

concentrations are considered to be 'extremely small' or 'very small' in magnitude and of 'negligible' significance overall when considered in the context of the air quality objectives with the exception of receptor number 11 (B970 West of existing Dell Road) in 2028, where predicted increase in annual mean NO<sub>2</sub> concentrations are considered 'slight adverse' and therefore not a significant effect.

**7.8.39** It has been determined that the proposed development leads to small increases in NO<sub>x</sub> concentrations in areas of the North Rothiemurchus Pine Woods SSSI, River Spey SAC and Craigellachie Forest SSSI which are closest to affected roads. The concentrations are below the NO<sub>x</sub> limit value of 30µg.m<sup>-3</sup> and therefore are concluded to be 'negligible' and therefore not a significant effect.

**7.8.40** With regards to nitrogen deposition, as all increases in nitrogen deposition as a result of the proposed development are small relative to the critical loads, and no exceedences are predicted to be caused, overall effects are concluded to be 'negligible' and therefore not a significant effect.

**7.8.41** With regard to sensitive ecological sites it can be concluded that annual NO<sub>x</sub> concentrations would not be significant.

## **7.9 EFFECT OF NOISE AND VIBRATION**

### **Introduction**

**7.9.1** This chapter presents the findings of the noise and vibration assessment of the proposed An Camas Mòr development.

### **Scope**

**7.9.2** The potential noise and vibration effects associated with the proposed development are assessed here. This includes an assessment of construction and operational emissions, both upon existing noise sensitive locations and areas of the proposed development that may be sensitive to noise. The decommissioning phase of the proposed development is expected to last for a shorter period than that of construction and is also anticipated to result in lower noise levels due to the reduced need for intensive on-site activity. Construction noise levels are therefore considered to represent a worst-case scenario and decommissioning noise has not been assessed as a result. The objectives of the assessment were to:

- Determine the potential noise and vibration effects caused and received by the proposed development;
- Develop, as necessary, mitigation and control measures to minimise adverse effects;
- Highlight any residual effects that cannot be mitigated; and

- Describe any cumulative effects the proposed development may have in combination with other developments.

## **Possible Effects and Inter-relationships**

- 7.9.3** The effect of noise and vibration is assessed in terms of its effect human beings. No Inter-relationships have been identified..

## **Influence of Periods A-D on Assessment**

- 7.9.4** Noise and vibration effects would occur mainly during the construction of the proposed development (Periods A 2011 to D 2027), as a result of the operation of large items of plant. This equipment would have the potential to generate noise levels considerably higher than current conditions.

## **Consultations**

- 7.9.5** Discussions were held with the Environmental Health department of The Highland Council, regarding the noise and vibration assessment methodology and the need for a baseline survey.
- 7.9.6** It was agreed that the use of best practice guidance, would offer a sufficient level of protection to receptors in the immediate vicinity of the proposed development. Furthermore, baseline monitoring was deemed to be necessary, due to the relative sensitivity of the local environment.

## **The Study Area**

- 7.9.7** The proposed study area for the noise assessment encompassed the proposed development site itself and the following measurement positions;
- Dalfaber Lodges;
  - Guislich Farm;
  - Coylum Road;
  - Dalfaber Road and
  - Dell Farm.

## **Baseline Conditions**

- 7.9.8** The proposed development is to be set in a location that may be described as rural in character. The general area is mainly National Park and farm land, used for recreational and agricultural pursuits, respectively. The terrain is undulating

and the area has a mature tree population in places. The River Spey forms the western boundary of the proposed development.

**7.9.9** Although background noise levels in the immediate area vary according to individual surroundings, the conditions at the nearest sensitive receptors are generally controlled by natural sources of noise, such as that produced by meteorological effects, watercourses and wildlife. As such, many of the sensitive receptor positions are relatively tranquil. Background noise levels are likely to increase during periods of inclement weather, owing to the rural and geographical nature of the area, specifically the terrain, forestry and the Rivers Spey.

**7.9.10** There is a degree of variation in background noise levels in the vicinity of the proposed development, due to natural noise sources and those generated by human activity. Road traffic noise from the B970 contributes to the local noise climate at positions typically to the east and south of the site, whilst the B9152 generally influences environmental conditions to the west and, to a lesser extent, north of the proposed development area. The level of road traffic noise reduces during evening and night-time periods. All other roads are generally single track or private, with low traffic movements.

