

## **30 Traffic Noise and Vibration**

This chapter considers likely noise and vibration impacts due to road traffic for receptors in the vicinity of the Southern Leg.

A total of 1176 residential properties and 110 sensitive receptors/areas were identified within 500m of the proposed scheme. Noise modelling was undertaken for all of the 450 properties within 300m of the mainline and 55 were selected as sample receptors to obtain a geographical representation of the route, to represent the noise environment at other non-sample receptors nearby and to illustrate the predicted noise in the Year of Opening and the Design Year, both with and without the proposed scheme.

Where possible, noise mitigation is proposed for potential impacts of Moderate or worse significance with a noise level of over 59.5dB  $L_{A10(18hr)}$ . Mitigation includes incorporated elements of the road design such as embankments and low noise road surfacing, plus acoustic screens to provide noise attenuation for specific receptors.

At ground floor, with proposed mitigation, for the Year of Opening, an estimated 177 properties within 300m would experience an increase in noise level of at least 1dB and 51 would experience a decrease of at least 1dB. For the Design Year the corresponding number of properties is 177 and 55 respectively. At an estimated 391 properties, the change in the noise level would result in people being more bothered by noise and 51 properties where the change would result in people being less bothered.

At ground floor, with proposed mitigation, it is predicted that 25 properties in the Year of Opening and 33 properties in the Design Year will experience residual impacts that exceed the desired mitigation threshold. The results also indicate that three properties may qualify for noise insulation.

At first floor for the Year of Opening, with proposed mitigation, an estimated 170 properties within 300m would experience an increase in noise level of at least 1dB while for the Design Year, the number of properties is predicted to be 175. There are 53 properties in the Year of Opening and 56 in the Design Year that would experience a decrease of at least 1dB. At first floor, there are an estimated 326 properties where the change in the noise level would result in people being more bothered by noise and 5 properties where the change would result in people being less bothered. The results also indicate that 51 properties at first floor may qualify for noise insulation.

There are approximately 36 residential buildings within 40m that would exceed the DMRB 59.5dB  $L_{A10(18hr)}$  lower threshold for vibration assessment in the Design Year. However, vibration annoyance is not considered to be a significant issue for this scheme.

### **30.1 Introduction**

- 30.1.1 This chapter provides an assessment of the noise and vibration impacts due to road traffic for receptors in the vicinity of the Southern Leg of the proposed scheme.

#### **Noise**

- 30.1.2 The World Health Organisation (WHO, 1999) has defined noise as unwanted sound, and sound is measured in terms of decibels (dB). Whilst the audible range of hearing extends from 20 Hertz (Hz) to 20,000Hz, human hearing is not equally sensitive to all frequencies. Consequently, the A-weighting is used to simulate the response of the human ear and environmental noise is generally measured in terms of dB(A).
- 30.1.3 Generally, noise fluctuates over time and to compare different types of time-varying sound it is therefore necessary to obtain representative levels. For environmental noise, this is commonly the equivalent continuous sound pressure level: the  $L_{eq}$ . It is also possible to represent time-varying noise by means of statistical parameters such as analysis of the distributions of sound levels. For example,  $L_{90}$ , is the level exceeded for 90% of the measurement time and  $L_{10}$  is the level exceeded for 10% of the measurement time period. The index adopted by the Government to assess traffic

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noise is the  $L_{A10(18hr)}$ , which is the arithmetic mean of the noise levels exceeded for 10% of the time in each of the one hour periods between 06:00h and midnight.

- 30.1.4 For the purposes of assessment, noise impacts are considered as increases or decreases in road traffic or construction noise relative to the noise levels within the area potentially affected without the scheme in place. When considering noise levels, it may be of assistance to note that doubling or halving of the otherwise similar traffic flow is equivalent to a change of approximately 3dB(A), and a subjective impression of a doubling of loudness generally corresponds to a 10dB(A) sound level increase. As noise is assessed as a logarithmic ratio of pressure levels (i.e. decibels), it is sometimes helpful to consider the relationship between the subjective evaluation of noise and the actual objective levels, and examples are therefore provided in Table 30.1.

**Table 30.1 – Typical Noise Levels and Subjective Evaluation**

Noise Level dB(A)	Description
120	Threshold of pain
95	Pneumatic drill (unsilenced); 7m distance
83	Heavy diesel lorry (40 km/h at 7 metres distance)
81	Modern Twin-engined Jet (at take-off at 152 metres distance)
70	Passenger Car (60 km/h at 7 metres distance)
60	Office Environment
50	Ordinary Conversation
40	Library
35	Quiet Bedroom
0	Threshold of hearing

- 30.1.5 When considering noise from traffic, the main sources of noise can be separated into two components. The first is generated by the engine, exhaust system and transmission, and is the dominant noise source when traffic is not freely flowing. This contributes a significant proportion of low frequency noise and is particularly apparent from heavy goods vehicles (HGVs) when accelerating, braking or changing gear. The second noise source component is generated from the interaction of tyres with the road surface; this is the dominant noise source under free flow traffic conditions at moderate to high road speeds, and contributes a significant proportion of higher frequency noise.
- 30.1.6 The noise from a stream of traffic at a receptor point is an aggregation of noise from each of a number of vehicles at various distances. There are several factors that influence the noise level experienced by the residents of a property, and these can be separated into two categories. First are factors that affect the noise emissions at source, such as volume and speed of traffic, the composition of the traffic (i.e. the percentage of HGVs), and the gradient and surface characteristics of the carriageway. Second are those factors affecting the propagation characteristics, such as the distance of the receptor from the source, the topography and characteristics of the ground between the source and receptor, the presence of any screening or barrier effects, and the wind strength and direction.

#### **Vibration**

- 30.1.7 Traffic-induced vibration is a low frequency disturbance which can be transmitted through the air or ground. Vibration can be measured in terms of peak particle velocities, or PPVs (i.e. the maximum speed of movement of a point in the ground during the passage of a vibration). For traffic vibration generally a PPV of 0.2mm/s measured on a floor in the vertical direction is imperceptible. At about 0.5mm/s it is perceptible and may become disturbing or annoying at higher levels. Air-borne vibration from traffic is produced by the drive-train of the vehicle; the engines and exhausts, whereas ground-borne vibration is produced by the interaction between rolling wheels and the road surface.

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- 30.1.8 There are two effects of traffic vibration that need to be considered: the effects on buildings and the disturbance caused to occupiers of properties. However, extensive research has been carried out on a range of buildings of various ages and types and no evidence has been found to support the theory that traffic-induced, ground-borne vibration is a source of significant damage to buildings (Watts, 1990). As such, ground-borne vibration is not assessed in this chapter. Ground-borne vibration is much less likely to be the cause of disturbance to occupiers than air-borne vibration (Baughan and Martin, 1981; Watts, 1984). Although there is no evidence that traffic-induced air-borne vibration can cause even minor damage to buildings, it can be a source of annoyance to local people causing vibrations of flexible elements within properties close to the carriageway (e.g. doors, windows and occasionally floors). This chapter therefore addresses the issue of DMRB defined nuisance at properties caused by air-borne vibration.

## **30.2 Approach and Methods**

- 30.2.1 This chapter describes the impacts that would be expected on properties in the vicinity of the Southern Leg section during operation of the proposed scheme, including changes to noise and vibration levels, and perceived noise and vibration DMRB defined nuisance. Noise and vibration impacts due to construction are addressed separately in Chapter 33 (Disruption due to Construction).
- 30.2.2 The assessment of noise is made in terms of the difference between the level of noise that would be likely to be experienced with the proposed scheme (the Do-Something scenario) and without the proposed scheme (the Do-Minimum scenario) for both the Year of Opening and the Design Year (15 years later). The existing, or ambient, noise in the 'base' year of 2005 is also reported at sample properties. The use of 2005 as base year is consistent with the Air Quality assessment (Chapter 29) and available traffic data. Chapter 5 (Overview of Assessment Process) provides a description of the traffic predictions on which this assessment is based.

### **Legislation and Guidance**

- 30.2.3 This assessment has been carried out with reference to the following documents:
- Design Manual for Roads and Bridges (DMRB) (The Highways Agency et al., 1993);
  - Calculation of Road Traffic Noise (CRTN) (Department of Transport, 1988);
  - The Noise Insulation (Scotland) Regulations 1975 (NISR);
  - Memorandum on the Noise Insulation (Scotland) Regulations 1975
  - World Health Organisation (WHO), Guidelines for Community Noise, 1999 and
  - Scot-TAG: Scottish Transport Appraisal Guidance (STAG).
- 30.2.4 The definitions of Core Study Area and Wider Area are provided below. In accordance with the requirements of DMRB Volume 11, Section 3, Part 7, a Stage 3 assessment has been carried out by:
- identifying sample noise sensitive locations and calculating the ambient and proposed noise levels to determine possible noise changes due to the scheme. Properties within the Core Study Area, (including side roads) were assessed using a three dimensional model;
  - identifying properties predicted to experience an increase of 25%, or a decreases by 20% in traffic flow (equivalent to a 1dB change) outwith the Core Study Area were also assessed as part of the Wider Area assessment reported in Chapter 54 (Cumulative Impact Assessment);
  - identifying appropriate mitigation methods to reduce the impact of any adverse effects within 300m either side of the road centrelines (see mitigation criteria as detailed in paragraphs 30.2.34 – 30.2.3);
  - undertaking a noise nuisance assessment for properties within the Core Study Area which experience a noise change of 1dB(A) or more;

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- considering traffic-induced vibration; and
- estimating the number of properties likely to be eligible in terms of NISR.

#### Study Area

- 30.2.5 The operational noise has been considered within a 500m Core Study Area extending to each side of the scheme centreline and a Wider Study Area encompassing any predicted indirect changes to noise levels (by +25%, or -20%) as a consequence of changes to traffic flows on the existing road network. The Core Study Area has been extended from the more commonly accepted 300m because of the rural nature of some of the proposed scheme. It is however acknowledged that DMRB advises that beyond 300m, the varying effects of wind and temperature render forecasting difficult in most circumstances and the area between 300m and 500m from the proposed scheme is therefore included to provide additional comparative information. The Core Study area is indicated on Figure 30.1. The Wider Study area is necessary as the introduction of an entirely new route such as the AWPR may change traffic flows on roads some distance from the proposed scheme. Hence the proposed scheme may affect the noise levels, and the level of perceived noise nuisance, experienced by some local residents already exposed to road traffic noise.
- 30.2.6 As explained in Chapter 1 (Introduction), noise impacts from the proposed scheme have been considered within three separate study areas. This chapter is therefore limited to consideration of the noise and vibration impacts of the proposed scheme on properties located within the Southern Leg Core Study Area, as indicated on Figures 30.1a-h and 30.3a-h. Any properties located to the north of the dividing line at Kingswells, as shown on Figures 30.1h and 30.3h, are considered in Chapter 15 (Northern Leg: Traffic Noise and Vibration). Any properties located to the south of the dividing line at Cleanhill Junction, as shown on Figures 30.1c and 30.3c, are considered in Chapter 45 (Fastlink: Traffic Noise and Vibration). Impacts of traffic utilising the full proposed scheme (i.e. not the Southern Leg traffic in isolation) are considered for each receptor.
- 30.2.7 Within the Core Study Area indicated on Figures 30.1a-h and 30.3a-h, the traffic noise assessment has classified locations according to their measured ambient levels, in bands of: below 50dB(A), 50 to <60dB(A), 60 to <70dB(A) and ≥70dB(A). For each band, the number of properties and other receptors, subject to the following increases or decreases have been assessed: 1 to <3dB(A), 3 to <5dB(A), 5 to <10dB(A), 10 to 15dB(A) and over 15dB(A).
- 30.2.8 A Wider Study Area was also assessed and is reported separately in Chapter 54 (Cumulative Impacts). The Wider Study Area assessment considers the indirect changes to noise levels as a result of altered traffic flows on the existing wider road network (caused by operation of the proposed scheme). This indirect impact on noise levels and the level of perceived noise nuisance experienced by local residents already exposed to road traffic noise may therefore occur beyond the Core Study Areas of the Northern Leg, Southern Leg and Fastlink.

#### Impact Assessment Criteria

- 30.2.9 The assessment of the significance of noise impacts was based on the sensitivity of noise receptors and the magnitude of impact in terms of predicted noise levels and extent of noise change. The significance of impact was assessed by comparing future year scenarios, (i.e. Year of Opening and Design Year, 15 years after opening, with and without the scheme). The difference in noise levels, together with the sensitivity of the receptors, determines the significance of impact.

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Sensitivity

30.2.10 The criteria used for classification of the sensitivity of receptors to noise resulting from the proposed scheme are defined in Table 30.2.

**Table 30.2 – Criteria used to Define Noise Sensitive Receptors**

Sensitivity	Description	Examples of Receptors
High	Receptors where people or operations are particularly susceptible to noise	Residential Quiet outdoor areas used for recreation Conference facilities Auditoria/studios Schools in daytime Hospitals/residential care homes
Medium	Receptors moderately sensitive to noise, where it may cause some distraction or disturbance	Offices Restaurants
Low	Receptors where distraction or disturbance from noise is minimal	Residences and other buildings not occupied during working hours. Factories and working environments with existing high noise levels.

Impact Magnitude

30.2.11 When considering two sounds of similar acoustic properties, i.e. similar spectral and temporal characteristics, a change of more than 3dB(A) is regarded as being just perceptible to the human ear. The magnitude of impact can therefore be based on this acoustic 'rule of thumb', supplemented with the evidence contained within DMRB Vol. 11, Section 3, Part 7, Chapter 3, Paragraph 3.5. The latter highlights that 'people are more sensitive to abrupt changes in traffic noise associated with new road schemes than would be predicted from the steady state evidence. In the period following a change in traffic flow, people may find benefits or disbenefits when the noise changes are as small as 1dB(A)'.

30.2.12 The magnitude of impact has been assessed by comparison between the increase or decrease in noise levels between the future year 'Do-Minimum' and 'Do-Something' (i.e., Year of Opening and Design Year). The magnitude of impact is defined as shown in Table 30.3.

