Saturdays (0700 to 1300 hours)	65	70	75

Category A: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than this value

Category B: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as Category A values

Category C: Threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than Category A values

15.5.10 The noise level likely to be generated at the receptor during the construction phase ie the ambient noise level plus the construction noise is then compared to the appropriate category value. If the noise level is greater than the appropriate category value, a significant noise impact may be experienced.

15.5.11 At the Broadnook site a representative baseline noise level at the properties adjacent A6 can be gauged from recordings at Monitoring Position 3 (see next section). The average daytime ambient noise level measured here is 67dB, or Category Value B in terms of BS 5228-1.

15.5.12 In addition to construction and groundworks activities noise can also be achieved at sensitive receptors from vehicle movements to and from development which will also be carried out in phases. At this point in the planning process, detailed traffic data relating to the likely number of construction vehicles is not available. However the level of construction vehicles is not considered to be significant relative to the existing flows on the major A6 road adjacent to the existing properties. It is therefore considered that the level of ambient noise in this location will not change significantly due to construction vehicles during the construction phases. Construction activity itself will be controlled itself by a Construction Environmental Management Plan to be approved and monitored by the local planning authority.

15.6 Operational Development

Noise standards to be considered

15.6.1 **National Planning Policy Framework (NPPF):** The Department of Communities and Local Government published the National Planning Policy Framework. Its advice reflects the Noise Policy Statement for England which was produced to support the reforms of the planning system and to promote sustainable growth. The NPPF has resulted in the withdrawal of earlier advice contained in Planning Policy Guidance and Statements including PPG24 "Noise". However, many Environmental Health Officers continue to use the noise boundaries defined by PPG24 as background reference criteria particularly where housing proposals are being brought forward.

15.6.2 Noise Exposure Categories (NECs) were identified for residential development in PPG24, with recommended levels for exposure to different noise sources. They were based on widespread experience and continue to be helpful reference in assessments. This approach is supported by Charnwood Borough Council. These categories are shown below;

NEC	Road Traffic Noise Sources		Planning Advice
	Daytime (07.00 – 23.00) LAeq 16hr dB	Night Time (23.00 – 07.00) LAeq.8hr dB	
A	<55	<45	Noise need not be considered as a determining factor in granting planning permission, although noise at the high end of the category should not be regarded as a desirable level
B	55-63	45-57	Noise should be taken into account when determining planning applications and, where possible, conditions imposed to ensure an adequate level of protection against noise
C	63-72	57-66	Planning permission should not normally be granted. Where it is considered that permission should be given, for example because there are no quieter sites available, conditions should be imposed to ensure a

			commensurate level of protection against noise
D	>72	>66	Planning permission should normally be refused

Figure 3a: PPG24 NEC categories

15.6.3 **British Standard 8233:2014: Sound Insulation and Noise Reduction for Buildings:** BS8233 was updated in February 2014 which has amended noise environment targets. The updated internal targets that are now ‘desirable’ are;

- 35dB LAeq (16 hour) during the daytime in living rooms
- 30dB LAeq (8 hour) during the night time in bedroom areas

It also gives an upper guideline value for external noise as 55dB LAeq (T)