**7.9.11** A wide variety of noise sensitive receptors are located in the nearest town of Aviemore. However, those identified as most likely to be affected by the Proposed development are dwellings or holiday villas. Potentially affected buildings are generally semi-detached and detached structures of varying designs and sizes. The nearest noise sensitive receptor is located at Dalfaber, approximately 200m to the north-west of the site.

**7.9.12** The daytime sounding of train horns on the Strathspey steam railway is audible at all locations in the general locale of the site, between the months of March to October. Other modes of transport, including aircraft, do not have a discernable effect on background noise levels.

## **Designations**

**7.9.13** There are no statutory designations relating to noise or vibration in the proposed development area.

## **Key Considerations**

**7.9.14** The key considerations, in respect to noise pollution at An Camas Mòr, are:

- Impact of noise as a result of the operation of plant and equipment during construction;
- Impact of noise from construction traffic; and
- Impact of traffic noise during operation.

**7.9.15** The possible impacts, which form the key considerations for assessment, are on:

- Increased noise for people living, working and recreating in the area.

## **Assessment Methodology**

**7.9.16** A range of factors determine the acceptability of construction site noise, in addition to the actual noise levels produced by plant items. These include the location of work positions, hours of work, baseline conditions, noise screening, the nature of work being carried out and the attitudes of the receptor and site operator.

**7.9.17** It is generally accepted by Local Authorities that, due to the temporary nature of construction noise, it warrants less stringent controls on noise emission than that of a permanent operational development. Strict noise control measures can also be difficult to impose, due to the transient nature of the works and may also hinder site progress.

**7.9.18** The type of equipment used would vary in sound power level, with heavy plant items, such trucks, excavators, and piling rigs, being the most significant sources of noise. These sources typically have greater low frequency noise content (20Hz to 200Hz) and their emissions are generally not attenuated as effectively by atmospheric effects and ground absorption as mid- and high frequency noise. This has the effect of low frequency noise being more audible at greater distances.

**7.9.19** Construction site noise in the UK is not regulated by a fixed noise limit. The guidance of the Department of Environment's Advisory Leaflet 72 (DoE AL 72) *Noise Control on Building Sites* (Department of Environment, 1976.) is the most widely employed instrument for assessing the potential level of disturbance caused by construction noise and as such it has been used to form significance criterion on which to judge the impact of the proposed development.

**7.9.20** According to DoE AL 72, daytime external noise levels at a sensitive property should not exceed the following levels over a normal working day:

- 75dB(A) in urban areas near to main roads in heavy industrial areas; or
- 70dB(A) in rural, suburban and urban areas away from main road traffic and industrial noise.

**7.9.21** Moderate to major effects may occur at the noise levels stated in DoE AL 72 in urban and rural areas, respectively.

**7.9.22** The practicality of any proposed construction noise effect criterion, in addition to the likely level of noise generated and the duration of exposure, should be considered when establishing a standard that is designed to protect the local environment.

- 7.9.23** Appropriate reference values for reduced effects have been derived, based on the guidance provided by DoE AL 72, in addition to that of the World Health Organisation Guidelines (Community Noise Guidelines 2000 (WHO Guidelines)) and PAN 50 (Planning Advice Note 50, Controlling the Environmental Effects of Surface Mineral Workings, Annex A).
- 7.9.24** The significance criterion (detailed in Volume 2, Chapter 9 Section 7 Table 7.1) represent a balanced compromise between practical limitations and the necessity to maintain an acceptable local noise climate. The potential effect of traffic using public roads in the vicinity of the proposed development during construction and operation has been assessed based on the guidance of CRTN and DMRB.
- 7.9.25** Road traffic noise calculated using the CRTN methodology is based on traffic flow. An increase in traffic volume of 25% is required in order to increase road traffic noise levels by 1dB(A). DMRB Volume 11 (Ref. 8.9) advises that a change of 1dB(A) is barely perceptible whilst PAN 56 states that a change in noise level of 3dB(A), equivalent to a doubling or halving of traffic flow, is just perceptible. It is therefore assumed that a change in traffic noise level between 1dB(A) and 3dB(A) is barely perceptible. The significance criterion used in the assessment of transportation noise is presented in Volume 2, Chapter 9, Section 7, Table 7.2.

