

Appendix A17.8: Pitlochry North Rail Underbridge Operational Noise Assessment

1 Introduction

- 1.1 This appendix presents the results of the operational noise assessment undertaken for the Pitlochry North Rail Underbridge, which is proposed as part of the proposed scheme.
- 1.1.1 The operational road traffic noise assessment for the proposed scheme, undertaken with reference to DMRB Noise and Vibration, is presented as part of Chapter 17 (Noise and Vibration). As a result of the proposed scheme there is the potential for a change in operational railway noise for receptors near to the proposed Pitlochry North Rail Underbridge due to acoustic screening and acoustic reflections caused by the proposed structure. The impact of a new or altered road scheme on other noise sources is not addressed in DMRB Noise and Vibration. Instead, an additional railway noise assessment has been undertaken with assessment criteria based on the operational road traffic noise assessment presented in Chapter 17 (Noise and Vibration), Section 17.2 (Approach and Methods).
- 1.1.2 Consideration was also given to whether operational railway noise impacts could occur at Dalshian Rail Underbridge, however, no change to railway noise impacts are expected as a result of Dalshian Rail Underbridge. Although, the tunnel opening would move closer (160m to 125m) to the nearest receptor (Middle Cottage), more of the railway would be screened by the extension of the tunnel and the retaining walls. The increased angle from the tunnel opening to the receptor would reduce the contribution of tunnel opening noise. Given the distance to the nearest receptor, any slight changes in railway noise are unlikely to be perceptible, particularly with the presence of the A9 which is nearer to the nearest receptors. The operational railway noise assessment reported in this appendix focuses on Pitlochry North Rail Underbridge.

Legislative and Policy Background

- 1.1.3 The assessment of potential changes to railway noise as a result of Pitlochry North Rail Underbridge has been undertaken with reference to the following documents:
- Planning Advice Note (PAN) 1/2011– Planning and Noise (The Scottish Government, 2011a);
 - Technical Advice Note (TAN): – Assessment of Noise (The Scottish Government, 2011b);
 - WHO Guidelines for Community Noise (WHO, 1999); and
 - WHO Night Noise Guidelines (NNG) for Europe (WHO, 2009).

2 Approach and Methods

Scope of Assessment

- 2.1.1 The railway assessment has been undertaken at two noise sensitive receptors (NSR); Faskally Cottage West and Faskally Cottage East, which are located approximately 17m and 32m from the east tunnel opening of the proposed structure, respectively. The location of the proposed structure and Faskally Cottages are shown on Figure A17.8.1.

2.1.5 Receptor points around Faskally Cottage West and Faskally Cottage East have been modelled at 5m intervals, 1m from the façade, at the same locations as in the road traffic noise models.

2.1.6 The railway line within approximately 350m of the Faskally Cottages was modelled in CadnaA® with the train movement assumptions presented in Table 1, based on the average actual movements over a five weekday period (17 – 20 October and 23 October 2017).

Table 1: Modelled Daytime (07:00 – 23:00) Train Movements Passing the Faskally Cottages

Service	No. of Units Passing NSR (in either Direction)	No. of Motor Vehicles per Unit	No. of Trailer Vehicles per Unit
Perth – Inverness Inverness – Edinburgh Glasgow – Inverness Inverness - Stirling	21	2	0
Caledonian Sleeper	1	1	4
London Euston – Inverness	2	2	8
Freight	2	1	18

2.1.7 The CadnaA® noise model inputs for existing topography, scheme topography, ground absorption and buildings are the same as described in Chapter 17 (Noise and Vibration), Section 17.2 (Approach and Methods). Additional CadnaA® noise model inputs for the prediction of railway noise include:

- Location of the existing railway line extracted from Ordnance Survey (OS) mapping data.
- Railway tunnel and wing wall dimensions based on the Pitlochry North Rail Underbridge General Arrangement Drawing (A9P04-JAC-SBR-A_NL046_ST-DR-ST-002).
- A maximum train speed of 60mph (97kph) has been assumed for all trains travelling in the vicinity of the proposed Pitlochry North Rail Underbridge, as advised by the Jacobs Highways Team.
- CRN source term corrections for train vehicles were obtained from CRN and the Defra document: ‘Additional railway noise source terms for “Calculation of Railway Noise 1995”³.
- CRN source term corrections for rolling noise and on-power noise for diesel locomotives were compared. The CRN source term correction for rolling noise resulting in negligibly (0.1dB – 0.3dB) greater predicted railway noise levels at the NSR assessed. Therefore, in the absence of information on whether diesel locomotives in the vicinity of the proposed Pitlochry North Rail Underbridge operate at full power, the CRN source term correction for rolling noise has been used.