Existing Noise Environment – Baseline Conditions

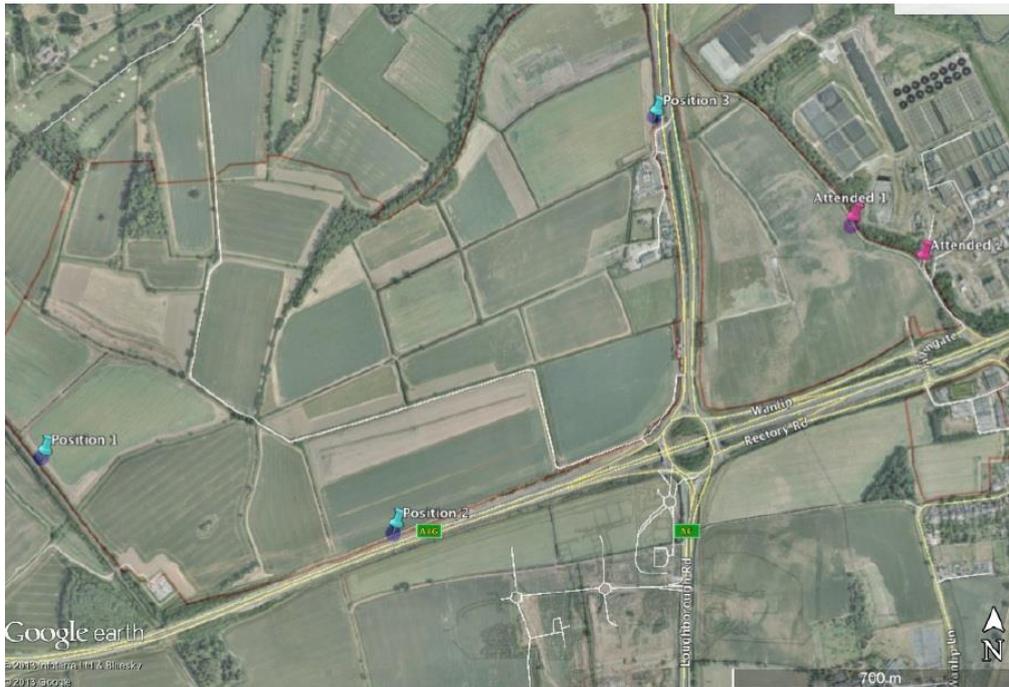
15.6.5 To understand the current noise environment across the area of assessment, a noise monitoring strategy was developed in accordance with good practice. This included monitoring the existing noise levels at appropriate locations over a 24-hour period. Further manned surveys were carried out to record the noise environment around the nearby water reclamation works east of A6.

15.6.6 The surveys were completed in accordance with relevant guidance such as BS7445:2003; “Description and Measurement of Environmental Noise”. The survey recorded LAeq, LAmax, LA10 and LA90 noise levels for both day time and night time.

15.6.7 As requested by the Environmental Protection Team at Charnwood Borough Council, the monitoring was performed in September 2013 to include the term time traffic effect of the nearby Longslade/Stonehill Secondary Schools and Ratcliffe College.

Dates and times of noise monitoring

15.6.8 The monitoring was conducted covering periods of 24 hours between Monday 9th September and Wednesday 11th September 2013. During the survey 5 minute measurements were made over a typical daytime and night-time periods. 1 minute measurements were made at the railway monitoring noise location. The measurements were subsequently analysed into hourly periods. The monitoring locations are indicated below;



Plan 1: Noise monitoring locations

15.6.9 The results of the noise monitoring are illustrated below. The points of monitoring were adjacent to the highway and railway to determine noise levels generated by traffic and any railway operations. The operation of the railway has been assessed through the noise monitoring. This has identified that the impact noise from the rail line is negligible and road traffic is identified as the predominant noise source adjacent A6 and A46.

Position	Daytime LAeq 16hr	Night-time LAeq 8hr
1	44	35
2	67	62
3	67	60

Figure 4b: Results of automatic recording locations

15.6.10 The attended surveys performed adjacent to the water reclamation works showed an LAeq varying between 51.5dB and 46.5dB at position 1 and 51.7dB and 49.7dB at position 2. Again at both positions, noise from the A6 or A46 respectively is identified as the dominant noise source in this area.

15.6.11 The noise measurements were made using equipment, being two Norsonic 118 Sound Level Meters and a Norsonic 1251 Acoustic Calibrator. The sound level meters were mounted vertically on a tripod 1.1m above the ground and more than 10 metres from any other reflecting surfaces.

15.6.12 Weather conditions during the assessment were considered to be mainly dry with occasional showers with no discernible wind speed. The sound level meter was calibrated to comply with section 4.2 of BS7445:1-2003 both before and on completion of the survey.

15.6.15 The manned monitoring locations in the north east quadrant of the assessment area adjacent to the water reclamation works reveals a markedly lower baseline noise level when compared to the roadside recordings. The noise monitoring confirms that linear areas of the site immediately bounding the A6 and A46 fall into noise category NEC C but noise levels drop quickly into Categories NEC B and NEC A.

15.7 Key Impact and Likely Significant Effects

Construction Phase

Noise from Earthworks and Construction Phase Activities

15.7.1 The application proposals are based on the Framework Masterplan, formulated and concluded following joint working, the evaluation of alternatives and the outcome of the Charnwood Core Strategy Examination process.

15.7.2 The Core Strategy policy confines new built development and primary infrastructure to the area west of A6 and north of A46, with some green infrastructure and walking/cycling connections in the north-east quadrant of the A6/A46 Junction.