## **Effects**

- 7.9.26** The potential for adverse noise and vibration effects would exist during the construction and operational phases of the proposed development. The likelihood of construction or operational activity to cause disturbance is determined in a different manner due to the temporary and permanent nature of each noise source, respectively.
- 7.9.27** A construction noise assessment enables the extent of temporary effects to be established in conjunction with the identification of appropriate mitigation measures to minimise adverse effects. Noise emissions during the construction phase would arise from a range of static and moving sources. Static sources of construction noise normally include construction plant temporarily positioned at specific locations, whilst moving sources typically consist of mobile construction plant and vehicles.
- 7.9.28** The prediction of construction noise has been carried out based on the methodology outlined in BS 5228. The standard provides information on how best to minimise the level of noise intrusion, and details guidance on noise measurement and prediction methods. The calculation methodologies cover the prediction of moving construction traffic noise and work activities at fixed locations. Typical noise levels of construction plant and activities are also detailed in the standard.
- 7.9.29** Calculated noise levels can be compared with noise limits beyond which construction noise is likely to provoke complaints. Construction traffic movement on public roads is assessed in terms of the likely general perception of changes in road traffic noise emissions as compared to baseline conditions using the methodology outlined in CRTN.

**7.9.30** Potential adverse effects arising from the completed development would generally be attributable to direct local changes in road traffic flows. This would include commuter traffic and vehicles servicing the operational development and would be evaluated using the methodology detailed in CRTN. Other potential sources of noise include effects associated with leisure and commercial operations, however, these are predicted to be negligible as a result of the transmission distances to the nearest receptors.

## **Significance of Effects at Assessment Periods**

### ***General Construction***

**7.9.31** The assessment indicates that received noise levels for most construction activities are of minor or negligible, that is, not significant, other than for tree felling and road construction activities at Coylum Road where effects of moderate, that is significant effects, although only for a number of days. The work associated with tree felling and road construction, however, is unlikely to produce noise levels in excess of 70dB(A) for an extended period of time at Coylum Road.

**7.9.32** The noise effects of construction activities should only be described as major, that is, significant, if work takes place over an extended period, for example, where noise levels in excess of 70dB(A) occur for a number of weeks. Whilst piling would generate the highest source sound levels, tree felling and road construction would result in the highest received noise levels due to their respective proximity to sensitive receptors.

**7.9.33** Tree felling and road construction would be mobile processes that gradually increase in distance from the receptor. Accordingly, the predicted local effects at Coylum Road would be of moderate, that is, significant, as a result of these factors. The predicted effects at this location for other construction activities would be minor to negligible, that is, not significant.

**7.9.34** Although construction noise would be audible above the existing noise climate (Volume 2 Chapter 9 Section 7 Table 7.4) it would generally not be considered intrusive in the context of the limited duration of site activity at a specific location.

### ***Construction Traffic Noise***

**7.9.35** Traffic noise levels with and without the Proposed Development have been assessed for the years 2012, 2016 and 2018. The same prediction method has also been applied to 2028 on project completion. The predicted changes in road traffic noise levels at each of these years are detailed in Volume 2 Chapter 9 Section 7 Tables 7.6 to 7.8.

**7.9.36** The predicted change in noise levels between the 2012 no development and with development scenarios is forecast to be of negligible to minor significance for all existing roads other than the B970 Ski Road where a major impact is predicted due to the projected increase in traffic.

**7.9.37** The predicted change in noise levels between the 2018 no development and with development scenarios is forecast to be of negligible to minor, that is, not significant, for all existing roads with the exception of noise at the roadside of the new B970 road (Substation route) which would be significant.

### ***Operational Noise***

**7.9.38** The change in the level of traffic noise associated with the operational development not significant, for all existing roads with the exception of noise at the roadside of the new B970 road (Substation route) which would be significant.