Significance of Impacts and Noise Mitigation Criteria

2.1.8 As future railway traffic data are not available, and the ‘immediate’ impact of the proposed Pitlochry North Rail Underbridge is being assessed, rather than any potential changes to the railway or its timetable in the future (which would not be as a result of the proposed scheme), only short-term impacts are assessed in this appendix.

2.1.9 The significance of noise impacts has been assessed using the approach set out in Chapter 17 (Noise and Vibration). As the railway noise has been calculated as free-field $L_{Aeq,16h}$ noise levels, there is no need to convert the WHO $L_{Aeq,16h}$ daytime guideline level to the façade $L_{A10,18h}$ noise index used for road traffic noise. Accordingly, for the purposes of this assessment and when identifying mitigation requirements, impacts were considered to be ‘significant’, under the EIA Regulations where the assessment results predicted noise impacts of Slight/Moderate adverse or worse significance (as shown in Table 17.5 in Chapter 17 (Noise and Vibration)) and where the predicted absolute noise level exceeds 55.0dB $L_{Aeq,16h}$ at ground floor level only. For night-time noise levels impacts were considered to be ‘significant’ where the assessment results indicated impacts of Slight/Moderate adverse or worse significance and where the predicted absolute noise level exceeds 55.0dB $L_{night,outside}$ at ground and/or first floor level. Reported significant impacts are highlighted in bold text throughout the remainder of this appendix.

³ Defra (2007). Additional railway noise source terms for “Calculation of Railway Noise 1995”.

- 2.1.10 In addition to the significance of noise impact in terms of railway noise, the significance of noise impact in terms of the combined railway and road noise is also considered. As road traffic noise is predicted as façade $L_{A10,18h}$ noise levels, the road traffic noise is converted to free-field $L_{Aeq,16h}$ noise levels using a correction of -4.5dB, which is the reverse of the correction applied to the WHO $L_{Aeq,16h}$ described in in Chapter 17 (Noise and Vibration). This allows the predicted railway and road traffic noise to be logarithmically added together and assessed against the criteria outlined above.

3 Potential Impacts

Consideration of Railway L_{AFmax} Noise

- 3.1.1 As the section of the railway nearest to the Faskally Cottages would not be altered as a result of the proposed scheme, and the train vehicles and speeds are not expected to be affected by the proposed structure, the L_{AFmax} level is not expected to materially change as a result of the introduction of the Pitlochry North Rail Underbridge.

Potential Impact of Railway Noise

- 3.1.2 The modelled railway noise levels and the associated significance of impacts at the Faskally Cottages are summarised in Table 2. In the following tables, where reference is made to the predicted daytime noise levels, the assessment has been undertaken at ground and first floors. For the assessment at first floor, only the receptor points on the west façade of Faskally Cottage West have been included (no receptor points around Faskally Cottage East are included), as this is the only façade that appears to have windows at first floor level.
- 3.1.3 It is important to note that the methodology in DMRB Noise and Vibration requires that the least beneficial change in noise level is reported. Accordingly, the same approach has been taken when presenting the results of the railway noise assessment. However, later in this appendix, the mitigation analysis considers all receptor points around the NSR, and not just the least beneficial in terms of noise change.

Table 2: Predicted Short-term Railway Noise Impact at Faskally Cottages – Day

Address/ Representative Location	Predicted Railway $L_{Aeq,16h}$ (dB) Noise Level (Free-field) and Significance of Impact					
	Ground Floor			First Floor		
	DM	DS	Significance of Impact	DM	DS	Significance of Impact
Faskally Cottage West	54.5	57.1	Slight/ Moderate Adverse	52.9	55.0	Slight/ Moderate Adverse
Faskally Cottage East	54.7	56.6	Slight/ Moderate Adverse	n/a	n/a	n/a

- 3.1.4 Table 2 shows that at ground floor and first floor (where applicable) level, without mitigation, that both Faskally Cottages are predicted to experience a Slight/Moderate adverse significance for railway noise. At ground floor level, both Faskally Cottage West and Faskally Cottage East are predicted to have a noise level of greater than 55dB $L_{Aeq,16h}$, and are therefore considered to be significant impacts, based on the least beneficial façade. However, because the potential railway noise level changes will not occur unless proposed scheme proceeds, it needs to be considered in conjunction with the road traffic noise.