15.7.3 Accordingly there are distinct, physical, boundaries to the west, south and east of the garden suburb proposal. To the north a new development boundary will be formed with a priority of settlement separation and identity. Therefore, there are no immediately adjacent "external" sensitive receptors. As stated there are three existing dwellings within the application site, two being sited close to one another at the eastern edge of the northwest quadrant and within the noise envelope associated with the A6 Corridor.

15.7.4 The primary access from A6 will be in the north east corner of the same quadrant and will incorporate a two-way connection with Loughborough Road. New housing development is under construction on the southern edge of Rothley accessed from Loughborough Road.

15.7.5 It is proposed that the new A6 primary access and ongoing built development will be implemented and co-ordinated from a construction depot on land to the immediate east of the new A6 roundabout.

15.7.6 During the earthworks and construction phases work carried out is likely to generate noise. At this stage detailed information on the nature and timescales of activities during the initial earthworks/construction stage are unknown.

15.7.7 At the time of writing, it is considered that the impact of construction traffic would be negligible. The temporary increase in traffic due to construction is likely to be undiscernible from daily variations in traffic flow. Further details regarding the levels of construction traffic are provided in the Transport Chapter.

15.7.8 Although the final details of the construction activities cannot be finalised until construction contractors have been confirmed, construction noise levels have been predicted using the sound pressure levels for typical construction plant as described

in BS 5228: 2009 Part 1. The sound pressure levels in BS 5228 have been presented as a LAeq at a distance of 10 m. A high percentage for the 'on-time' (the length of time that the equipment remains active on site) has been assumed so as to present a reasonable worst case.

Plant Description	BS5228 Reference	Sound level at 10m	On time %
Angle Grinder	Table C4 No. 93	80	40
Asphalt Paver	Table C5 No. 33	75	60
Circular Saw	Table C4 No. 72	79	40
Compressor	Table C5 No. 5	75	80
Concrete Pump & Concrete mixer truck discharging	Table C4 No. 28	79	80
Concrete Saw	Table C4 No. 71	85	10
Delivery Lorry	Table C2 No. 35	80	70
Diesel Generator	Table C4 No. 84	74	100
Dozer	Table C5 No. 12	77	60
Dumpers	Table C4 No. 9	77	60
Excavator	Table C5 No. 34	82	75
Percussion Drill	Table C4 No. 69	85	40
Pneumatic Breaker	Table D2 No.2	81	40
Poker Vibrator	Table C4 No. 33	78	80
Road Planer	Table C5 No. 7	82	70
Roller Compactor	Table C5 No. 29	76	60
Telescopic Handler	Table C4 No. 54	79	75
Tower Crane	Table C4 No. 49	77	60
Tracked Excavator	Table C5 No. 18	80	70
Tracked Excavator fitted with Breaker	Table D2 No. 5	91	70
Tracked Mobile Crane	Table C4 No. 52	75	60
Vibratory Roller (22t)	Table C5 No. 28	77	60
Water Pump	Table C2 No. 45	65	75
Welder	Table C3 No. 31	73	40
Wheeled Loader	Table C2 No. 26	79	75

Table 4.3 - List of Construction Plant and Associated Sound Levels

15.7.9 The on-time correction factor has been extracted from Figure F5 within BS5288.

15.7.10 The above table identifies a list of plant that could be used across the site, to identify the likely construction noise. Construction processes include:

- Site mobilisation
- Road Construction
- Site Clearance
- Building construction

15.7.11 The likely construction plant to be used during the identified construction processes has also been identified and the combined noise output has been calculated using the following methodology.

15.7.12 The construction noise impacts that are to be experienced at the different distances to the receptors have been calculated using the following formula as described in BS5228:

$$k_n = 20 \times \text{LOG} \frac{R}{r}$$

Where:

- k_h = the correction for propagation across hard ground
- R = the distance to the receptor location
- r = the distance of 10 m at which the SPL has been measured

15.7.13 Where more than one piece of the same equipment is used in a construction activity, the following equation has been used to determine the total noise level generated for that equipment:

$$\text{Combined noise level} = x + 10 \cdot \log_{10}(N)$$

Where

- x = noise level from a single piece
- N = the number of items of equipment used

15.7.14 To calculate the combined noise level for a construction process the following equation has been used to combine the noise levels from the use of different construction plant:

$$\text{Combined event} = 10 \cdot \log_{10}(10 (L_1/10) + 10 (L_2/10) + 10 (L_3/10) + \dots + 10 (L_n/10))$$

Where L_1 = noise event from each separate piece of construction plant

15.7.15 A reasonable worst case scenario has been presented by considering propagation across hard ground and by not considering screening provided by topographical features, buildings or other structures.