### ***Vibration***

**7.9.39** The vibration levels applicable to nearby receptors, are expected to be well within the necessary range for protection against cosmetic or structural damage. Similarly, the effects inside a given building are likely to be imperceptible. As such, potential vibration effects would be negligible, that is, not significant.

**7.9.40** The predicted change in road traffic flows between the no development and with development scenarios are likely to have a negligible, that is, not significant, effect on vibration levels received at the nearest receptors.

### **Mitigation**

**7.9.41** Specific mitigation measures cannot be detailed at present as the contractor has not yet been appointed and the scheme design is still to be finalised. The measures detailed below are considered to be proportionate and reasonable and include engineering, layout design and management techniques.

### ***Construction Noise***

**7.9.42** Potential noise effects can be controlled by implementing the following measures, wherever practical to do so:

- Construction activities should be carried out in accordance with the good practice guidance of BS5228. Noise monitoring should be carried out at representative intervals;
- General hours of working should be restricted to avoid sensitive periods of the day. Work outside these hours should only occur through prior written agreement with the local authority;

- An appropriate piling method should be used for the Proposed development, so as to minimise noise levels at source;
- Piling rigs and similar equipment should be screened from receptors, where necessary and practicable, and throttled down to a minimum when not in use;
- Plant with directional noise features should be positioned so as to minimise the potential for noise disturbance;
- Nearby receptors should be informed in advance of activities likely to generate particularly high levels of noise. A site contact number for local residents should be provided;
- Site compounds and partly-static equipment should be located as far as practically possible from neighbouring residential dwellings. Material stockpiles and suitable work locations should be used so as to screen work locations and maximise the distance between work activities and receptors;
- All equipment should be maintained in good working order and fitted with appropriate noise control features at all times (for example, silencers and mufflers); and,
- All site employees should be advised to adopt the quietest work practices, where appropriate.

### ***Operational Noise***

**7.9.43** Buildings should be designed for compliance with PAN 56 and WHO guidelines:

- Consideration should be given to noise emission levels at the detailed design stage, in addition to cost, when acquiring plant;
- HVAC and other fixed plant should be located in the best practicable positions in terms of noise attenuation;
- Adequate noise control measures such as acoustic enclosures, acoustic louvres and vibration isolation systems should be employed where necessary;
- It is considered that mitigation such as screening in the form of earth bunds or acoustic fencing may be necessary in order to reduce the predicted road traffic effects at Dell Farm; and,
- Appropriate road layout design and traffic calming measures should be incorporated into the completed development.

### ***Vibration***

**7.9.44** Potential vibration effects can be controlled by implementing the following measures, wherever practical to do so:

- Vibration monitoring should be carried out where piling or other percussive activities are likely to occur in close proximity to receptors. Work methods should be altered where recommended limits are exceeded; and,
- The contents of construction vehicles should be properly loaded at all times.

## **Significance of Residual Effects**

### ***Construction***

**7.9.45** Noise and vibration effects arising from construction would result in no residual effects following completion of the proposed development.

**7.9.46** The predicted construction noise levels may be reduced by up to 10dB(A) by implementing the mitigation measures detailed previously. The residual effect during the activities that generate the highest noise levels, tree felling and road construction, is predicted to remain moderate, that is, significant and therefore significant at the most affected receptors. The residual vibration effect is judged to be negligible, that is, not significant, for all phases of construction.

### ***Operation***

**7.9.47** The noise and vibration effects of road traffic on existing roads are expected to range from negligible to minor as a result of the completed development. As a result of traffic using the new B970 Substation Route, a major, that is, significant effect is predicted.

**7.9.48** The effects of HVAC and other fixed plant associated with the proposed development should be negligible provided that the plant does not exhibit audible tones and is designed not to exceed the minimum baseline measurements presented in Volume 2 Chapter 9 Section 7.

## **Summary**

**7.9.49** An assessment of the potential noise and vibration effects of the proposed An Camas Mòr development has been carried out. The Proposed Development has the potential to cause disturbance to nearby receptors due to the levels of noise and vibration that may be generated through construction and operation.