**Table 30.3 – Magnitude of Impacts due to Changes in Road Traffic Noise**

Change in Noise Level	Magnitude of Impact
5 dB(A) and greater	High adverse
3 to < 5 dB(A)	Medium adverse
1 to < 3 dB(A)	Low adverse
0 to < 1 dB(A)	Negligible adverse
0 dB(A)	No impact
0 to <-1 dB(A)	Negligible beneficial
-1 to < -3 dB(A)	Low beneficial
-3 to < -5 dB(A)	Medium beneficial
-5 dB(A) and greater	High beneficial

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Impact Significance

30.2.13 The significance of noise impacts was determined according to the relationship between magnitude and sensitivity, as shown in Table 30.4.

**Table 30.4 – Significance of Noise Impacts**

Magnitude	Sensitivity		
	Low	Medium	High
High	Moderate	Moderate/Substantial	Substantial
Medium	Slight/Moderate	Moderate	Moderate/Substantial
Low	Negligible/Slight	Slight/Moderate	Moderate
Negligible	Negligible	Negligible/Slight	Slight

**Assessment Methods**

30.2.14 Sample properties within the scheme study area were assessed in accordance with DMRB. However, for discussion purposes some properties and locations were selected as representative on the basis of one or more of the following principles:

- where it has been considered that buildings may qualify for sound insulation;
- where it has been anticipated that properties will experience significant changes in noise level; and
- where properties are representative of surrounding buildings and the effects of noise will be similar.

Baseline (Ambient) Noise Monitoring

30.2.15 With regard to the determination of existing (ambient) noise levels, DMRB advises that there are three basic types of ambient noise situations that can occur:

- (i) where the ambient noise is dominated by traffic noise;
- (ii) where the ambient noise is comprised of a combination of several undefined sources, such as might be encountered in low noise sites in rural settings; or
- (iii) where the ambient noise is dominated by noise from non-road traffic sources, such as aircraft or trains.

30.2.16 For condition (i), the ambient noise should be measured using the  $L_{A10}$  noise metric. For condition (ii), it is advised that the  $L_{A10}$  noise metric may be inappropriate and DMRB suggests that, while the  $L_{Aeq}$  parameter could be considered, the  $L_{A90}$  scale is a suitable alternative. For condition (iii), DMRB recommends the use of the  $L_{A90}$  noise metric. Where the existing noise climate is determined by road traffic noise, the existing ambient levels can also be predicted using the methodology set out in the 1988 Department of Transport publication 'Calculation of Road Traffic Noise' (CRTN).

30.2.17 Ambient noise monitoring was undertaken during June, July, August, and September 2006 and also during March 2007 at representative locations along the route of the proposed scheme. All instrumentation was calibrated before, and after, each measurement and there was no significant shift in the calibration level recorded. A summary of the results together with the instrumentation used is contained within Appendix 30.1.

30.2.18 The 55 sample monitoring locations are listed below and results shown on Figures 30.1a-h and 30.3a-h. The properties were selected on the basis of obtaining a geographical representation of the route and to represent the noise environment at other non-sample receptors nearby:

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- The Clachan, Nigg, Aberdeen AB12 3LL (Figure 30.1a)
- Novara, Nigg, Aberdeen AB12 3LL (Figure 30.1a)
- Brae View, Charleston, Nigg, Aberdeen AB12 3LN (Figure 30.1a)
- Whistlebrae Farmhouse, Banchory Devenick, Aberdeen AB12 5YJ (Figure 30.1a)
- Eastland Cottage, Kingcausie, Maryculter, Aberdeen AB12 5FS (Figure 30.1c)
- 2 Eastland House, Maryculter, Aberdeen AB12 5FS (Figure 30.1c)
- Kemehede, Blairs, Aberdeen AB12 5YT (Figure 30.1c)
- Tarns, Blairs, Aberdeen AB12 5YX (Figure 30.1c)
- Burnhead Cottage, Blairs, Aberdeen AB12 5YX (Figure 30.1c)
- Newlands Farm, Blairs, Aberdeen AB12 5YB (Figure 30.1b)
- Grianan, Auchlunies, Blairs, Aberdeen AB12 5YA (Figure 30.1b)
- Bishopston Farm, Portlethen, Aberdeen AB12 4RS (Figure 30.1b)
- Midfield Cottage, Portlethen, Aberdeen AB12 4RT (Figure 30.1b)
- 4 Hare Moss Steadings, Portlethen, Aberdeen AB12 4RT (Figure 30.1a)
- Hare Moss Cottage, Portlethen, Aberdeen AB12 4RT (Figure 30.1a)
- The Beeches, Banchory Devenick, Aberdeen AB12 5YD (Figure 30.1a)
- Duffshill, Portlethen, Aberdeen AB12 4RX (Figure 30.1a)
- Glencairn, Portlethen, Aberdeen AB12 4RX (Figure 30.1a)
- Little Bishopston, Portlethen, Aberdeen AB12 4RS (Figure 30.1b)
- Turnamiddle House, Portlethen, Aberdeen AB12 4RX (Figure 30.1a)
- North Lodge, Kingcausie Estate, Maryculter, Aberdeen AB12 5FR (Figure 30.1d)
- Kingcausie, Maryculter, Aberdeen AB12 5FR (Figure 30.1d)
- Croft House, Culter House Road, Milltimber AB13 0EP (Figure 30.1e)
- Pavillion, Albyn School Playing Fields, AB13 0AJ (Figure 30.1d)
- 381 North Deeside Road, Milltimber AB13 0AD (Figure 30.1d)
- Aberdeen Petroleum Club, Kippie Lodge, North Deeside Road AB13 0AB (Figure 30.1d)
- 69b Culter House Road, Milltimber AB13 0EP (Figure 30.1e)
- East Lodge, Culter House Road, Milltimber AB13 0EP (Figure 30.1d)
- 47 Culter House Road, Milltimber AB13 0EP (Figure 30.1a)
- The Stables, Bellenden Walk, Milltimber AB13 0EY (Figure 30.1d)
- Hawkhill House Residential Nursing Home, 234 North Deeside Road, AB13 0DQ (Figure 30.1d)
- 1 Milltimber Brae East, Milltimber AB13 0DN (Figure 30.1d)
- The Siding, Station Road, Milltimber AB13 0DP (Figure 30.1d)
- Holly House, Station Road, Milltimber AB13 0DP (Figure 30.1d)
- The Gables, Milltimber Brae, Milltimber AB13 0AA (Figure 30.1d)
- Old Mill Inn, Maryculter, Aberdeen AB12 5FX (Figure 30.1d)
- Beanshill Lodge, Milltimber AB13 0ER (Figure 30.1e)

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- 2 Hill Farm, Milltimber AB13 0ET (Figure 30.1e)
- Nether Beanshill Farm, Milltimber AB13 0EQ (Figure 30.1e)
- Moss-Side Of Auchlea, Kingswells, Aberdeen AB15 8ST (Figure 30.1f)
- Tigh-Na-Bruaich, Kingswells, Aberdeen AB15 8QQ (Figure 30.1f)
- Craiglug, Kingswells, Aberdeen AB15 8QQ (Figure 30.1f)
- Silverburn House, Kingswells, Aberdeen AB15 8QL (Figure 30.1f)
- Gairn Park, Kingswells, Aberdeen AB15 8QJ (Figure 30.1f)
- Broomhill, Kingswells, Aberdeen AB15 8QL (Figure 30.1f)
- Ardnamoine, Kingswells, Aberdeen AB15 8QL (Figure 30.1f)
- Benview, Kingswells, Aberdeen AB15 8QQ (Figure 30.1f)
- Ardenlea, Kingswells, Aberdeen AB15 8RT (Figure 30.1g)
- Hillview, Kingswells, Aberdeen AB15 8SL (Figure 30.1f)
- Fareview, West Hatton, Kingswells, Aberdeen AB15 8RX (Figure 30.1g)
- Westholme, Kingswells, Aberdeen AB15 8RX (Figure 30.1g)
- Clark & Sutherland, Smiddy Brae, Kingswells, Aberdeen AB15 8SL (Figure 30.1g)
- St. Hildas, Milltimber AB13 0AP (Figure 30.1fd)
- Kippie Lodge Golf Course, Culter House Road, Milltimber, AB13 0AB (Figure 30.1d)
- Gairn Farm, Blacktop, Kingswells, Aberdeen AB15 8QJ (Figure 30.1f)

- 30.2.19 Unless otherwise specified, all measured noise levels were taken in free field conditions (i.e. not at the façade of the property and at least 3.5m away from any hard reflecting surface other than the ground). The measured noise readings were therefore adjusted to be comparable with the calculated noise levels, which are determined at the property façade (+ 2.5dB to the measured free field). A summary of the field results is contained in Appendix A30.1 and the site notes are also contained within Appendix A30.2.
- 30.2.20 The Camphill Milltimber Campus houses and educates children with special needs and is particularly noise sensitive. In recognition of this, an extensive separate baseline study was undertaken and is included as Appendix A30.3. This baseline data will be used more comprehensively for a detailed assessment of noise impacts at Camphill, to be reported at a later date.
- 30.2.21 In all areas further than 300m from a georectified road (i.e. a road for which traffic data were provided and subsequently attached to the road centreline as an attribute for use in the three dimensional modelling), the ambient descriptor was taken to be the  $L_{A90(T)}$ . It should be noted that for a one hour period, the  $L_{A90}$  is determined by the quietest six minutes, whereas the predicted level of traffic noise is described by the  $L_{A10}$ , which is determined by the noisiest six minutes. Therefore, it is possible that in evaluating the effects for areas with no existing traffic, the DMRB comparison of the  $L_{A10}$  and the  $L_{A90}$  can in certain circumstances lead to some distortion of impact. DMRB expects that once the scheme is in place, the  $L_{A90}$  will tend towards the  $L_{A10}$ . It is possible that there may be an exaggeration of impact when considering the measured results for  $L_{A90}$  and  $L_{A10}$  for areas where the existing noise climate is dominated by road traffic.



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##### Traffic Noise Prediction

- 30.2.22 The prediction of traffic noise levels were calculated using Cadna® software, which adopts the algorithms contained within the 1988 Department of Transport publication 'Calculation of Road Traffic Noise' (CRTN). Ground contours were supplied by Jacobs, and the building locations were identified using OS Mastermap data under license from the Scottish Executive (in some instances these locations were amended by the Jacobs Survey Department). In addition to this, buildings were classified by type (e.g. residential, commercial) using Address Point Data.
- 30.2.23 Using the methodology set out in CRTN, noise levels were calculated at sample properties within 500m of the current road network with the base year, as well as for the Do-Minimum and Do-Something scenarios in the Year of Opening and the Design Year. Calculations were based on measurements at a point 1m in front of the most exposed façade (unless in open areas, where the levels are reported as free field levels). All calculations are based on the predicted traffic flows as summarised in Chapter 4 (The Proposed Scheme). Noise calculations have been undertaken using the AAWT (Annual Average Weekday Traffic – 18hr, 5 day average) provided by MVA. All traffic data have been derived using the ASAM3B traffic model. The traffic modelling is fully explained in Chapter 5 (Overview of Assessment Process).

##### Noise Nuisance Assessment

- 30.2.24 DMRB states that a noise nuisance assessment should be carried out for properties with a 1dB change. Due to variability in individual responses, DMRB recommends that community annoyance ratings are used for each noise level. It is therefore important to note that the results of the DMRB nuisance assessment should not be related to individual annoyance response.
- 30.2.25 The term 'nuisance' in DMRB means the percentage of people bothered by traffic noise (i.e. those who say they are 'very much' or 'quite a lot' bothered on a four point worded scale).
- 30.2.26 DMRB details procedures for estimating changes in traffic noise nuisance when a new road scheme is planned. This method is based on the results of surveys which examined the relationship between objective measures of road traffic noise outside residential properties, and the percentage of people bothered by road traffic noise. The 1977 National Environmental Survey (England) (Harland and Abbot, 1997), has shown that once people become accustomed to a change in noise, their general dissatisfaction with traffic noise does not alter until changes in level on the  $L_{A10(18h)}$  scale exceed at least 3dB(A). However, in the period immediately following the completion of a road scheme, people may find appreciable benefits or disbenefits when noise changes are less than 3dB(A). Prior to the publication of DMRB, available research (1977) indicated that an abrupt change in traffic noise as small as 1dB(A) may result in a 21% change in the number of people bothered 'very much' or 'quite a lot' by road traffic noise. A noise disturbance assessment was therefore made for all properties with an expected noise change of 1dB(A) or greater due to the proposed scheme. This change in noise level would be produced by a change in traffic flow of approximately +25% or -20%, assuming that other factors, such as the average speed and the percentage of HGVs remain unchanged.
- 30.2.27 Noise nuisance predictions for the proposed scheme are based on the highest nuisance levels expected during the first 15 years after opening. These assessments have been undertaken in accordance with the predictive technique presented in DMRB, although the method has limitations as discussed in paragraphs 30.2.31 – 30.2.33.
- 30.2.28 DMRB also requires an indication of the number of properties that are likely to be eligible for statutory insulation. The Noise Insulation (Scotland) Regulations 1975 provide for acoustic insulation to be offered for residential properties. The qualifying criteria are detailed within the Regulations and within the Memorandum on the Noise Insulation (Scotland) Regulations 1975 (NISR), Regulations 3 and 6. The qualifying criteria are as follows:

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- the properties are situated within 300m of the new or altered carriageway;
- the properties lie within the triangular area at the terminal point of the new road, the apexes of which are 50m along the centreline of the existing road from the terminal points and the bases of which extend from points 300m on either side of the road to the nearest point on the carriageway, at right angles to the centreline of the carriageway;
- a straight line can be drawn from any point of the property to a point on the carriageway without passing through another building;
- the use of the road causes, or is expected to cause, noise at a level not less than 68dB(A); and
- the property will experience noise levels exceeding the 'prevailing noise level' by at least 1.0dB(A).