15.7.16 The potential noise impacts during the construction stage are presented below.

Plant	Number	Noise level at 10m	Noise level at 20m	Noise level at 50m	Noise level at 100m	Noise level at 200m
Delivery Lorry	1	80	74	66	60	54
Tracked Mobile Crane	1	75	69	61	55	49
Telescopic Handler	1	79	73	65	59	53
Wheeled loader	1	78	72	64	58	52
Dozer	1	77	71	63	57	51
Dumpers	2	80	74	66	60	54
Diesel generator	1	74	68	60	54	48
Total		87	81	73	67	61

Table 4.4 - Site Mobilisation Noise Levels

Plant	Number	Noise level at 10m	Noise level at 20m	Noise level at 50m	Noise level at 100m	Noise level at 200m
Road Planer	1	82	76	68	62	56

Tracked Excavator	1	80	74	66	60	54
Dozer (Spreading fill)	1	77	71	63	57	51
Dumpers	2	80	74	66	60	54
Vibratory Roller (22t)	1	77	71	63	57	51
Asphalt Paver	1	75	69	61	55	49
Diesel Generator	1	74	68	60	54	48
Total		87	81	73	67	61

Table 4.5 - Road Construction Noise Levels

Plant	Number	Noise level at 10m	Noise level at 20m	Noise level at 50m	Noise level at 100m	Noise level at 200m
Dumpers	2	80	74	66	60	54
Tracked Excavator	1	80	74	66	60	54
Lorry	1	79	73	65	59	53
Dozer	2	77	71	63	57	51
Compressor	1	75	69	61	55	49
Diesel Generator	1	74	68	60	54	48
Total		86	80	72	66	60

Table 4.6 - Site Clearance Noise levels

Plant	Number	Noise level at 10m	Noise level at 20m	Noise level at 50m	Noise level at 100m	Noise level at 200m
Tracked Excavator	1	80	74	66	60	54
Diesel Generator	1	74	68	60	54	48
Dumpers	1	80	74	66	60	54
Telescopic Handler	1	79	73	65	59	53
Concrete Pump & mixer truck discharging	1	79	73	65	59	53
Poker Vibrator	2	78	72	64	58	52
Compressor	2	75	69	61	55	49
Total		87	81	73	67	61

Table 4.7 - Building Construction Noise Levels

15.7.17 Construction activities can produce high noise levels, particularly close to source. Construction noise tends to fluctuate and is usually of fairly short duration related to particular activities. The construction noise impacts would depend on the proximity of construction activities to nearby receptor locations.

15.7.18 The construction noise impacts predicted above indicate that the impacts could be observed by sensitive receptors within 200 m of the construction site. The predicted noise levels are based on a possible worst case scenario. Propagation across hard ground has been assumed and no screening from topographical features or other structures has been assumed.

15.7.19 The majority of existing residential dwellings in the area lie over 200 m from the site, meaning the highest value identified for noise levels at 200 m (maximum) would be 61 dB, which is below the Category A threshold (ABC method) of 65 dB.

15.7.20 As set out in the Mitigation section, where necessary, for the small number of dwellings affected, construction plant would be located, as far as is reasonably practicable, away from adjacent occupied buildings or as close as possible to site hoardings located between the plant and the buildings. Such measures to control construction noise would be implemented through the CEMP, which would also minimise operations during sensitive time periods.

15.7.21 Overall, in view of the ambient noise regime, it is considered that the magnitude of the noise impact in relation to the closest receptors would be low and at most would have a negligible effect.

15.7.22 Construction activities can include;

- site preparation including excavation, levelling, compacting and filling
- construction of access roads, provision and diversion of utilities and services, piling and laying of foundations and a range of fabrication processes

15.7.23 In addition, as part of the construction activities vehicle movements will generate noise. At this point detailed traffic data on the likely number of construction vehicles is not available. However the number of construction vehicles is not considered to be significant relative to the existing flows on the A6/A46 roads from which access will be achieved. A traffic routeing plan will be agreed as part of a Construction Environmental Management Plan which will restrict and control vehicle movement and hours of operation. It is therefore considered that the level of road traffic noise at sensitive receptor locations will not change significantly during the construction phases of development and this impact is not considered further.