Potential Impact of Road Traffic Noise

- 3.1.5 For completeness, the modelled road traffic noise levels and the associated significance of impacts at the Faskally Cottages are summarised in Table 3. It should be noted that the road traffic noise levels have been converted from façade $L_{A10,18h}$ noise levels (the noise metric used to present road traffic noise levels in Chapter 17 to $L_{Aeq,16h}$ noise levels (the conversion factor is presented in Chapter 17: Noise and Vibration)). It should also be noted that these road traffic noise impacts may not be at the same façade location as that for the least beneficial railway noise impacts as the façade with the least beneficial impact may be different.

Table 3: Predicted Short-term Road Traffic Noise Impact at Faskally Cottages – Day

Address/ Representative Location	Predicted Road Traffic $L_{Aeq,16h}$ (dB) Noise Level (Free-field) and Significance of Impact					
	Ground Floor			First Floor		
	DM	DS	Significance of Impact	DM	DS	Significance of Impact
Faskally Cottage West	43.7	48.9	Large/ Very Large Adverse	56.7	56.1	Slight Beneficial
Faskally Cottage East	41.8	48.8	Large/ Very Large Adverse	n/a	n/a	n/a

- 3.1.6 Table 3 shows that at ground floor level, without mitigation, both Faskally Cottages are predicted to experience a Large/Very Large adverse significance for road traffic noise. Neither is predicted to have a noise level of greater than 55dB $L_{Aeq,16h}$, and are therefore not considered to be significant impacts, based on the least beneficial façade.
- 3.1.7 At first floor level, Faskally Cottage West is predicted to have a Slight beneficial significance of impact for road traffic noise.

Potential Impact of Combined Railway and Road Traffic Noise

- 3.1.8 The predicted railway and road traffic noise levels at each receptor point at the Faskally Cottages have been logarithmically summed to give the resultant $L_{Aeq,16h}$ noise level from these two noise sources. The resultant least beneficial noise levels and associated significance of impacts at the Faskally Cottages are summarised in Table 4.

Table 4: Predicted Short-term Combined Railway and Road Traffic Noise Impact at Faskally Cottages – Day

Address/ Representative Location	Predicted Road Traffic $L_{Aeq,16h}$ (dB) Noise Level (Free-field) and Significance of Impact					
	Ground Floor			First Floor		
	DM	DS	Significance of Impact	DM	DS	Significance of Impact
Faskally Cottage West	43.3	49.0	Large/ Very Large Adverse	57.7	57.7	Neutral
Faskally Cottage East	42.4	49.0	Large/ Very Large Adverse	N/A	N/A	N/A

- 3.1.9 Table 4 shows that at ground floor level, without mitigation, both Faskally Cottages are predicted to experience a Large/Very Large adverse significance for combined railway and road traffic noise. Neither is predicted to have a noise level of greater than 55dB $L_{Aeq,16h}$ at ground floor level. Therefore, based on the least beneficial façade, noise impacts are not significant. Any potential significant impacts at all façade receptor points, not only at the least beneficial, are considered in Section 4 (Mitigation).
- 3.1.10 At first floor level, Faskally Cottage West is predicted to have a Slight adverse significance for combined railway and road traffic noise.

4 Mitigation

- 4.1.1 As stated in paragraph 2.9 of this appendix, daytime noise impacts are considered to be significant for locations where the potential significance of impact is Slight/Moderate adverse or worse and the predicted free-field noise level exceeds 55.0dB $L_{Aeq,16h}$, at ground floor level. Mitigation has been considered in terms of the combined railway and road traffic noise levels because the potential railway and road traffic noise impacts will not occur in isolation as a result of the proposed scheme.
- 4.1.2 When considering each receptor point at the façades of the Faskally Cottages the noise change and absolute noise level mitigation criteria were not both met. Therefore, there are no significant impacts predicted for the combined railway and road traffic noise at Faskally Cottage West and Faskally Cottage East. Accordingly, site specific mitigation is not required for either of these NSR.

5 Summary and Conclusions

- 5.1.1 The railway noise at Faskally Cottage West and Faskally Cottage East has been predicted using CadnaA® noise modelling software for the Do-Minimum and Do-Something scenarios for the Pitlochry North Rail Underbridge, which is proposed as part of the proposed scheme.
- 5.1.2 For combined railway and road traffic noise levels, there are predicted to be no significant noise impacts at the Faskally Cottages as a result of the scheme and no NSR will require mitigation as a result of the proposed Pitlochry North Rail Underbridge.
- 5.1.3 Changes in railway L_{AFmax} levels at Faskally Cottage West and Faskally Cottage East have also been considered. No material change in L_{AFmax} levels at the NSR are expected.