#### Vibration

- 30.2.29 Investigations have determined a relationship between the number of people affected by the traffic noise and those adversely impacted by air-borne vibration. It was found that the  $L_{A10(18h)}$  index was among the physical variables most closely associated with average vibration disturbance ratings. The relationships between the percentage of people affected by largely air-borne vibration and this noise exposure index are similar to that for noise nuisance. However, it is recommended in DMRB that the percentage of people bothered by vibration is 10% lower than the corresponding noise nuisance figure and that at noise levels below 58dB  $L_{A10(18h)}$ , it should be assumed that no people would be affected.
- 30.2.30 In accordance with DMRB Volume 11, the prediction of disturbance caused by air-borne vibration is made for properties within 40m of the road centreline which are un-screened.

#### Limitation to Assessment

- 30.2.31 The surveys were conducted at sites where road traffic was the dominant noise source, noise levels ranged from 65 to 78dB  $L_{A10,18h}$ , the changes in traffic noise were up to 10dB  $L_{A10,18h}$  and properties were up to 18m from the road, in accordance with the DMRB method. Therefore, it is only at these noise levels and distance ranges that the method is strictly valid. The DMRB method is also valid only for noise changes caused by alterations in traffic flow and will not necessarily give a good prediction if traffic noise changes are brought about by other means, such as barriers or low noise road surfaces. The Southern Leg section of the proposed scheme contains areas where the ambient levels are dominated by road traffic noise, such as properties alongside the A90 at Nigg, the A93 at Camphill/Milltimber and the A944 at Kingswells. However, throughout the scheme there are many areas where the ambient noise climate is currently not dominated by road traffic noise. The ambient descriptor will therefore be the  $L_{A90}$  or  $L_{A10}$ , as appropriate (refer to paragraphs 30.2.16 and 30.2.17), but as the nuisance assessment is based on changes in road traffic noise level, the noise nuisance results are strictly not applicable where the  $L_{A90}$  is used. However, DMRB, Volume 11, Section 3, Part 7, Chapter 8, Paragraph 5.10 states that 'Strictly, the method should not be used outside the noise and distance ranges covered by the surveys, or when the ambient noise is not from traffic. However, it seems likely that the mechanisms underlying the survey results will operate outside these ranges. Until better information becomes available, it is recommended that the method is used to predict nuisance changes outside these noise and distance ranges, albeit with caution'.
- 30.2.32 As the method for assessing vibration is similar to noise nuisance, it is subject to the same limitations as discussed above.
- 30.2.33 The prediction method detailed within the NISR Memorandum for considering requirements for statutory noise insulation has been improved since 1975. While DMRB does allow for the use of the method detailed within the NISR Memorandum, the prediction methodology employed in this assessment uses the more detailed and accurate predictive methods set out in CRTN. To ensure compliance with NISR, the assessment uses as a proxy a CRTN predicted level of 65dB(A) as a

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preliminary indicator of the need to utilise the full NISR Memorandum methodology assessment of eligibility, where all the other qualifying criteria are met.

#### Threshold for Mitigation

- 30.2.34 As best practice, mitigation should be implemented, where practicable, where the significance of impact in the Design Year is found to be 'Moderate adverse' or worse at ground floor. This is an onerous target as mitigation is therefore considered where there is an increase of greater than 1dB irrespective of the absolute noise level (in recognition of the sudden change effects as reported within DMRB), and must be applied with caution in rural areas where there are at present no traffic sources.
- 30.2.35 For guidance on onset of effects, reference was made to the current WHO document entitled 'Community Noise' (WHO, 1999). This document does not contain recommendations, but provides guideline values based on the precautionary principle. The WHO document states that 'To protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed 55dB  $L_{Aeq}$  on balconies, terraces and in outdoor living areas. To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound level should not exceed 50dB  $L_{Aeq}$ . Where it is practical and feasible, the lower outdoor sound level should be considered the maximum desirable sound level for new development'.
- 30.2.36 The WHO refers to a daytime time base of 16 hours ( $L_{Aeq(16hr)}$ ), and CRTN predictions are in terms of  $L_{A10(18hr)}$ . To translate the WHO  $L_{Aeq(16hr)}$  to  $L_{A10(18hr)}$ , a correction of approximately +2dB is therefore required, with a further +2.5dB necessary to translate into façade levels. This translation applied to 55dB  $L_{Aeq,16hr}$  gives an equivalent threshold façade level of 59.5dB  $L_{A10(18hr)}$ .
- 30.2.37 Where mitigation is considered, it is necessary that it complies with acceptable standards in terms of traffic, safety, environmental and economic issues (DMRB Volume 11, Section 2, Part 3, Mitigation, Paragraph 1.2(a)). Examples that could preclude the use of mitigation are disproportionate cost and unacceptable visual impact.
- 30.2.38 In summary, taking into account the WHO and DMRB guidance, mitigation was considered where the significance of impact at a receptor was assessed as Moderate adverse or worse and where the predicted façade level exceeded 59.5dB  $L_{A10(18hr)}$ . As noted in paragraph 30.2.5, noise prediction beyond 300m may be inaccurate and the mitigation threshold was therefore only applied to receptors within 300m in accordance with DMRB.

### 30.3 Baseline Conditions

- 30.3.1 A total of 1280 potentially sensitive receptors were identified within 500m of the Southern Leg of the proposed scheme. Of these, 1176 are categorised as residential and 110 as non-residential, including 7 which are considered within both receptor categories (i.e. residential properties that are also historic buildings or, in the case of St. Hilda's Milltimber, an educational building).
- 30.3.2 Table 30.5 illustrates the number of potentially sensitive receptors within each category. As explained above, certain receptors are listed in more than one category, as indicated in the table footnote.

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**Table 30.5 – Number of Properties Within 500m**

Distance Band	Residential	Commercial/Industrial	Amenity/Recreation	Farm	Education	Health	Woodland	Historic	Footpath
0 – 50m	48	3	0	1	0	0	12	0	7
50 – 100m	75	14	1	2	0	0	4	1	2
100 – 200m	145	3	0	4	0	0	4	8	3
200 – 300m	182	3	0	5	0	0	2	4	0
300 – 500m	726	6	0	4	2	1	7	6	1
Totals	1176*	29	1	16	2*	1	29	19*	13

\* includes those categorised as both residential and historic or educational.

30.3.3 DMRB requires that the assessment also include 'all relevant locations' and relevant is further defined as 'e.g. sports fields, canals, footpaths'. References to Figures 30.1a-h are provided where appropriate below. These include the locations of all 55 sample receptors reported in this assessment and a representative selection of sensitive receptors within 500m of the proposed scheme.

Educational

- Rudolph Steiner Schools Ltd (St Hilda's), Camphill House, Milltimber AB13 0AN [note: also categorised as 'residential' in Table 30.5]

Health

- Ardene House Veterinary Hospital, Kingswells, Aberdeen AB15 8PJ

Historical

- Kingswells, Consumption Dyke
- Cloghill House Sundial
- Friends Burial Ground
- Culter House Walled Garden
- March Stone No. 23
- March Stone No 24
- March Stone No. 21
- March Stone No. 22
- Kingcausie House – Sundial (1)
- Kingcausie House – Sundial (2)
- Milton Bridge Over Crynoch Burn
- West Hatton, Long Cairn

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- Culter House (St. Margaret's School For Girls Boarding House) (also known as Culter House Nursing Home) [note: also categorised as 'residential' in Table 30.5]
- Fairley House, Newhills (also known as Fairley Home Farm) [note: also categorised as 'residential' in Table 30.5]
- Mill Inn – Old Corn Mill
- Cloghill House [note: also categorised as 'residential' in Table 30.5]
- Cloghill House, Offices (also known as the Coach House, Cloghill) [note: also categorised as 'residential' in Table 30.5]
- Eastland House, Maryculter [note: also categorised as 'residential' in Table 30.5]
- Kingcausie House, Maryculter [note: also categorised as 'residential' in Table 30.5]

#### Amenity/Recreation

- Kippie Lodge Course, Culter House Road

#### Footpaths

- Near Westfield Cottage
- Near Nether Fifeshill
- Near Kingshill Wood
- Near Lythewood
- Near Auchlea
- Near Kingswells Community Centre
- Near Cults And Junction Of Westerton Road And Ashfield Road)
- Near Inch Of Culter
- Near Inchgarth Reservoir)
- Near Burnside
- Near Hilton Farm House
- Near North Westfield House
- Near Westfield Lodge

#### Woodland:

- Woodland, near Coldstone Avenue, Newhills
- Kingshill Wood
- Gairnhill/Kingshill Woods
- Gairnhill/Kingshill Woods (South West)
- Woodland, near Silverburn Farm
- Woodland, near Garden House
- Woodland, near Contlaw Road
- Woodland, near Bloomfield House, Peterculter
- Woodland, near Hillhouse, Peterculter
- Woodland, Guttrie Hill, Peterculter
- Woodland, near Culter House Road, Peterculter

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- Woodland, Bride's Ward
- Woodland, near Dreycot
- Woodland, near St. Ronans Circle
- Woodland, near Charnwood House
- Woodland, near Broomvale Inch Ferry
- Woodland, around Kingcausie Estate
- Woodland, near Maryculter Bridge
- Woodland, near Corbie Lodge
- Woodland, near Old Mill Inn
- Woodland, Banchory-Devenick
- Woodland, near Blue Hill
- Craingles/Cleanhill Woods
- Woodland, near Red Lodge
- Craingles/Cleanhill Woods, Near Hill of Blairs
- Woodland, near Heatherknowe
- Woodland, near Whitestones
- Woodland, near Kemehede
- Woodland, Clochandigher, Maryculter

#### Commercial/Industrial

- Lochinch Croft, Nigg, AB123LL
- E I S Waste Services, Nigg, AB123LL
- Alistair Morrison, Nigg, AB123LL
- A N C Express Parcels, Nigg, AB123LL
- Jeeves Couriers Ltd, Nigg, AB123LL
- Julannville, Nigg, AB123LL
- Storybook Glen, Maryculter, AB125FT
- Phoenix Windows & Conservatories, Blairs, AB125YA
- North East Reprographics Ltd, Nigg, AB124LP
- Marywell Park Homes Ltd, Nigg, AB124LP
- Apex Tubulars, Portlethen, AB124SB
- Seaforth Maritime Ltd, Nigg, AB124LP
- M G S Transport, Portlethen, AB124SA
- Marywell Garden Centre, Nigg, AB123LP
- Granloran, Nigg, AB124LP
- Laramie Plant Hire, Nigg, AB124LP
- Aberdeen Petroleum Club, Milltimber, AB130AB
- British Telecom, Milltimber, AB130EN

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- R E Talbott & Associates Ltd, Milltimber, AB130EN
- Old Mill Inn, Maryculter, AB125FX
- M Mair, Kingswells, AB158TR
- 2 Hill Of Milltimber, Milltimber, AB130ET
- 1 Hill Of Milltimber, Milltimber, AB130ET
- L Harvey, Kingswells, AB158QR
- Waste Enterprises, Kingswells, AB158QR
- Kingsford, Kingswells, AB158QR
- Clark & Sutherland, Kingswells, AB158SL
- L D Motors, Kingswells, AB158SL
- King Street Autobody, Kingswells, AB158SL

#### Farm:

- Hillside Farm House, Banchory Devenick, AB125YJ
- Lochinch Farm, Nigg, AB123LL
- Greenhowe Farm, Banchory Devenick, AB125YJ
- Old Barn, Banchory Devenick, AB125YJ
- Greenhowe Steading, Banchory Devenick, AB125YJ
- Hillhead Farm, Nigg, AB123LN
- Cowford Farm, Blairs, AB125YA
- Newlands Farm, Blairs, AB125YB
- Bishopston Farm, Portlethen, AB124RS
- Causeyport Farm, Portlethen, AB124RT
- Milltimber Farm, Milltimber, AB130AA
- Nether Beanshill Farm, Milltimber, AB130EQ
- Derbeth Farm, Kingswells, AB158SD
- Gairn Farm, Kingswells, AB158QJ
- Silverburn Farm, Kingswells, AB158QL
- Pinecrest Farm, Kingswells, AB158SN

30.3.4 All Listed Historic Buildings within 500m of the proposed scheme were considered during identification of sensitive receptors however, noise climate is not one of the listing criteria and as such noise would not have any cultural heritage implications. Impacts on the 19 historic buildings/sites have been included in this assessment as potential noise receptors, a selection of which is shown on Figures 30.1a-h.

## 30.4 Potential Impacts

### Noise Model Calibration

- 30.4.1 To calibrate the 3D noise model of the existing road network model, generated predicted noise levels were compared with the measured noise levels at a selection of the sample receptors previously listed. For comparison, predicted noise levels were determined for ground floor level and compared to the measured noise levels at these locations, as shown in Table 30.6. It must be noted that there will rarely be perfect agreement between predicted and measured levels as the modelled levels use flow data for an 18 hour period and the measured levels are based on the short term measurement period, and DMRB does not expect this. The CRTN shortened measurement procedure advises that where a measurement is made over three consecutive hours, a correction factor of -1dB should be applied to obtain an 18 hour value. In essence, the short term measured levels are likely to be slightly higher than the predicted levels.

**Table 30.6 – Modelled Predicted Noise Levels versus Measured Noise Levels**

Sample Receptor	Modelled Predicted (dB) $L_{A10(18hr)}$	Equivalent Measured (dB) $L_{A10(18hr)}$
Westholme	48.8	46.4
Ardenlea	72.1	71.6
Clark & Sutherland	64.6	65.2
The Stables	51.6	47.9
1 Milltimber Brae East	63.9	64.5
The Gables	63.1	62.8
Old Mill Inn	57.1	54.6
Whistlebrae Farmhouse	53.0	49.2
The Clachan	65.1	63.1
Novara	61.4	61.7

- 30.4.2 The results in Table 30.6 do show reasonable agreement between the modelled predicted noise levels and the measured noise levels, and therefore effectively calibrate the 3D noise model. It is stated in DMRB that with regard to the actual measured levels 'Care is needed in the interpreting of the levels of the  $L_{A10,18h}$  recorded. These will vary from day to day during the year, depending on the influence of varying traffic and weather conditions and seasonal effects'. It is therefore recommended that where road traffic noise presently dominates the noise climate the predicted Do-Minimum levels of  $L_{A10(18hr)}$  provide a more reliable measure for an average day than the measured level and therefore the predicted ambient levels are, where possible (see paragraph 30.2.17 for an explanation of where the predicted  $L_{A10(18hr)}$  is not used), used in this future year comparison assessment.