15.7.24 The enabling and construction works are likely to be carried out in daytime hours i.e. between 07.00 am and 18.00 hours Monday to Friday and 07.300 to 12.30 hours on Saturdays.

15.7.25 Consideration may be given to working on Sundays to facilitate the primary access given its relatively isolated location, the important priority of retaining uninterrupted flows on the important A6 during the working week and completing the project in the shortest feasible period.

15.7.26 In terms of earthworks and construction phase activities there is potential for short-term increases in noise levels – depending on ambient noise levels and the variables of machines used, the presence or introduction of screening or topography, the ability of the intervening ground to absorb noise, the distance from properties and climatic conditions including wind direction.

15.7.27 The nearest noise sensitive receptors are very limited and locationally contained at the outset and will vary depending on the progressive phases of development under

construction. At times there will be potentially limited distance between construction activities and new residential dwellings and progressively dwellings will become inhabited before the completion of the construction phase. Therefore there is potential for noise generated to exceed Category A in BS 5228 (see para 15.5.9) at the existing and proposed sensitive receptors where positioned for a short time in the immediate vicinity of a construction element of each development phase.

15.7.28 Therefore it is recommended that mitigation measures are put in place within a Construction Environmental Management Plan (CEMP) to minimise any potential adverse impact.

15.7.29 Construction activities could also potentially give rise to vibration effects - again with an effect on existing sensitive receptors and to new dwellings occupied before that construction phase is completed. Ground-borne vibration is often a cause for concern to future residents, especially in relation to construction.

15.7.30 BS 6472 presents vibration levels that could induce the probability of human discomfort due to ground-borne vibration. These are more stringent than those recommended for structural damage. Compliance with BS 6472 criteria should ensure that building damage is unlikely.

15.7.31 Vibration transmitted from construction activities through the ground to the receiver cannot be reliably calculated at this stage. Factors affecting ground borne vibration such as rock/soil type, water content and solid damping will greatly influence the way in which vibration travels through the ground.

15.7.32 However whilst there may be some temporary adverse disturbance these will occur only for a limited period in a controlled and restricted area, for example at the development phase boundary.

15.7.33 Ground conditions at Broadnook suggest that piling of foundations generally will not be required. The responsible infrastructure contractors have not yet been appointed however and detailed information is not available.

15.7.34 Precise locations of activity accounting for ground conditions will enable precise building techniques to be confirmed. Vibration levels can therefore be estimated and control recommendations formulated for each phase of construction. As the construction timetable sequence and methods are more closely defined the earthworks and construction noise and vibration can be reconsidered and a detailed system if control implemented. Best working practices will be implemented and this will mean residual vibration impact will be negligible. Brief periods of minor adverse impacts associated with construction are likely in the short-term in very localised areas.

Operation Phase Assessment

Road Traffic Noise and Predicted Future Noise Environment

15.7.35 Traffic noise predictions have been made using the CRTN (Calculation of Road Traffic Noise) SoundPLAN prediction methodology. This methodology has been

carried out to predict the magnitude of any change in noise level resulting from the development proposals at the roadside of the local network.

(i) **overall site suitability**

15.7.36 The changes in noise levels at each location have been assessed by comparing noise levels predicted for the “National Development” scenario (i.e. without Broadnook development) and the “With Development” scenario in 2016 and 2031. The predicted changes have been assessed and shown in Figure 4e.

Link	Basic Noise without development	Basic noise with development	Noise Impact	Magnitude
A6 - (East of Mountsorrel)	75.5	75.5	0.0	Negligible
A46 - (West of Railway)	78.2	78.3	0.0	Negligible
A6	76.1	76.6	0.4	Negligible
Rectory Road	67.6	68.0	0.5	Negligible
Mountsorrel Lane	63.7	63.8	0.1	Negligible
King Street	63.2	63.3	0.1	Negligible
Syston Road	70.3	70.1	-0.3	Negligible
Cossington Road	65.1	65.5	0.4	Negligible
Hallfields Lane	68.1	68.5	0.4	Negligible
Westfield Lane	68.4	68.9	0.5	Negligible
Station Road	66.6	66.9	0.3	Negligible

Fig 4e: Predicted noise levels within local road network.

15.7.37 The results show that the maximum increase that any of the noise receptors are likely to experience is 0.5dB at Rectory Road and Westfield Lane. Some of the receptors will experience a negligible decrease after the completion of the development. It is considered that an increase of less than 3dB is not discernible and therefore it is concluded that the development will have a negligible impact at existing receptors.