- 7.9.50** The outcome arising from construction of the Proposed Development would result in no residual effects following completion of the Proposed Development.
- 7.9.51** The assessment indicates that received noise levels for most construction activities are of minor or negligible, that is, not significant, other than for tree felling which would take a few weeks, and road construction activities at Coylum Road where moderate effects, that is, significant effects, are predicted. The use of silenced equipment and adequate attenuation such as barriers may reduce predicted noise levels by as much as 10dB(A) but would not affect the assessment of significance of effects.
- 7.9.52** The predicted change in noise levels during construction is forecast to be minor or below, that is, not significant, for all existing roads other than the B970 Ski Road to An Camas Mòr SE access where a major, that is, significant, effect is predicted in 2012 and 2016. This change takes place as a result of the projected traffic volumes. It would occur during daytime periods only and would be intermittent in nature.
- 7.9.53** Although the predicted roadside change in noise levels resulting from the new B970 road (Substation route) in 2018 is a major, that is, significant, effect, the likely change in noise levels at Dell Farm some 250m away is calculated to be 36dB(A) which constitutes an increase of 2.6dB above minimum baseline conditions, effectively representing a minor, that is, not significant, effect. All other roads in 2018 are predicted to experience minor or below, that is not significant, effects.
- 7.9.54** The effects of the operational development in 2028 would be primarily road traffic-based and these are expected to be of minor or below, that is, not significant, for existing roads other than traffic using the B970 from the B970/B9152 roundabout to the Substation Route where a moderate, that is, significant effect is predicted.
- 7.9.55** Although a roadside change in noise levels is predicted as a major (Paragraph 7.15.11), that is, a significant effect at 2028 as a result of traffic using the new B970 road (Substation route), however, it should be noted that the minimum LA<sub>90</sub> noise level of 33.4dB(A) occurred only on one occasion near Dell Farm over a measurement interval of eight days. This occurrence took place at approximately 3am meaning that internal household noise levels would be within recognised limits. Furthermore, the predicted worst-case road traffic noise level at 250m (Dell Farm) is predicted to be a maximum of 1.4dB(A) above the average prevailing background noise conditions, this represents a minor, that is, not significant effect when compared to average prevailing background noise conditions.
- 7.9.56** HVAC and other fixed plant associated with the Proposed Development should not have a discernable effect provided that the plant does not exhibit audible tones and is designed not to exceed minimum baseline measurements at receptors.

- 7.9.57** The potential for noise and vibration arising from construction of the Proposed Development should be managed in accordance with the principles of British Standard 5228 'Noise Control on Construction and Open Sites', and referenced in contractual documentation in order to ensure compliance. The need for appropriate control measures should be stated in the contract and work should be phased in such a way so as to reduce the potential for negative effects to a minimum.
- 7.9.58** The use of each of the mitigation measures detailed in this report may not be appropriate or feasible at all receptors due to site layout and the transitory nature of construction activities, for example. It is possible, however, to reduce the potential effects of the Proposed Development through the implementation of various mitigation measures detailed in this report. Such measures would allow for potential noise and vibration effects to be controlled at source and through pro-active engineering, layout and management measures, thereby limiting the overall effect of the proposed scheme to a minimum.
- 7.9.59** Whilst piling would generate the highest source sound levels, tree felling and road construction would result in the highest received noise levels due to their respective proximity to receptors. Tree felling and road construction noise levels are predicted to exceed the recommended limit of 70dB(A) as advised in the Department of Environment's Advisory Leaflet 72, constituting a moderate effect when the duration of these activities is considered. The predicted effects for other construction activities are judged to be minor to negligible, that is, not significant.
- 7.9.60** It is predicted that construction and operational vibration levels resulting from Proposed Development would remain at a level that is not likely to cause cosmetic damage to buildings or disturb inhabitants, this aspect therefore represents a negligible, that is, not significant, effect. Piling should not be carried out within 5m of underground services (i.e. gas/water mains and sewers of brick construction). A study to establish the location of underground services should be conducted prior to commencement of piling works.

## **7.10 EFFECT OF NIGHT LIGHTING**

### **Introduction**

- 7.10.1** This section considers the likely significant effects of lighting, associated with the proposed new community at An Camas Mòr, on the landscape character and the visual amenity of the local area at night. This section also assess the impacts of lighting associated with the new community on designated landscapes and other landscapes of recognised value. Mitigation measures to reduce adverse impacts are identified.