### Traffic Noise

- 30.4.3 The finalised road traffic model for the Southern Leg section incorporates design elements which will mitigate traffic noise, such as sections of false cutting. These are summarised in Section 30.5 (Mitigation) and have been developed iteratively through discussion between the road engineers, Jacobs landscape team and Hamilton & McGregor noise specialists. The potential impacts described in this section are based on the finalised road model and therefore take these measures into account.



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- 30.4.4 Section 30.6 (Residual Impacts) takes account of the incorporated measures as well as additional receptor specific measures to further reduce impacts as described in Section 30.5 (Mitigation).
- 30.4.5 In total, there are 450 residential properties within 300m of the proposed Southern Leg. The results for the 55 selected sample receptors (residential and non-residential) deemed to be representative of their locality, at ground and first floor, for both the Year of Opening and the Design Year, with and without the proposed scheme are presented in Table 30.7a and Table 30.7b together with the associated Significance of Impact. It should be appreciated that, in order to determine the change in noise level between scenarios, the following process has been adopted: receptor points were located at a distance of 1m from each façade of each building and the receptor location that had the highest noise level in the Do-Something scenario was then compared with the same receptor location in the Do-Minimum scenario. The results in Table 30.7a and Table 30.7b for ground and first floor respectively are reproduced graphically in 30.1a-h and 30.3a-h.
- 30.4.6 As explained in previously, where a property is outwith 300m of an existing road, the  $L_{A90(T)}$  noise parameter has been used to characterise the noise at that property. Although it was not feasible to take noise measurements at every property beyond 300m, the arithmetic average of the  $L_{A90(T)}$  noise level as measured at all sample properties has been used as a proxy for the  $L_{A90(T)}$  for all properties. Where appropriate, this 34.9dB  $L_{A90(T)}$  noise level has been used in the noise assessment with the assumption that the existing noise climate will not change significantly at these locations in the absence of the proposed Southern Leg.
- 30.4.7 The noise related impacts for the Wider Area Network are presented in Chapter 54 (Cumulative Impact Assessment).

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**Table 30.7(a) – Predicted Noise Impacts at Sample Properties at Ground Floor (receiver height=1.5m, \*\* = L<sub>A90(T)</sub>)**

Note: DS = Do-Something (i.e. With Proposed scheme), DM = Do-Minimum (i.e. without scheme)

Property	Building Type	Base 2005 L <sub>A10(T)</sub> or L <sub>A90(T)</sub> as appropriate	Noise Levels dB L <sub>A10(18hr)</sub>				Significance of Impact	
			Year of Opening		Design Year		Year of Opening	Design Year
			DM	DS	DM	DS		
Gairn Park, Kingswells**	Residential	35.5	35.5	62.8	35.5	63.5	Substantial Adverse	Substantial Adverse
Ardenlea, Kingswells	Residential	71.0	71.6	71.4	71.6	71.8	Slight Beneficial	Slight Adverse
Ardnamoine, Kingswells**	Residential	39.5	39.5	60.2	39.5	60.9	Substantial Adverse	Substantial Adverse
Broomhill, Kingswells**	Residential	41.3	41.3	67.0	41.3	67.8	Substantial Adverse	Substantial Adverse
Tigh-Na-Braich, Kingswells**	Residential	39.1	39.1	63.2	39.1	63.9	Substantial Adverse	Substantial Adverse
Benview, Kingswells**	Residential	34.6	34.6	62.7	34.6	63.3	Substantial Adverse	Substantial Adverse
Hillview, Kingswells	Residential	51.9	52.3	57.8	52.4	58.4	Substantial Adverse	Substantial Adverse
Croft House, Culter House Road, Milltimber**	Residential	38.3	38.3	64.5	38.3	65.1	Substantial Adverse	Substantial Adverse
Pavillion, Milltimber Playing Fields** Albyn School Playing Fields	Educational	47.0	47.0	57.6	47.0	57.9	Moderate Adverse	Moderate Adverse
Bishopston Farm, Portlethen**	Farm	41.9	41.9	54.1	41.9	55.3	Moderate Adverse	Moderate Adverse
Newlands Farm, Blairs**	Farm	35.8	35.8	54.2	35.8	55.5	Moderate Adverse	Moderate Adverse
Burnhead Cottage, Blairs**	Residential	22.3	22.3	52.1	22.3	53.3	Substantial Adverse	Substantial Adverse
Eastland Cottage, Kingcausie, Maryculter**	Residential	34.9	34.9	64.9	34.9	65.7	Substantial Adverse	Substantial Adverse
Kemehede, Blairs**	Residential	33.6	33.6	57.9	33.6	59.1	Substantial Adverse	Substantial Adverse
Kippie Lodge, North Deeside Road, Milltimber	Commercial/Industrial	48.0	48.7	56.5	49.0	57.2	Moderate/ Substantial Adverse	Moderate/ Substantial Adverse
The Stables, Bellenden Walk, Milltimber	Residential	55.1	55.6	58.7	55.9	59.3	Moderate/ Substantial Adverse	Moderate/ Substantial Adverse
North Lodge, Kingcausie Estate, Maryculter	Residential	65.0	65.6	66.6	65.8	67.0	Moderate Adverse	Moderate Adverse
Kingcausie, Maryculter**	Residential and Historical	36.2	36.2	62.4	36.2	63.3	Substantial Adverse	Substantial Adverse
Old Mill Inn, Maryculter	Commercial/Industrial	60.9	61.8	60.7	62.2	61.3	Slight/ Moderate Beneficial	Negligible/ Slight Beneficial
The Gables, Milltimber Brae, Milltimber	Residential	61.1	61.6	62.5	62.0	63.3	Slight Adverse	Moderate Adverse

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Property	Building Type	Base 2005 L <sub>A10(T)</sub> or L <sub>A90(T)</sub> as appropriate	Noise Levels dB L <sub>A10(18hr)</sub>				Significance of Impact	
			Year of Opening		Design Year		Year of Opening	Design Year
			DM	DS	DM	DS		
St. Hildas, Milltimber	Camphill (Residential and Educational)	50.5	51.0	55.6	51.4	56.4	Moderate/ Substantial Adverse	Substantial Adverse
Midfield Cottage, Portlethen**	Residential	32.8	32.8	60.1	32.8	61.3	Substantial Adverse	Substantial Adverse
Hare Moss Cottage, Portlethen**	Residential	34.7	34.7	50.5	34.7	51.6	Substantial Adverse	Substantial Adverse
Duffshill, Portlethen**	Residential	40.8	40.8	53.4	40.8	54.6	Substantial Adverse	Substantial Adverse
Turnamiddle House, Portlethen**	Residential	41.4	41.4	52.5	41.4	53.0	Substantial Adverse	Substantial Adverse
The Beeches, Banchory Devenick**	Residential	40.8	40.8	57.0	40.8	58.2	Substantial Adverse	Substantial Adverse
Novara, Nigg	Residential	62.6	62.8	63.8	63.2	64.1	Moderate Adverse	Slight Adverse
Little Bishopston, Portlethen**	Residential	26.4	26.4	52.3	26.4	53.4	Substantial Adverse	Substantial Adverse
Kippie Lodge Golf Course, Culter House Road, Milltimber**	Amenity/Recreation	43.7	44.7	57.2	45.2	57.7	Moderate/ Substantial Adverse	Moderate/ Substantial Adverse
Beanshill Lodge, Milltimber**	Residential	36.1	36.1	51.7	36.1	52.4	Substantial Adverse	Substantial Adverse
Westholme, Kingswells	Residential	54.8	56.0	60.1	56.5	60.9	Moderate/Substantial Adverse	Moderate/Substantial Adverse
Clark & Sutherland, Smiddy Brae, Kingswells	Commercial/Industrial	69.9	70.2	70.9	70.3	71.1	Negligible/ Slight Adverse	Negligible/ Slight Adverse
Grianan, Auchlunies, Blairs**	Residential	29.9	29.9	57.5	29.9	58.7	Substantial Adverse	Substantial Adverse
Tarns, Blairs**	Residential	28.4	28.4	57.8	28.4	58.5	Substantial Adverse	Substantial Adverse
381 North Deeside Road, Milltimber	Residential	64.2	65.4	65.4	65.7	65.6	No Benefit	Slight Beneficial
The Siding, Station Road, Milltimber	Residential	58.3	58.9	64.7	59.3	65.5	Substantial Adverse	Substantial Adverse
1 Milltimber Brae East, Milltimber	Residential	62.4	62.7	61.8	62.9	62.2	Slight Beneficial	Slight Beneficial
69b Culter House Road, Milltimber**	Residential	42.1	42.1	61.9	42.1	62.5	Substantial Adverse	Substantial Adverse
The Clachan, Nigg	Residential	66.4	66.9	65.8	67.2	66.1	Moderate Beneficial	Moderate Beneficial
Brae View, Charleston, Nigg	Residential	61.7	63.3	63.3	63.6	63.7	No Benefit	Slight Adverse
Whistlebrae Farmhouse, Banchory Devenick	Residential	49.2	49.2	57.5	49.2	58.2	Substantial Adverse	Substantial Adverse
Nether Beanshill Farm, Milltimber**	Farm	36.8	36.8	56.5	36.8	57.1	Moderate Adverse	Moderate Adverse
234 North Deeside Road, Milltimber	Residential	58.6	58.8	58.2	59.0	58.7	Slight Beneficial	Slight Beneficial

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Property	Building Type	Base 2005 L <sub>A10(T)</sub> or L <sub>A90(T)</sub> as appropriate	Noise Levels dB L <sub>A10(18hr)</sub>				Significance of Impact	
			Year of Opening		Design Year		Year of Opening	Design Year
			DM	DS	DM	DS		
Craiglug, Kingswells**	Residential	34.9	34.9	61.3	34.9	62.0	Substantial Adverse	Substantial Adverse
2 Eastland House, Maryculter**	Residential and Historical	40.0	40.0	62.7	40.0	63.5	Substantial Adverse	Substantial Adverse
Gairn Farm, Blacktop, Kingswells**	Farm	30.0	30.0	62.6	30.0	63.4	Moderate Adverse	Moderate Adverse
Moss-Side Of Auchlea, Kingswells**	Residential	39.3	39.3	60.6	39.3	61.3	Substantial Adverse	Substantial Adverse
East Lodge, Culter House Road, Milltimber	Residential	53.6	54.2	60.1	54.5	60.7	Substantial Adverse	Substantial Adverse
2 Hill Farm, Milltimber**	Residential	35.6	35.6	57.5	35.6	58.2	Substantial Adverse	Substantial Adverse
Silverburn House, Kingswells**	Residential	50.1	50.1	59.9	50.1	60.6	Substantial Adverse	Substantial Adverse
Glencairn, Portlethen**	Residential	37.4	37.4	53.4	37.4	54.6	Substantial Adverse	Substantial Adverse
47 Culter House Road, Milltimber**	Residential	44.2	44.2	57.8	44.2	58.4	Substantial Adverse	Substantial Adverse
Holly House, Station Road, Milltimber**	Residential	48.0	48.0	64.3	48.0	65.2	Substantial Adverse	Substantial Adverse
Fareview, West Hatton, Kingswells**	Residential	46.3	46.3	57.4	46.3	58.2	Substantial Adverse	Substantial Adverse
4 Hare Moss Steadings, Portlethen**	Residential	37.7	37.7	56.8	37.7	58.0	Substantial Adverse	Substantial Adverse

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**Table 30.7(b) – Predicted Noise Impacts at Sample Properties at First Floor (receiver height=4.5m, \*\* = L<sub>A90(T)</sub>)**

Note: DS = Do-Something (i.e. With Proposed scheme), DM = Do-Minimum (i.e. without scheme)

Property	Building Type	Base 2005 L <sub>A10(T)</sub> or L <sub>A90(T)</sub> as appropriate	Noise Levels dB L <sub>A10(18hr)</sub>				Significance of Impact	
			Year of Opening		Design Year		Year of Opening	Design Year
			DM	DS	DM	DS		
Gairn Park, Kingswells**	Residential	35.5	35.5	64.4	35.5	65.1	Substantial Adverse	Substantial Adverse
Ardenlea, Kingswells	Residential	73.2	73.7	73.4	73.7	73.8	Slight Beneficial	Slight Adverse
Ardnamoine, Kingswells**	Residential	39.5	39.5	60.9	39.5	61.5	Substantial Adverse	Substantial Adverse
Broomhill, Kingswells**	Residential	41.3	41.3	68.9	41.3	69.7	Substantial Adverse	Substantial Adverse
Tigh-Na-Bruaich, Kingswells**	Residential	39.1	39.1	65.2	39.1	65.8	Substantial Adverse	Substantial Adverse
Benview, Kingswells**	Residential	34.6	34.6	65.4	34.6	66.0	Substantial Adverse	Substantial Adverse
Hillview, Kingswells	Residential	53.6	54.0	59.3	54.1	59.9	Substantial Adverse	Substantial Adverse
Croft House, Culter House Road, Milltimber**	Residential	38.3	38.3	67.9	38.3	68.5	Substantial Adverse	Substantial Adverse
Pavillion, Milltimber Playing Fields** Albyn School Playing Fields	Unassigned	47.0	47.0	59.1	47.0	59.3	Moderate Adverse	Moderate Adverse
Bishopston Farm, Portlethen**	Farm	41.9	41.9	55.6	41.9	56.8	Moderate Adverse	Moderate Adverse
Newlands Farm, Blairs**	Farm	35.8	35.8	55.6	35.8	56.9	Moderate Adverse	Moderate Adverse
Burnhead Cottage, Blairs**	Residential	22.3	22.3	57.0	22.3	58.2	Substantial Adverse	Substantial Adverse
Eastland Cottage, Kingcausie, Maryculter**	Residential	34.9	34.9	66.7	34.9	67.5	Substantial Adverse	Substantial Adverse
Kemehede, Blairs**	Residential	33.6	33.6	59.2	33.6	60.4	Substantial Adverse	Substantial Adverse
Kippie Lodge, North Deeside Road, Milltimber	Commercial/Industrial	49.5	50.2	57.8	50.5	58.4	Moderate/ Substantial Adverse	Moderate/ Substantial Adverse
The Stables, Bellenden Walk, Milltimber	Residential	57.1	57.6	60.0	57.8	60.6	Moderate Adverse	Moderate Adverse