(ii) **operational noise impacts - NPPF/PPG24 Noise Assessment**

15.7.38 Noise level prediction has been carried out using the computer modelling software SoundPLAN. The noise model incorporates ground level topographical information including all relevant site features. The NEC boundaries for the baseline scenario were modelled for the daytime and night time traffic flows.

- 15.7.39 To ensure that the future year models are reflective of the future year scenarios, the base line model was calibrated against the 24 hour noise levels recorded across the site during the monitoring.
- 15.7.40 A difference of up to 3dB between the actual and modelled noise levels is considered an acceptable variation in results, as human subjects, under laboratory conditions, are generally not capable of noticing changes in steady noise levels of less than 3dB(A).
- 15.7.41 The NEC boundaries produced by SoundPLAN are reflective of the monitored noise environment and therefore the SoundPLAN model is sufficiently reflective of the actual noise environment and suitable to use in modelling future scenarios. The current and future year traffic flow information used in the model has been provided by the transport consultant and are consistent with the Transport Assessment forming part of the Broadnook planning application.
- 15.7.42 The future noise environment was then modelled both with and without the effects of the development in order to assess the impact of the introduction of the development on the noise environment. The Broadnook Garden Suburb parameter plans has been used to define the potential location of the residential units and this land use has been addressed in a PPG24 equivalent valuation. The predicted future year NEC boundaries are shown in drawings 10154-NM-101 to 10154-NM-102 and are contained within the appendix. These indicate that the site falls predominantly within NEC A and B with limited areas adjacent to the A46 and A6 in NEC C.
- 15.7.43 The Broadnook Garden Suburb Framework Plan has been used to define the potential location of the residential units and this disposition of land uses has been assessed in a PPG24 equivalent valuation.

PPG24: Noise Assessment

- 15.7.45 The NEC boundaries for the existing situation were modelled for the daytime and night time traffic flows initially. This scenario assumes no mitigation measures at site boundaries and a continuation of unrestricted speeds along the A6 Corridor adjoining the Broadnook Framework Plan boundaries.
- 15.7.46 PPG24 Methodology advised that for sites that fall into NEC A:

"Noise need not be considered as a determining factor in granting planning permission, although noise at the high end of the category should not be regarded as a desirable level"

- 15.7.47 PPG24 Methodology advised that for sites that fall into NEC B:

"Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection against noise"

- 15.7.48 Properties falling within NEC B can typically require standard thermal double glazing to provide an acceptable noise environment. Table 1 in Annex 6 of PPG24

provide examples of typical noise reductions for a dwelling façade with windows set in a brick/block wall. The table shows various levels of noise reduction provided by different glazing configurations and for different noise sources. The values shown are the level difference (in dBA) between the outside and the inside of a typical dwelling and to represent worst case, it is assumed that the outside level is a façade measurement. For a road traffic noise spectrum, PPG24 states that standard thermal double glazing will provide a façade sound insulation performance of 33dB(A).

15.7.49 However, opening windows for ventilation purposes would reduce the insulation provided by the building façade and may cause internal design standards to be exceeded. Therefore, if it is considered necessary to satisfy internal noise standards with a degree of ventilation, mitigation and design measures may be required to enable occupiers to obtain ventilation with windows closed. For example passive acoustic ventilators with the appropriate attenuation can be installed within the walls of habitable rooms or utilise 'trickle' vents within the window frames for those proposed properties in the limited NEC B areas.

15.7.50 The layout of the development and internal arrangements will be subject to further detailed design. Consideration should be given to the internal layout of the limited number of relevant properties such that sensitive rooms and window areas are oriented away from the predominant noise source at A6 and A46.

BS 8223 Assessment of Day Time Noise levels in Living Rooms

15.7.51 BS 8223 indicates that a daytime level of 35LAeq represents the desirable noise standard. The calculated noise levels have been used to determine likely noise levels at the worst case locations and the extent of attenuation required. The predicted noise contours boundaries are shown in drawings 10154-NM-103.

15.7.52 To determine the internal noise levels, the worst case location, locations are adjacent to the A46 and A6. These indicate daytime façade noise levels of 62.1dB and 65.4dB respectively. These noise levels reduce to 29.1dB and 32.4dB respectively when taking into account noise reductions through thermal double glazing. This could be reduced further with efficient orientation of rooms and the change of location during the detail design stage.