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Property	Building Type	Base 2005 L <sub>A10(T)</sub> or L <sub>A90(T)</sub> as appropriate	Noise Levels dB L <sub>A10(18hr)</sub>				Significance of Impact	
			Year of Opening		Design Year		Year of Opening	Design Year
			DM	DS	DM	DS		
North Lodge, Kingcausie Estate, Maryculter	Residential	66.0	66.6	67.6	66.7	68.0	Moderate Adverse	Moderate Adverse
Kingcausie, Maryculter**	Residential	36.2	36.2	63.9	36.2	64.7	Substantial Adverse	Substantial Adverse
Old Mill Inn, Maryculter	Commercial/Industrial	62.7	63.6	62.2	64.0	62.8	Slight/ Moderate Beneficial	Slight/ Moderate Beneficial
The Gables, Milltimber Brae, Milltimber	Residential	63.3	63.9	64.0	64.2	64.7	Slight Adverse	Slight Adverse
St. Hildas, Milltimber	Camphill	50.5	52.4	56.8	52.8	57.7	Moderate/ Substantial Adverse	Moderate/ Substantial Adverse
Midfield Cottage, Portlethen**	Residential	32.8	32.8	61.4	32.8	62.6	Substantial Adverse	Substantial Adverse
Hare Moss Cottage, Portlethen**	Residential	34.7	34.7	51.9	34.7	53.1	Substantial Adverse	Substantial Adverse
Duffshill, Portlethen**	Residential	40.8	40.8	54.5	40.8	55.7	Substantial Adverse	Substantial Adverse
Turnamiddle House, Portlethen**	Residential	41.4	41.4	53.6	41.4	54.1	Substantial Adverse	Substantial Adverse
The Beeches, Banchory Devenick**	Residential	40.8	40.8	58.0	40.8	59.2	Substantial Adverse	Substantial Adverse
Novara, Nigg	Residential	65.0	65.3	67.2	65.7	67.6	Moderate Adverse	Moderate Adverse
Little Bishopston, Portlethen**	Residential	26.4	26.4	53.9	26.4	55.1	Substantial Adverse	Substantial Adverse
Kippie Lodge Golf Course, Culter House Road, Milltimber**	Amenity	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Beanshill Lodge, Milltimber**	Residential	36.1	36.1	53.2	36.1	53.9	Substantial Adverse	Substantial Adverse
Westholme, Kingswells	Residential	55.6	56.8	60.9	57.3	61.6	Moderate/Substantial Adverse	Moderate/Substantial Adverse
Clark & Sutherland, Smiddy Brae, Kingswells	Commercial/Industrial	70.9	71.2	72.9	71.3	73.1	Slight/ Moderate Adverse	Slight/ Moderate Adverse
Grianan, Auchlunies, Blairs**	Residential	29.9	29.9	60.3	29.9	61.5	Substantial Adverse	Substantial Adverse

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Property	Building Type	Base 2005 L <sub>A10(T)</sub> or L <sub>A90(T)</sub> as appropriate	Noise Levels dB L <sub>A10(18hr)</sub>				Significance of Impact	
			Year of Opening		Design Year		Year of Opening	Design Year
			DM	DS	DM	DS		
Tarns, Blairs**	Residential	28.4	28.4	58.5	28.4	59.2	Substantial Adverse	Substantial Adverse
381 North Deeside Road, Milltimber	Residential	67.4	70.7	70.6	71.0	70.8	Slight Beneficial	Slight Beneficial
The Siding, Station Road, Milltimber	Residential	59.8	60.8	67.8	61.2	68.6	Substantial Adverse	Substantial Adverse
1 Milltimber Brae East, Milltimber	Residential	65.6	66.0	65.0	66.2	65.4	Slight Beneficial	Slight Beneficial
69b Culter House Road, Milltimber**	Residential	42.1	42.1	63.2	42.1	63.8	Substantial Adverse	Substantial Adverse
The Clachan, Nigg	Residential	68.7	69.0	68.1	69.3	68.4	Slight Beneficial	Slight Beneficial
Brae View, Charleston, Nigg	Residential	64.3	65.6	65.5	65.9	66.0	Slight Beneficial	Slight Adverse
Whistlebrae Farmhouse, Banchory Devenick**	Residential	49.2	49.2	59.1	49.2	59.9	Substantial Adverse	Substantial Adverse
Nether Beanshill Farm, Milltimber**	Farm	36.8	36.8	58.3	36.8	59.0	Moderate Adverse	Moderate Adverse
234 North Deeside Road, Milltimber	Residential	62.8	63.0	62.6	63.2	63.1	Slight Beneficial	Slight Beneficial
Craiglug, Kingswells**	Residential	34.9	34.9	62.1	34.9	62.8	Substantial Adverse	Substantial Adverse
2 Eastland House, Maryculter**	Residential	40.0	40.0	63.7	40.0	64.5	Substantial Adverse	Substantial Adverse
Gairn Farm, Blacktop, Kingswells**	Farm	30.0	30.0	64.1	30.0	64.8	Moderate Adverse	Moderate Adverse
Moss-Side Of Auchlea, Kingswells**	Residential	39.3	39.3	61.5	39.3	62.1	Substantial Adverse	Substantial Adverse
East Lodge, Culter House Road, Milltimber	Residential	55.1	55.7	61.8	56.0	62.4	Substantial Adverse	Substantial Adverse
2 Hill Farm, Milltimber**	Residential	35.6	35.6	58.8	35.6	59.5	Substantial Adverse	Substantial Adverse
Silverburn House, Kingswells**	Residential	50.1	50.1	60.7	50.1	61.4	Substantial Adverse	Substantial Adverse

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Property	Building Type	Base 2005 L <sub>A10(T)</sub> or L <sub>A90(T)</sub> as appropriate	Noise Levels dB L <sub>A10(18hr)</sub>				Significance of Impact	
			Year of Opening		Design Year		Year of Opening	Design Year
			DM	DS	DM	DS		
Glencairn, Portlethen**	Residential	37.4	37.4	54.5	37.4	55.7	Substantial Adverse	Substantial Adverse
47 Culter House Road, Milltimber**	Residential	44.2	44.2	59.5	44.2	60.1	Substantial Adverse	Substantial Adverse
Holly House, Station Road, Milltimber**	Residential	48.0	48.0	65.4	48.0	66.3	Substantial Adverse	Substantial Adverse
Fareview, West Hatton, Kingswells**	Residential	46.3	46.3	58.4	46.3	59.1	Substantial Adverse	Substantial Adverse
4 Hare Moss Steadings, Portlethen**	Residential	37.7	37.7	58.3	37.7	59.5	Substantial Adverse	Substantial Adverse



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##### Ground Floor

- 30.4.8 Table 30.7a shows the predicted noise levels for the selected sample receptors at ground floor level. For the 450 residential properties within 300m of the proposed Southern Leg section, there are ten residential properties that are predicted to experience 'No Change' in the Year of Opening and 15 in the Design Year. There are 44 residential properties in the Year of Opening and 48 in the Design Year that experience a significance of impact that is Moderate Beneficial or better. There are also 165 properties in the Year of Opening and 141 properties in the Design Year that are predicted to experience a significance of impact that is Slight Beneficial.
- 30.4.9 Beneficial impacts would occur in areas such as Nigg due to a reduction in road traffic flow and the percentage of heavy goods vehicles on the A90 with the scheme in place. There would also be slight beneficial impacts for some properties within the Milltimber area as a result of traffic flows reducing on the A93. The Chapel of Stoneywood – Fairley Road (C89C) west of Kingswells will also experience a reduction in flows that will lead to reduced noise levels at some properties within Kingswells.
- 30.4.10 Of the 450 residential properties within 300m of the proposed Southern Leg section, there are 185 properties in the Year of Opening and 184 in the Design Year that are predicted to experience a significance of impact that is Moderate Adverse or worse. This is mainly because the properties are, to a large extent, remote from significant road traffic noise at present. Of these properties, there are 47 in the Year of Opening and 54 in the Design Year that also exceed  $L_{A10(18hr)}$  of 59.5dB and will therefore warrant mitigation, where practicable. These properties are as follows (with applicable assessment years shown in brackets and, where the property is a selected sample receptor, reference to the appropriate figure has been included):
- Newtonsyde, Charleston, Nigg (Year of Opening, Design Year)
  - Corbie Cottage, Maryculter (Design Year)
  - Eastland Cottage, Kingcausie, Maryculter (Year of Opening, Design Year) (Figure 30.1c)
  - 2 Eastland House, Maryculter (Year of Opening, Design Year) (Figure 30.1c)
  - Blair-Crynoch, Blairs (Design Year)
  - Whitestones, Blairs (Year of Opening, Design Year)
  - Heatherknowe, Blairs (Year of Opening, Design Year)
  - Midfield Cottage, Portlethen (Year of Opening, Design Year) (Figure 30.1b)
  - Rylands, Banchory Devenick (Design Year)
  - North Lodge, Kingcausie Estate, Maryculter (Year of Opening, Design Year) (Figure 30.1d)
  - Kingcausie, Maryculter (Year of Opening, Design Year) (Figure 30.1d)
  - Croft House, Culter House Road, Milltimber (Year of Opening, Design Year) (Figure 30.1e)
  - 69b Culter House Road, Milltimber (Year of Opening, Design Year) (Figure 30.1e)
  - 61 Culter House Road, Milltimber (Year of Opening, Design Year)
  - East Lodge, Culter House Road, Milltimber (Year of Opening, Design Year) (Figure 30.1e)
  - Edgehill House, North Deeside Road, Milltimber (Year of Opening, Design Year)
  - 250 North Deeside Road, Milltimber (Year of Opening, Design Year)
  - 246 North Deeside Road, Milltimber (Design Year)
  - 2 Milltimber Brae, Milltimber (Year of Opening, Design Year)
  - 2 Milltimber Brae East, Milltimber (Year of Opening, Design Year)

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- 1 Milltimber Brae, Milltimber (Year of Opening, Design Year)
- 4 Milltimber Brae East, Milltimber (Year of Opening, Design Year)
- 8 Milltimber Brae East, Milltimber (Year of Opening, Design Year)
- The Mearns, Station Road, Milltimber (Year of Opening, Design Year)
- The Siding, Station Road, Milltimber (Year of Opening, Design Year)
- Holly House, Station Road, Milltimber (Year of Opening, Design Year) (Figure 30.1d)
- 6 Station Road, Milltimber (Year of Opening, Design Year)
- The Gables, Milltimber Brae, Milltimber (Design Year)
- Hillview House, Contlaw Road, Milltimber (Year of Opening, Design Year)
- 250a, North Deeside Road, Milltimber (Year of Opening, Design Year)
- Lythewood, Kingswells (Year of Opening, Design Year)
- Tigh-Na-Braich, Kingswells (Year of Opening, Design Year) (Figure 30.1f)
- Invermoriston, Kingswells (Year of Opening, Design Year)
- Byways, Kingswells (Year of Opening, Design Year)
- Craiglug, Kingswells (Year of Opening, Design Year) (Figure 30.1f)
- Silverburn House, Kingswells (Year of Opening, Design Year) (Figure 30.1f)
- East Silverburn, Kingswells (Year of Opening, Design Year)
- Gairn Park, Kingswells (Year of Opening, Design Year) (Figure 30.1f)
- Brackendale, Kingswells (Design Year)
- Aonachrigh, Kingswells (Year of Opening, Design Year)
- Broomhill, Kingswells (Year of Opening, Design Year) (Figure 30.1f)
- Ardamoine, Kingswells (Year of Opening, Design Year) (Figure 30.1f)
- Broomwood, Kingswells (Year of Opening, Design Year)
- Benview, Kingswells (Year of Opening, Design Year) (Figure 30.1f)
- Woodside Of Cloghill, Kingswells (Year of Opening, Design Year)
- The Steadings, Woodside Of Cloghill, Kingswells (Year of Opening, Design Year)
- The Coachhouse, Cloghill, Kingswells (Year of Opening, Design Year)
- West Hatton, Kingswells (Year of Opening, Design Year)
- Westholme, Kingswells (Year of Opening, Design Year) (Figure 30.1g)
- Highfield, Kingswells (Year of Opening, Design Year)
- Kingslea, Kingswells (Year of Opening, Design Year)
- The Corner Cottage, Kingswells (Year of Opening, Design Year)
- Bonvista, Cloghill, Kingswells (Design Year)
- Moss-Side Of Auchlea, Kingswells (Year of Opening, Design Year) (Figure 30.1g)

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#### First Floor

- 30.4.11 Table 30.7b shows the predicted noise levels for the 55 selected sample receptors at first floor level. For the 450 residential properties within 300m of the proposed Southern Leg section, there are 16 residential properties that will experience 'No change' in both the Year of Opening, while in the Design Year 4 properties are predicted to experience 'No Change'. There are 45 properties in the Year of Opening and 49 in Design Year that are predicted to experience a significance of impact that is Moderate Beneficial or better. There are also 157 properties in the Year of Opening and 142 in the Design Year that experience a significance of impact that is Slight Beneficial.
- 30.4.12 Of the 450 residential properties within 300m of the proposed Southern Leg section, there are 180 properties in the Year of Opening and 183 properties in the Design Year that experience a potential significance of impact that is Moderate Adverse or worse. Of the properties that are predicted to experience a potential significance of impact that is Moderate Adverse or worse, there are 61 properties in the Year of Opening and 73 in the Design Year that also exceed  $L_{A10(18hr)}$  of 59.5dB. These properties are as listed in Appendix A30.5 (with applicable assessment years shown in brackets).

### **30.5 Mitigation**

- 30.5.1 Mitigation is considered in terms of incorporated mitigation (i.e. measures included as part of the assessed road model as explained in paragraphs 30.4.3. and receptor specific mitigation for the properties identified above in Section 30.4 with potential impacts of Moderate Adverse or worse significance and a noise level exceeding 59.5dB  $L_{A10(18hr)}$ .
- 30.5.2 Mitigation measures comprise substantial acoustic screens, and some revised earthworks. It should also be noted that properties situated further back from the road may experience further noise reduction from intervening buildings.

#### **Incorporated Mitigation**

##### Earthworks

- 30.5.3 Earthworks mitigation is fully described within the Chapter 26 (Landscape), but has been summarised here for clarification:
- false cutting at Kemehede, Cleanhill (ch200650 – 200950)
  - false cutting at Fairley Home Farm, Kingswells (ch109900-110300)

##### Low Noise Surfacing

- 30.5.4 Lower noise road surfacing is proposed throughout the scheme. Quieter road surfaces such as Stone Mastic Asphalt (SMA), or a pervious material, would be likely to reduce noise levels by approximately 2.5dB  $L_{A10\ 18h}$  compared with conventional hot rolled asphalt surfacing. This benefit is related to the speed of the traffic on the road, and is likely to be significant at speeds above approximately 50kph.

#### **Receptor Specific Mitigation**

##### Acoustic Screens

- 30.5.5 Noise mitigation will be positioned as close to the carriageway as possible to ensure maximum attenuation, taking into account alignment requirements, land available, and landscaping and visual requirements. Noise barriers set close to a road can provide protection to garden areas as well as the living space of properties.

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- 30.5.6 The acoustic screens may be in the form of an earth bund, or a combination of an earth bund and a noise fence. It should be noted that basic acoustic fencing will be of a minimum surface density of 15kg/m<sup>2</sup> with no holes or gaps. Timbers must be overlapped to allow for shrinkage and timber screens should be well bedded in gravel (or equivalent) to avoid soil erosion, which could create gaps underneath the screens, reducing their noise attenuation effectiveness. The full detailed barrier specification for each of the barriers will be detailed in the Employers Requirement prepared for scheme construction should the scheme proceed. The barrier specification will comply with all relevant British Standards.
- 30.5.7 The specific additional mitigation measures are summarised in Table 30.8 and have been incorporated to minimise the impacts at properties meeting the threshold described in paragraphs 30.2.3-35 for consideration of mitigation, where practicable. Figures 30.2c-e and 30.4c-e show the locations of the proposed acoustic screens.

**Table 30.8 – Acoustic Screen Noise Mitigation**

Address	Height	Length	Approximate Chainage
Newtonsyde & Novara, Nigg, AB12 3LL	1.0m 2.8	64m 91m	North east of Charleston Junction
Midfield Cottage, Portlethen, AB12 4RT	1.0m	186m	203700
Heatherknowe, Blairs, AB12 5YA	2.2m	170m	202700
Whitestones, Blairs, AB12 5YT	2.7m 2.0m	203m 127m	201050 201050
Blair-Crynoch, Blairs, AB12 5YX	1.0m	304m	200450
Eastlands (Eastland Cottage and Eastland House), Maryculter, AB12 5FS	2.0m	210m	101100
Corbie Lodge and Corbie Lynn, Maryculter, AB12 5FT	1.2m	195m	101600
Camphill, Milltimber, AB13 0AP and The Gables, Milltimber, AB13 0AA	1.2m parapets on River Dee bridge 4m barrier : Dee crossing to Old Deeside Line Walk 2.5m barrier south verge A93 junction	330m, s/b 330m n/b 628m 114m	102550/102650
Approx 10 properties (Milltimber Brae/Culterhouse Rd/North Deeside Rd)	2.5m, 2.0m and 1.5m: Station Rd south, returning along North Deeside Line. 2.5m, 1.5m, 2.5m and 3m.: A93 to Culterhouse Rd. 1m: east verge of junction link road and 1.2m: north of Culterhouse Rd.	147m 889m 972m	102900/103500
Hillview	1.5m 1.5m	76m 99m	104700
Gairmpark	2.5m 2.0m parapet on bridge at Siverburn 2.0m parapet on bridge at Siverburn	491m 43m 39m	106400

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Address	Height	Length	Approximate Chainage
East Silverburn	2.5m	491m	106500
Craiglug, Brackendale and Aonachrigh	3.0m	241m	107500
Moss-side of Auchlea (incl Kingswood Learning Centre)	1.6m	249m	107650
Tigh-na-bruaich	2.6m	207m	107750
Benview and Lythewood	2.8m	134m	108050
Westholme	1.7m	53m	108850
West Hatton and Highfield	3.0m	351m	109100
The Steadings and Woodside of Cloghill	3.5m	208m	110000
	3.0m	83m	
The Coach House and Bonvista	1.5m	146m	109800

#### Noise Insulation

- 30.5.8 As noted in paragraph 30.2.28, Regulation 3 of the Noise Insulation (Scotland) Regulations 1975 (NISR), confers a duty on the roads authorities in certain instances to offer insulation to eligible residential properties affected by noise.
- 30.5.9 The results of this noise assessment indicate that, at ground floor, with receptor specific mitigation measures in place the following properties may qualify in terms of the NISR:
- Broomhill, Kingswells, Aberdeen, AB15 8QL (Year of Opening, Design Year)
  - Broomwood, Kingswells, Aberdeen, AB15 8QL (Year of Opening, Design Year)
  - The Corner Cottage, Kingswells, Aberdeen, AB15 8RX (Design Year)
- 30.5.10 At the first floor, with receptor specific mitigation measures in place, the following properties may qualify in terms of the NISR:
- The Clachan, Nigg, Aberdeen, AB12 3LL (Year of Opening, Design Year)
  - Lynden Villa, Nigg, Aberdeen, AB12 3LN (Year of Opening, Design Year)
  - Brae View, Charleston, Nigg, Aberdeen, AB12 3LN (Year of Opening, Design Year)
  - Four Winds, Nigg, Aberdeen, AB12 3LN (Year of Opening, Design Year)
  - Woodside Bungalow, Nigg, Aberdeen, AB12 3LN (Year of Opening, Design Year)
  - Straloch, Nigg, Aberdeen, AB12 3LN (Year of Opening, Design Year)
  - Bonnyhill, Nigg, Aberdeen, AB12 3LN (Year of Opening, Design Year)
  - West Loch, Charleston, Nigg, Aberdeen, AB12 3LN (Year of Opening, Design Year)
  - The Cairns, Nigg, Aberdeen, AB12 3LN (Year of Opening, Design Year)
  - Duconer, Charleston, Nigg, Aberdeen, AB12 3LN (Year of Opening, Design Year)
  - Argyll, Charleston, Nigg, Aberdeen, AB12 3LN (Year of Opening, Design Year)
  - Mark 1 Signs, Nigg, Aberdeen, AB12 3LN (Year of Opening, Design Year)
  - 42 Marywell Park Homes, Nigg, Aberdeen, AB12 4LQ (Year of Opening, Design Year)
  - 43 Marywell Park Homes, Nigg, Aberdeen, AB12 4LQ (Year of Opening, Design Year)

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- 19 Marywell Park Homes, Nigg, Aberdeen, AB12 4LQ (Year of Opening, Design Year)
- 1 Marywell Park Homes, Nigg, Aberdeen, AB12 4LQ (Year of Opening, Design Year)
- 7 Marywell Park Homes, Nigg, Aberdeen, AB12 4LQ (Year of Opening, Design Year)
- 4 Marywell Park Homes, Nigg, Aberdeen, AB12 4LQ (Year of Opening, Design Year)
- 5 Marywell Park Homes, Nigg, Aberdeen, AB12 4LQ (Year of Opening, Design Year)
- 2 Marywell Park Homes, Nigg, Aberdeen, AB12 4LQ (Year of Opening, Design Year)
- 13 Marywell Park Homes, Nigg, Aberdeen, AB12 4LQ (Year of Opening, Design Year)
- 12 Marywell Park Homes, Nigg, Aberdeen, AB12 4LQ (Year of Opening, Design Year)
- The Old Schoolhouse, Portlethen, Aberdeen, AB12 4SA (Year of Opening, Design Year)
- Windyneuk, Portlethen, Aberdeen, AB12 4SA (Year of Opening, Design Year)
- Findon Guest House, Portlethen, Aberdeen, AB12 4SA (Year of Opening, Design Year)
- Bonnybrig Whistlebrae, Nigg, Aberdeen, AB12 3TP (Year of Opening, Design Year)
- Bothiebrigg Cottage, Charleston, Nigg, AB12 3TP (Year of Opening, Design Year)
- North Lodge, Kingcausie Estate, Maryculter, AB12 5FR (Year of Opening, Design Year)
- East Lodge, Fairley, Kingswells, Aberdeen, AB15 8SD (Year of Opening, Design Year)
- 381 North Deeside Road, Milltimber, AB13 0AD (Year of Opening, Design Year)
- 250a, North Deeside Road, Milltimber, AB13 0DJ (Year of Opening, Design Year)
- 2 Milltimber Brae, Milltimber, AB13 0DY (Year of Opening, Design Year)
- 375 North Deeside Road, Milltimber, AB13 0AD (Year of Opening, Design Year)
- 373 North Deeside Road, Milltimber, AB13 0AD (Year of Opening, Design Year)
- 371 North Deeside Road, Milltimber, AB13 0AD (Year of Opening, Design Year)
- 377 North Deeside Road, Milltimber, AB13 0AD (Year of Opening, Design Year)
- 302 North Deeside Road, Milltimber, AB13 0AB (Year of Opening, Design Year)
- 240 North Deeside Road, Milltimber, AB13 0DQ (Year of Opening, Design Year)
- 236c, North Deeside Road, Milltimber, AB13 0DQ (Year of Opening, Design Year)
- 1 Milltimber Brae East, Milltimber, AB13 0DN (Year of Opening, Design Year)
- The Siding, Station Road, Milltimber, AB13 0DP (Year of Opening, Design Year)
- Holly House, Station Road, Milltimber, AB13 0DP (Year of Opening, Design Year)
- 6 Station Road, Milltimber, AB13 0DP (Year of Opening, Design Year)
- Invermoriston, Kingswells, Aberdeen, AB15 8QQ (Design Year)
- Byways, Kingswells, Aberdeen, AB15 8QQ (Design Year)
- Broomhill, Kingswells, Aberdeen, AB15 8QL (Design Year)
- Broomwood, Kingswells, Aberdeen, AB15 8QL (Design Year)
- Ardenlea, Kingswells, Aberdeen, AB15 8RT (Design Year)
- East Kingsford, Kingswells, Aberdeen, AB15 8QR (Design Year)
- The Corner Cottage, Kingswells, Aberdeen, AB15 8RX (Design Year)
- Brodiach Cottage, Kingswells, Aberdeen, AB15 8RT (Design Year)

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- 30.5.11 The list of properties that may be eligible will be confirmed in advance of the construction stage. Prevailing noise levels will be assessed pre-construction for these properties in accordance with NISR and within 12 months of the opening of the road, further assessments will be undertaken to determine eligibility. NISR also require that eligibility for noise insulation is reviewed at defined intervals (5, 10 and 15 years) after the road is opened. The statutory noise insulation assessments will be undertaken by Scottish Executive or its nominated representatives.

#### Summary of Mitigation

- 30.5.12 The aims of the proposed mitigation is summarised in Table 30.9.

**Table 30.9 – Summary of General Aim of Measures Employed to Address Noise Potential Impacts**

Type of Measure	Description
Prevent	Where practicable road aligned to avoid closely populated areas.
Reduce	Construction of noise barriers, earthworks bunds and the use of low noise surfacing will reduce the predicted traffic noise levels.
Offset	A list of properties that may be eligible for noise insulation due to increase in noise caused by the new road will be drawn up and assessed prior to construction.
Enhance	None.

## 30.6 Residual Impacts

- 30.6.1 Residual impacts are reported assuming the implementation of all mitigation measures described in the preceding section.

#### Traffic Noise

- 30.6.2 The residual predicted noise levels and associated derived residual significance of impact for the selected sample properties are presented in Tables 30.10a and 30.10b.