15.7.53 This indicates that appropriate attenuation can be achievable for all of the properties through the use of thermal double glazing, with façades of properties further into the site being protected and screened by other buildings.

BS 8233 Assessment of Night Time Noise Levels in Bedrooms

15.7.54 BS 8233 indicates that a night time internal noise level of 30dB LAeq is desired. The calculated noise levels, as previously indicated, have been used to determine likely noise levels at the worst case location fronting the A46 and the extent of attenuation required. The predicted noise contours boundaries are shown in drawings 10154-NM-104.

15.7.55 Using the dwelling locations shown in the current Masterplan, a typical night time façade noise level is identified at the locations fronting the A46 and A6 as 56.1dB and

58.1dB respectively. This reduces to 23.1dB and 25.1dB respectively when taking into account noise reductions through thermal double glazing and these levels comply with BS 8233. This confirms that appropriate attenuation will be achievable.

External Noise Standards

15.7.56 BS8233 recommends noise should not exceed 55dB in areas such as back gardens. As a result of this standard, the daytime boundaries have been modelled and are shown in drawings 10154-NM-105 contained within the appendix.

15.7.57 A review of the noise environment across the site has indicated that the external noise without mitigation exceeds 55 dB along the site boundary and for some small parts of the site.

Additional Mitigation

15.7.58 To minimise the external noise environment it is practicable to include noise screening along the southern boundary of the site. The noise screening would include a 3m acoustic fence along the elevated section of the southern boundary (immediately adjacent to the A46). For the section immediately adjacent to the Eastbound Off-slip Road a 5.5m high noise bund is proposed decreasing to 4.3m towards the roundabout along the southern part of the site. The screening will be provided through the provisions of an earth bund, noise fence or a combination of these. These proposals are identified on Munro-Whitten drawings 06.38.29-34.

15.7.59 However, it should be noted that the proposed buildings will provide natural screening from road traffic noise and as such the external noise levels can be achieved across the site.

15.8 Assessment Results Summary

15.8.1 The future year noise environment has been considered using the future year traffic flows provided by the traffic consultant and utilises the calibrated SoundPLAN 3D noise model.

15.8.2 The assessment has considered both the internal noise at properties fronting the A46 and A6 as well as external noise across the site.

15.8.3 Following this initial review of the proposed noise environment across the site, taking into account the future traffic levels, the following noise mitigation measures are recommended for consideration with proposals for housing closest to the A6 and A46:

- Trickle vent ventilation systems and double glazing for residential properties fronting towards the A46 and A6. The acoustic ventilation at the site will comply with Building Regulations 2000 Approved Document F1 Means of Ventilation and BS 5925 1991 "Code of Practice for Ventilation Principles and Designing for Natural Ventilation". Noise attenuation schemes detailing the proposed glazing and ventilation requirements for residential dwellings and office premises in each relevant area of the development will be submitted to

Charnwood Borough Council for review and approval at the reserved matters stage.

- Internal layout of properties to consider the location of lounge and bedroom areas for those properties fronting onto the A46 and A6
- Site layout to consider the internal layout of residential buildings to reduce sight lines onto the A46 and A6
- Orientation of buildings along the A46 and A6 to provide noise screening to ensure external noise thresholds can be achieved
- Local mitigation measures e.g. walls and fences and buildings themselves acting as acoustic screens

Existing sensitive receptors and noise

15.8.4 There are two residential properties at the eastern edge of the garden suburb area adjacent A6 with a third being located on the boundary edge. They are both in an adverse noise environment given proximity to high levels of fast moving traffic. The Broadnook proposals include a reduction in traffic speeds on the A6 from unrestricted to 50mph. This is predicted to produce a minor beneficial effect.

15.8.5 With appropriate land use control and mitigation it is considered that noise from proposed industrial activities will be controlled in order to satisfy guidance in BS 8233:1999 in accordance with the requirements of Charnwood Borough Council.

15.9 Conclusions

15.9.1 Potential noise and vibration impacts of the proposed Broadnook Garden Suburb have been assessed – including those prospectively associated with earthworks and the sequence of construction and operational phases of the proposed development.

Baseline Conditions

15.9.2 Ambient noise levels at and around the development site known as Land North of Birstall in the Borough Council's Local Plan Core Strategy have been established by both automatic and attended noise surveys. The source of significant noise levels are the A6 and A46 primary roads. There are two dwellings on site. Whilst these are sensitive receptors they are located in close proximity to the A6 which generates high ambient noise levels.