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**Table 30.10(a) – Residual Impacts at Sample Properties at Ground Floor (receiver height=1.5m, \*\* = L<sub>A90(T)</sub>)**

Note: DS = Do-Something (i.e. With Proposed scheme), DM = Do-Minimum (i.e. without scheme)

Property	Building Type	Base 2005 L <sub>A10(T)</sub> or L <sub>A90(T)</sub> as appropriate	Noise Levels dB L <sub>A10(18hr)</sub>				Significance of Impact	
			Year of Opening		Design Year		Year of Opening	Design Year
			DM	DS	DM	DS		
Gairn Park, Kingswells**	Residential	35.5	35.5	58.7	35.5	59.4	Substantial Adverse	Substantial Adverse
Ardenlea, Kingswells	Residential	71.0	71.6	71.4	71.6	71.8	Slight Beneficial	Slight Adverse
Ardnamoine, Kingswells**	Residential	39.5	39.5	60.2	39.5	60.9	Substantial Adverse	Substantial Adverse
Broomhill, Kingswells**	Residential	41.3	41.3	67.0	41.3	67.8	Substantial Adverse	Substantial Adverse
Tigh-Na-Bruaich, Kingswells**	Residential	39.1	39.1	59.0	39.1	59.6	Substantial Adverse	Substantial Adverse
Benview, Kingswells**	Residential	34.6	34.6	60.3	34.6	60.9	Substantial Adverse	Substantial Adverse
Hillview, Kingswells	Residential	51.9	52.3	56.9	52.4	57.5	Moderate/ Substantial Adverse	Substantial Adverse
Croft House, Culter House Road, Milltimber**	Residential	38.3	38.3	58.8	38.3	59.5	Substantial Adverse	Substantial Adverse
Pavillion, Albyn School Playing Fields** AB13 OAJ	Educational	47.0	47.0	57.5	47.0	57.8	Moderate Adverse	Moderate Adverse
Bishopston Farm, Portlethen**	Farm	41.9	41.9	54.0	41.9	55.2	Moderate Adverse	Moderate Adverse
Newlands Farm, Blairs**	Farm	35.8	35.8	54.2	35.8	55.5	Moderate Adverse	Moderate Adverse
Burnhead Cottage, Blairs**	Residential	22.3	22.3	52.1	22.3	53.3	Substantial Adverse	Substantial Adverse
Eastland Cottage, Kingcausie, Maryculter**	Residential	34.9	34.9	60.6	34.9	61.4	Substantial Adverse	Substantial Adverse
Kemehede, Blairs**	Residential	33.6	33.6	56.6	33.6	57.8	Substantial Adverse	Substantial Adverse
Kippie Lodge, North Deeside Road, Milltimber	Commercial/ Industrial	48.0	48.7	56.1	49.0	56.8	Moderate/ Substantial Adverse	Moderate/ Substantial Adverse
The Stables, Bellenden Walk, Milltimber	Residential	55.1	55.6	57.2	55.9	57.9	Moderate Adverse	Moderate Adverse
North Lodge, Kingcausie Estate, Maryculter	Residential	65.0	65.6	64.8	65.8	65.3	Slight Beneficial	Slight Beneficial
Kingcausie, Maryculter**	Residential	36.2	36.2	62.4	36.2	63.3	Substantial Adverse	Substantial Adverse
Old Mill Inn, Maryculter	Commercial/ Industrial	60.9	61.8	60.6	62.2	61.2	Slight/ Moderate Beneficial	Negligible/ Slight Beneficial
The Gables, Milltimber Brae, Milltimber	Residential	61.1	61.6	59.8	62.0	60.6	Moderate Beneficial	Moderate Beneficial
St. Hildas, Milltimber	Camphill	50.5	51.0	52.7	51.4	53.5	Moderate Adverse	Moderate Adverse



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Property	Building Type	Base 2005 L <sub>A10(T)</sub> or L <sub>A90(T)</sub> as appropriate	Noise Levels dB L <sub>A10(18hr)</sub>				Significance of Impact	
			Year of Opening		Design Year		Year of Opening	Design Year
			DM	DS	DM	DS		
	(Residential and Educational)							
Midfield Cottage, Portlethen**	Residential	32.8	32.8	58.2	32.8	59.4	Substantial Adverse	Substantial Adverse
Hare Moss Cottage, Portlethen**	Residential	34.7	34.7	50.3	34.7	51.5	Substantial Adverse	Substantial Adverse
Duffshill, Portlethen**	Residential	40.8	40.8	54.3	40.8	55.6	Substantial Adverse	Substantial Adverse
Turnamiddle House, Portlethen**	Residential	41.4	41.4	52.7	41.4	53.2	Substantial Adverse	Substantial Adverse
The Beeches, Banchory Devenick**	Residential	40.8	40.8	57.0	40.8	58.2	Substantial Adverse	Substantial Adverse
Novara, Nigg	Residential	62.6	62.8	61.1	63.2	61.5	Moderate Beneficial	Moderate Beneficial
Little Bishopston, Portlethen**	Residential	26.4	26.4	52.4	26.4	53.6	Substantial Adverse	Substantial Adverse
Golf Course, Cukter House Road, Milltimber, AB13 0AB	Amenity	43.7	44.7	52.5	45.2	53.1	Moderate/ Substantial Adverse	Moderate/ Substantial Adverse
Beanshill Lodge, Milltimber**	Residential	36.1	36.1	51.6	36.1	52.4	Substantial Adverse	Substantial Adverse
Westholme, Kingswells	Residential	54.8	56.0	58.6	56.5	59.3	Moderate/Substantial Adverse	Moderate/Substantial Adverse
Clark & Sutherland, Smiddy Brae, Kingswells	Commercial/Industrial	69.9	70.2	70.9	70.3	71.1	Negligible/ Slight Adverse	Negligible/ Slight Adverse
Grianan, Auchlunies, Blairs	Residential	29.9	29.9	57.5	29.9	58.7	Substantial Adverse	Substantial Adverse
Tarns, Blairs**	Residential	28.4	28.4	58.0	28.4	58.7	Substantial Adverse	Substantial Adverse
381 North Deeside Road, Milltimber	Residential	64.2	65.4	65.3	65.7	65.6	Slight Beneficial	Slight Beneficial
The Siding, Station Road, Milltimber	Residential	58.3	58.9	58.6	59.3	59.5	Slight Beneficial	Slight Adverse
1 Milltimber Brae East, Milltimber	Residential	62.4	62.7	61.8	62.9	62.3	Slight Beneficial	Slight Beneficial
69b Culter House Road, Milltimber**	Residential	42.1	42.1	60.1	42.1	60.9	Substantial Adverse	Substantial Adverse
The Clachan, Nigg	Residential	66.4	66.9	65.8	67.2	66.1	Moderate Beneficial	Moderate Beneficial
Brae View, Charleston, Nigg	Residential	61.7	63.3	63.3	63.6	63.7	No Benefit	Slight Adverse
Whistlebrae Farmhouse, Banchory Devenick	Residential	49.2	49.2	57.5	49.2	58.2	Substantial Adverse	Substantial Adverse
Nether Beanshill Farm, , Milltimber**	Farm	36.8	36.8	56.5	36.8	57.1	Moderate Adverse	Moderate Adverse

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Property	Building Type	Base 2005 L <sub>A10(T)</sub> or L <sub>A90(T)</sub> as appropriate	Noise Levels dB L <sub>A10(18hr)</sub>				Significance of Impact	
			Year of Opening		Design Year		Year of Opening	Design Year
			DM	DS	DM	DS		
234 North Deeside Road, Milltimber	Residential	58.6	58.8	58.1	59.0	58.7	Slight Beneficial	Slight Beneficial
Craiglug, Kingswells	Residential	34.9	34.9	59.2	34.9	59.9	Substantial Adverse	Substantial Adverse
2 Eastland House, Maryculter**	Residential	40.0	40.0	58.1	40.0	59.0	Substantial Adverse	Substantial Adverse
Gairn Farm, Blacktop, Kingswells**	Farm	30.0	30.0	62.6	30.0	63.4	Moderate Adverse	Moderate Adverse
Moss-Side Of Auchlea, Kingswells**	Residential	39.3	39.3	58.8	39.3	59.4	Substantial Adverse	Substantial Adverse
East Lodge, Culter House Road, Milltimber	Residential	53.6	54.2	57.8	54.5	58.6	Moderate/ Substantial Adverse	Moderate/ Substantial Adverse
2 Hill Farm, Milltimber	Residential	35.6	35.6	57.5	35.6	58.2	Substantial Adverse	Substantial Adverse
Silverburn House, Kingswells**	Residential	50.1	50.1	58.1	50.1	58.9	Substantial Adverse	Substantial Adverse
Glencairn, Portlethen**	Residential	37.4	37.4	54.2	37.4	55.4	Substantial Adverse	Substantial Adverse
47 Culter House Road, Milltimber**	Residential	44.2	44.2	56.0	44.2	56.7	Substantial Adverse	Substantial Adverse
Holly House, Station Road, Milltimber**	Residential	48.0	48.0	59.0	48.0	60.0	Substantial Adverse	Substantial Adverse
Fareview, West Hatton, Kingswells**	Residential	46.3	46.3	56.8	46.3	57.5	Substantial Adverse	Substantial Adverse
4 Haremosse Steadings, Portlethen**	Residential	37.7	37.7	56.7	37.7	57.9	Substantial Adverse	Substantial Adverse

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**Table 30.10(b) –Residual Impacts at Sample Properties at First Floor (receiver height=4.5m, \*\* = L<sub>A90(T)</sub>)**

Note: DS = Do-Something (i.e. With Proposed scheme), DM = Do-Minimum (i.e. without scheme)

Property	Building Type	Base 2005 L <sub>A10(T)</sub> or L <sub>A90(T)</sub> as appropriate	Noise Levels dB L <sub>A10(18hr)</sub>				Significance of Impact	
			Year of Opening		Design Year		Year of Opening	Design Year
			DM	DS	DM	DS		
Gairn Park, Kingswells**	Residential	35.5	35.5	60.3	35.5	61.0	Substantial Adverse	Substantial Adverse
Ardenlea, Kingswells	Residential	73.2	73.7	73.4	73.7	73.7	Slight Beneficial	No Benefit
Ardnamoine, Kingswells**	Residential	39.5	39.5	60.9	39.5	61.5	Substantial Adverse	Substantial Adverse
Broomhill, Kingswells**	Residential	41.3	41.3	68.9	41.3	69.7	Substantial Adverse	Substantial Adverse
Tigh-Na-Bruaich, Kingswells**	Residential	39.1	39.1	63.6	39.1	64.2	Substantial Adverse	Substantial Adverse
Benview, Kingswells**	Residential	34.6	34.6	63.2	34.6	63.8	Substantial Adverse	Substantial Adverse
Hillview, Kingswells	Residential	53.6	54.0	58.3	54.1	58.9	Moderate/ Substantial Adverse	Moderate/ Substantial Adverse
Croft House, Culter House Road, Milltimber**	Residential	38.3	38.3	62.4	38.3	63.2	Substantial Adverse	Substantial Adverse
Pavillion, Milltimber Playing Fields** Albyn School Playing Fields	Unassigned	47.0	47.0	58.9	47.0	59.2	Moderate Adverse	Moderate Adverse
Bishopston Farm, Portlethen**	Farm	41.9	41.9	55.6	41.9	56.8	Moderate Adverse	Moderate Adverse
Newlands Farm, Blairs**	Farm	35.8	35.8	55.6	35.8	56.9	Moderate Adverse	Moderate Adverse
Burnhead Cottage, Blairs**	Residential	22.3	22.3	57.1	22.3	58.3	Substantial Adverse	Substantial Adverse
Eastland Cottage, Kingcausie, Maryculter**	Residential	34.9	34.9	62.0	34.9	62.9	Substantial Adverse	Substantial Adverse
Kemehede, Blairs**	Residential	33.6	33.6	57.8	33.6	59.0	Substantial Adverse	Substantial Adverse
Kippie Lodge, North Deeside Road, Milltimber	Commercial/ Industrial	49.5	50.2	57.4	50.5	58.1	Moderate/ Substantial Adverse	Moderate/ Substantial Adverse

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Property	Building Type	Base 2005 L <sub>A10(T)</sub> or L <sub>A90(T)</sub> as appropriate	Noise Levels dB L <sub>A10(18hr)</sub>				Significance of Impact	
			Year of Opening		Design Year		Year of Opening	Design Year
			DM	DS	DM	DS		
The Stables, Bellenden Walk, Milltimber	Residential	57.1	57.6	59.0	57.8	59.6	Moderate Adverse	Moderate Adverse
North Lodge, Kingcausie Estate, Maryculter	Residential	66.0	66.6	67.3	66.7	67.7	Slight Adverse	Moderate Adverse
Kingcausie, Maryculter**	Residential	36.2	36.2	63.9	36.2	64.7	Substantial Adverse	Substantial Adverse
Old Mill Inn, Maryculter	Commercial/ Industrial	62.7	63.6	62.2	64.0	62.7	Slight/ Moderate Beneficial	Slight/ Moderate Beneficial
The Gables, Milltimber Brae, Milltimber	Residential	63.3	63.9	61.8	64.2	62.6	Moderate Beneficial	Moderate Beneficial
St. Hildas, Milltimber	Camphill	50.5	52.4	54.0	52.8	54.9	Moderate Adverse	Moderate Adverse
Midfield Cottage, Portlethen**	Residential	32.8	32.8	59.7	32.8	60.9	Substantial Adverse	Substantial Adverse
Hare Moss Cottage, Portlethen**	Residential	34.7	34.7	51.8	34.7	53.0	Substantial Adverse	Substantial Adverse
Duffshill, Portlethen**	Residential	40.8	40.8	55.4	40.8	56.6	Substantial Adverse	Substantial Adverse
Turnamiddle House, Portlethen**	Residential	41.4	41.4	53.8	41.4	54.3	Substantial Adverse	Substantial Adverse
The Beeches, Banchory Devenick**	Residential	40.8	40.8	58.0	40.8	59.2	Substantial Adverse	Substantial Adverse
Novara, Nigg	Residential	65.0	65.3	64.2	65.7	64.6	Moderate Beneficial	Moderate Beneficial
Little Bishopston, Portlethen**	Residential	26.4	26.4	54.1	26.4	55.2	Substantial Adverse	Substantial Adverse
Kippie Lodge Golf Course, Culter House Road, Milltimber**	Amenity	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Beanshill Lodge, Milltimber**	Residential	36.1	36.1	53.1	36.1	53.8	Substantial Adverse	Substantial Adverse
Westholme, Kingswells	Residential	55.6	56.8	60.7	57.3	61.4	Moderate/Substantial Adverse	Moderate/Substantial Adverse
Clark & Sutherland, Smiddy Brae, Kingswells	Commercial/	70.9	71.2	72.9	71.3	73.1	Slight/ Moderate Adverse	Slight/ Moderate Adverse