15.9.3 Future traffic noise levels have been predicted using the "Calculation of Road Traffic Noise" (CRTN) method based on future traffic levels arising from the modelling work of the Transport Assessment.

Methodology and Planning Policy

15.9.4 The noise assessment has been completed in the context of current planning policy and advice – including criteria documented in National Planning Policy and Practice

Guidance, relevant British Standards, PPG24 methodology and following discussions with local planning authority's Environment Protection Team.

Likely Significant Effects

(i) Construction

15.9.5 Activities during the construction phases - including earthworks and vehicle movements - will have potential to create short-term and intermittent increases in noise levels possibly above recommended limits set in accordance with current guidance. This may occur in relation to existing and proposed sensitive receptors (dwellings) as the Broadnook garden suburb develops. The use of some heavy plant and machinery associated with some groundworks and constructive activities may also give rise to ground-borne vibration.

15.9.6 Because of the short distances between construction activities and the nearest sensitive receptors some may experience minor adverse noise and vibration impacts in the short term. This would occur temporarily and only for a short period.

(ii) Existing sensitive receptors and road traffic noise

15.9.7 Using the CRTN methodology changes in road traffic noise due to the development generated traffic have been assessed.

(iii) Proposed sensitive receptors and noise

15.9.9 The Broadnook proposals incorporate noise sensitive uses including extensive residential areas and office elements as part of the employment areas. The baseline Noise Survey and prediction calculations indicate that noise levels at the proposed development should not be a determining factor in granting planning permission in accordance with guidance. The daytime and night time noise contours indicate that the new uses fall predominantly into Noise Exposure Categories (NEC) A and B with limited areas adjacent to the A6 and A46 Corridors in NEC C. The Framework Plan (the basis of the Parameter Plans) does not show residential development in the areas categorised as NEC C. However mitigation measures are proposed to be incorporated into site boundaries and the more precise layout and building design to ensure that improved external daytime and internal daytime and night-time noise levels are achieved at the residential areas nearest A6 and A46 as well as the proposed offices.

Mitigation and Enhancement

(i) Construction Phase

15.9.10 In line with best practice it is anticipated that Charnwood Borough Council will require a rolling Construction Environmental Management Plan (CEMP) to be submitted and approved in order to control construction works throughout the delivery of the garden suburb. This will include restrictions on working hours, traffic routeing, on-site working practices, noise suppression including temporary screening and so on.

15.9.11 With the implementation of best working practices the noise and any vibration impacts of earthworks and construction phases will generally be negligible with brief periods of minor adverse impacts in concentrated areas.

(ii) **Operational Phase**

Proposed sensitive receptors and noise

15.9.12 Traffic noise from the A46 and A6 roads is the most significant noise source. The Site lies mostly within the NEC B limits; therefore, the local noise environment gives no reason not to proceed with the Proposed Development. Internal noise levels inside the proposed dwellings can be provided within acceptable limits through the following mitigation measures.

- Passive ventilation systems and double glazing for those residential properties falling within NEC B/C and those closest to the A46 and A6 roads.
- Internal layout of properties to consider the location of lounge and bedroom areas for properties fronting onto the A46 and A6 roads; and
- Site layout to consider the orientation of residential buildings to reduce sight lines onto the A46 and A6 roads.

15.9.13 Additional noise mitigation and enhancement is proposed along the southern boundary to A46 as shown on Munro-Whitten drawings 0638.029-34 (see Appendix 15 of the submission ES). This involves a combination of acoustic fencing and ground modelling in response to levels relative to the road and site. A combination of 3 metre fencing and 4-5.5m mounding has a significant beneficial effect for both visual and acoustic screening. These measures ensure that internal and external daytime and night-time limits are met.

15.9.14 This Noise Assessment demonstrates that the Proposed Development will not be significantly affected by the noise levels in the immediate vicinity. It is therefore concluded the Proposed Development is consistent with relevant planning policy guidance and its location on the Site should be supported from a noise perspective.

Limitations

15.9.15 The conclusions and recommendations highlighted above are limited to the general availability of background information and the planned usage of the site.

15.9.16 Third part information has been used in the preparation of this report, which Brookbanks Consulting Ltd, by necessity assumes is correct at the time of writing. While all reasonable checks have been made on data sources and the accuracy of data, Brookbanks Consulting Ltd accepts no liability for the same.