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Property	Building Type	Base 2005 L <sub>A10(T)</sub> or L <sub>A90(T)</sub> as appropriate	Noise Levels dB L <sub>A10(18hr)</sub>				Significance of Impact	
			Year of Opening		Design Year		Year of Opening	Design Year
			DM	DS	DM	DS		
	Industrial							
Grianan, Auchlunies, Blairs**	Residential	29.9	29.9	60.3	29.9	61.5	Substantial Adverse	Substantial Adverse
Tarns, Blairs**	Residential	28.4	28.4	58.7	28.4	59.4	Substantial Adverse	Substantial Adverse
381 North Deeside Road, Milltimber	Residential	67.4	70.7	70.5	71.0	70.8	Slight Beneficial	Slight Beneficial
The Siding, Station Road, Milltimber	Residential	59.8	60.8	65.0	61.2	65.9	Moderate/ Substantial Adverse	Moderate/ Substantial Adverse
1 Milltimber Brae East, Milltimber	Residential	65.6	66.0	65.1	66.2	65.5	Slight Beneficial	Slight Beneficial
69b Culter House Road, Milltimber**	Residential	42.1	42.1	61.7	42.1	62.5	Substantial Adverse	Substantial Adverse
The Clachan, Nigg	Residential	68.7	69.0	68.0	69.3	68.4	Slight Beneficial	Slight Beneficial
Brae View, Charleston, Nigg	Residential	64.3	65.6	65.5	65.9	66.0	Slight Beneficial	Slight Adverse
Whistlebrae Farmhouse, Banchory Devenick**	Residential	49.2	49.2	59.1	49.2	59.9	Substantial Adverse	Substantial Adverse
Nether Beanshill Farm, Milltimber**	Farm	36.8	36.8	58.3	36.8	59.0	Moderate Adverse	Moderate Adverse
234 North Deeside Road, Milltimber	Residential	62.8	63.0	62.5	63.2	63.1	Slight Beneficial	Slight Beneficial
Craiglug, Kingswells**	Residential	34.9	34.9	60.3	34.9	61.0	Substantial Adverse	Substantial Adverse
2 Eastland House, Maryculter**	Residential	40.0	40.0	59.8	40.0	60.6	Substantial Adverse	Substantial Adverse
Gairn Farm, Blacktop, Kingswells**	Farm	30.0	30.0	64.1	30.0	64.8	Moderate Adverse	Moderate Adverse
Moss-Side Of Auchlea, Kingswells**	Residential	39.3	39.3	59.5	39.3	60.2	Substantial Adverse	Substantial Adverse
East Lodge, Culter House Road, Milltimber	Residential	55.1	55.7	59.7	56.0	60.4	Moderate/ Substantial Adverse	Moderate/ Substantial Adverse

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Property	Building Type	Base 2005 L <sub>A10(T)</sub> or L <sub>A90(T)</sub> as appropriate	Noise Levels dB L <sub>A10(18hr)</sub>				Significance of Impact	
			Year of Opening		Design Year		Year of Opening	Design Year
			DM	DS	DM	DS		
2 Hill Farm, Milltimber**	Residential	35.6	35.6	58.8	35.6	59.5	Substantial Adverse	Substantial Adverse
Silverburn House, Kingswells**	Residential	50.1	50.1	59.1	50.1	59.9	Substantial Adverse	Substantial Adverse
Glencairn, Portlethen**	Residential	37.4	37.4	55.2	37.4	56.4	Substantial Adverse	Substantial Adverse
47 Culter House Road, Milltimber**	Residential	44.2	44.2	57.8	44.2	58.5	Substantial Adverse	Substantial Adverse
Holly House, Station Road, Milltimber**	Residential	48.0	48.0	64.7	48.0	65.7	Substantial Adverse	Substantial Adverse
Fareview, West Hatton, Kingswells**	Residential	46.3	46.3	57.4	46.3	58.2	Substantial Adverse	Substantial Adverse
4 Hare Moss Steadings, Portlethen**	Residential	37.7	37.7	58.2	37.7	59.4	Substantial Adverse	Substantial Adverse

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##### Ground Floor

- 30.6.3 Of the 450 residential properties within 300m, there are nine properties in the Year of Opening and 15 properties in the Design Year that are predicted to experience 'No change' at ground floor level. At ground floor, there are 51 properties in the Year of Opening and 55 in the Design Year that are predicted to experience a residual significance of impact that is Moderate Beneficial or better. These beneficial impacts are indicated on Figures 30.2a-h.
- 30.6.4 At ground floor level within 300m, 177 properties in both the Year of Opening and Design Year that are predicted to experience a residual significance of impact of Moderate Adverse or worse. Of these properties, 25 properties are predicted to exceed the threshold of  $L_{A10(18hr)}$  59.5dB in the Year of Opening and 33 in the Design Year. These properties are as follows:
- Eastland Cottage, Kingcausie, Maryculter, AB12 5FS (Year of Opening, Design Year)
  - Rylands, Banchory Devenick, Aberdeen, AB12 5YD (Design Year)
  - Kingcausie, Maryculter, Aberdeen, AB12 5FR (Year of Opening, Design Year)
  - 69b Culter House Road, Milltimber, AB13 0EP (Year of Opening, Design Year)
  - 250 North Deeside Road, Milltimber, AB13 0DJ (Year of Opening, Design Year)
  - 2 Milltimber Brae, Milltimber, AB13 0DY (Year of Opening, Design Year)
  - 2 Milltimber Brae East, Milltimber, AB13 0DN (Design Year)
  - 1 Milltimber Brae East, Milltimber, AB13 0DY (Year of Opening, Design Year)
  - 4 Milltimber Brae East, Milltimber, AB13 0DN (Year of Opening, Design Year)
  - 8 Milltimber Brae East, Milltimber, AB13 0DN (Design Year)
  - The Mearns, Station Road, Milltimber, AB13 0DP (Design Year)
  - Holly House, Station Road, Milltimber, AB13 0DP (Design Year)
  - 6 Station Road, Milltimber, AB13 0DP (Design Year)
  - Invermoriston, Kingswells, Aberdeen, AB15 8QQ (Year of Opening, Design Year)
  - Byways, Kingswells, Aberdeen, AB15 8QQ (Year of Opening, Design Year)
  - Craiglug, Kingswells, Aberdeen, AB15 8QQ (Design Year)
  - Gairn Farm, Blacktop, Kingswells, Aberdeen, AB15 8QJ (Year of Opening, Design Year)
  - Broomhill, Kingswells, Aberdeen, AB15 8QL (Year of Opening, Design Year)
  - Ardnamoine, Kingswells, Aberdeen, AB15 8QL (Year of Opening, Design Year)
  - Broomwood, Kingswells, Aberdeen, AB15 8QL (Year of Opening, Design Year)
  - Benview, Kingswells, Aberdeen, AB15 8QQ (Year of Opening, Design Year)
  - Kingslea, Kingswells, AB15 8SL (Year of Opening, Design Year)
  - The Corner Cottage, Kingswells, Aberdeen, AB15 8RX (Year of Opening, Design Year)
  - Ardenlea, Kingswells, Aberdeen, AB15 8RT (Year of Opening, Design Year)
  - Tigh-Na-Bruaich, Kingswells, Aberdeen, AB15 8QQ (Design Year)
  - North Lodge, Kingcausie Estate, Maryculter (Year of Opening, Design Year)
  - Old Mill Inn, Maryculter, Aberdeen, AB12 5FX (Year of Opening, Design Year)
  - The Gables, Milltimber Brae, Milltimber, AB13 0AA (Year of Opening, Design Year)
  - Novara, Nigg, Aberdeen, AB12 3LL (Year of Opening, Design Year)

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- Clark & Sutherland, Smiddy Brae, Kingswells, Aberdeen, AB15 8SL (Year of Opening, Design Year)
- 381 North Deeside Road, Milltimber, AB13 0AD (Year of Opening, Design Year)
- The Clachan, Nigg, Aberdeen, AB12 3LL (Year of Opening, Design Year)
- Brae View, Charleston, Nigg, Aberdeen, AB12 3LN (Year of Opening, Design Year)

#### First Floor

- 30.6.5 At first floor, there are 17 properties in the Year of Opening and six in the Design Year that are predicted to experience 'No change' in the Do-Minimum and Do-Something noise levels. There are 53 properties in the Year of Opening and 56 properties in the Design Year that are predicted to experience a residual significance of impact that is Moderate Beneficial or better.
- 30.6.6 At first floor level, there are 170 properties in the Year of Opening and 175 properties in the Design Year that are predicted to experience a residual significance of impact that is Moderate Adverse or worse. Of these, there are 43 properties in the Year of Opening and 58 properties in the Design Year that exceed the mitigation threshold of  $L_{A10(18hr)}$  59.5dB. These properties are as listed in Appendix A30.5 (with applicable assessment years shown in brackets).
- 30.6.7 Generally, the adverse impacts will be experienced due to the introduction of the proposed scheme where no road previously existed. As mentioned earlier in the text, the beneficial impacts will accrue from traffic reductions on the existing roads, as occur as detailed in paragraph 30.4.9.
- 30.6.8 A summary of the residual impact significance is provided in Table 30.11.

**Table 30.11 – Residual Impacts in Terms of the Significance of Impact For Residential Properties within 300m of the Scheme**

Significance of Impact	Ground Floor				First Floor			
	Unmitigated		Mitigated		Unmitigated		Mitigated	
	Year of Opening	Design Year	Year of Opening	Design Year	Year of Opening	Design Year	Year of Opening	Design Year
Substantial Adverse	127	130	123	125	126	126	121	122
Moderate/ Substantial Adverse	18	15	14	14	19	22	18	21
Moderate Adverse	40	39	40	38	35	35	31	32
Slight Adverse	46	62	49	64	52	72	55	76
No Change	10	15	9	15	16	4	17	6
Slight Beneficial	165	141	164	139	157	142	155	137
Moderate Beneficial	43	44	49	50	44	45	52	52
Moderate/ Substantial Beneficial	1	4	2	5	1	4	1	4
Substantial Beneficial	0	0	0	0	0	0	0	0



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Noise Nuisance

- 30.6.9 An assessment of noise nuisance has been carried out for selected properties in accordance with the predictive techniques presented in DMRB.
- 30.6.10 All changes in terms of noise and nuisance levels are reported in Appendix A30.4, for each of the DMRB defined ambient noise bands at ground floor and first floor. It is acknowledged that in assessing residual impacts the DMRB nuisance assessment method is based on noise changes caused by changes in traffic flow alone. Traffic noise changes will not therefore give a good prediction of nuisance where brought about by means other than traffic flow, such as, barriers or low noise road surfaces.
- 30.6.11 Overall, within the Core Study Area, more properties will be subject to an increase in noise level than are subject to decreases. This is very apparent in areas of existing low ambient noise. Examples of areas of existing low noise can be found at isolated properties along the line of the proposed route where there is no road at present, e.g. Heathfield at Portlethen, Red Roofs at Maryculter, properties around Blairs and Brackendale at Kingswells. This is evidenced in the nuisance assessment presented in Appendix A30.4, which shows that for the <50dB ambient noise band there are 105 properties predicted to experience noise level increases of 10dB or greater. This results in 116 properties being subject to increases in DMRB defined nuisance of >40%.
- 30.6.12 However the number of properties within the 50-60dB ambient noise band subject to DMRB defined nuisance of >40% reduces to eight. Obviously, this is due to the fact that properties currently exposed to higher ambient noise levels will experience a smaller relative increase in noise level, when compared with the <50dB ambient noise level band, after the new road scheme is introduced. Also, although there are a total of 164 properties that are predicted to experience an increase in noise nuisance for the Do-Something, there are also predicted to be 155 properties that will experience an increase in noise nuisance for the Do-Minimum scenario. This is due to the fact that the 155 properties that are predicted to experience an increase in noise nuisance for the Do-Minimum scenario have increases of less than 1dB, which can be attributed to natural growth in traffic along existing roads. This is evidenced by reference to the appropriate DMRB summary tables which show that, while there are 155 properties predicted to be subject to an increase in noise nuisance, two are exposed to increases in noise level of greater than 1dB. For the Do-Something scenario, 41 properties are predicted to experience a noise level increase greater than 1dB. The remainder of the 164 properties that would experience an increase in noise nuisance within the 50–60dB ambient noise band will experience an increase in noise that is less than 1dB.
- 30.6.13 Most of the properties in the 60 – 70dB ambient noise band are presently exposed to road traffic noise. There are 48 properties that will experience an increase in the noise nuisance for the Do-Something scenario whilst there are 58 for the Do-Minimum scenario. As above, the increases for Do-Minimum scenario are as a consequence of traffic growth on existing roads, but these increases are less than 1dB. Although there is more of a spread in the noise nuisance levels in the 60 – 70dB ambient noise band for the Do-Something scenario, the total number of properties adversely affected by noise nuisance decreases with the scheme in place.
- 30.6.14 There are very few properties that are within the >70dB ambient noise band. In this band as well, there are more properties that will experience increased noise nuisance for the Do-Minimum scenario than with the scheme in place. In addition, there are a couple of properties that will experience a decrease in noise with the scheme in place. As they are already exposed to high ambient noise levels, this is desirable. These properties are at 381 North Deeside Road (A93), and Nethermore at Kingswells (minor road to the west of Kingswells).

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##### Vibration

- 30.6.15 As explained in Section 30.2 (Approach and Methods), nuisance caused by vibration is considered in terms of noise nuisance categories, but reduced by 10%, and properties experiencing noise levels below 58dB  $L_{A10,18h}$  and/or outwith 40m of the road will not experience nuisance from vibration.
- 30.6.16 There are approximately 36 residential buildings within 40m of the proposed main line that will exceed the 58 dB  $L_{A10,18h}$  lower threshold for vibration assessment. However, a predicted noise level of 64 dB  $L_{A10,18h}$  is necessary before the percentage of people that are likely to be bothered by noise reaches 10%. The nine properties listed below are those where there is predicted to be a greater than 10% change in the percentage of people likely to be bothered by vibration for the Design Year Do-Something scenario. In addition, if "(DM)" is displayed next to the property this indicates that the property will also exceed the lower threshold for Do-Minimum scenario and therefore it is apparent that the change in vibration is very small at all of the properties which exceed the threshold with the exception of Broomwood where, if the community based response figures within DMRB are used, there is predicted to be a 12% change in the number of people like to be bothered by vibration, which is unlikely to be significant.
- Pinewood, Nigg, Aberdeen, AB12 3TP (6.6) (DM )
  - Bonnybrig Whistlebrae, Nigg, Aberdeen, AB12 3TP (15.5) (DM)
  - Bothiebrigg Cottage, Charleston, Nigg, Aberdeen, AB12 3TP (13.9) (DM)
  - 248 North Deeside Road, Milltimber, AB13 0DJ (6.3) (7.3 DM)
  - 250a, North Deeside Road, Milltimber, AB13 0DJ (6.2) (8.5 DM)
  - 302 North Deeside Road, Milltimber, AB13 0AB (14.5) (13.9 DM)
  - Broomwood, Kingswells, Aberdeen, AB15 8QL (8.1)
  - Ardenlea, Kingswells, Aberdeen, AB15 8RT (13.8) (DM)
  - East Kingsford, Kingswells, Aberdeen, AB15 8QR (11.2) (DM)

## 30.7 References

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