

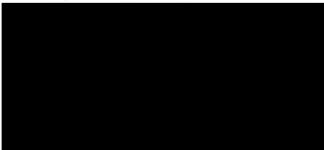
SAK – 15th Year Noise Modelling




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SAK 15th Year Noise Modelling

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SAK 15th Year Noise Modelling

1 Introduction

- 1.1 AECOM were instructed by Transport Scotland and Clackmannanshire Council to undertake 15th year noise level predictions at properties located in the vicinity of the SAK railway line. These predictions are in addition to the AECOM report **60051581 JN692DP, SAK Noise Modelling/Mapping**, issued in October 2009 which detailed the predicted noise levels from the SAK railway line at the time of opening in 2008 and is presented in Appendix 1.
- 1.2 The purpose of the noise modelling assessment is to identify properties adjacent to the SAK line that may be eligible for insulation in accordance with The Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996. The provisions of the 1996 regulations, which came into force under the Land Compensation Act 1973, do not extend to Scotland (Scotland has the Land Compensation (Scotland) Regulation 1973, as amended). The 1996 regulations apply to new or improved railways and the procedure only deals with the airborne component of railway noise, but this is the major component from surface railways built at grade or on earthwork structures.
- 1.3 While there are no regulations governing rail noise in Scotland, both Transport Scotland and Clackmannanshire Council as promoter have acted reasonably and agreed to broadly apply the Noise Insulation (Railways and Other Guided Systems) Regulations 1996 as though they were in force in Scotland. These regulations specify noise levels above which noise insulation may be offered.
- 1.4 The section of railway line that has been modelled is that from Stirling railway station to Longannet Power Station. The noise modelling is based upon the predicted combined freight and passenger timetables 15 years (i.e., the year 2023) from the date of (re)opening of the railway line.
- 1.5 The study area covers an area 300m either side of the rail tracks, and the total length of track that has been modelled is 21km. The total area extends over an area equal to 14 km², and for this area noise levels have been determined at properties, 1m from the façade, at heights of 1.5m above the ground, i.e., ground floor, and 4.5m above the ground, i.e., first floor.

2 Assessment Criteria

- 2.1 The adopted assessment criteria are that which is detailed in The Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996. Although this legislation is strictly only applicable in England and Wales, the criteria contained within these regulations have been used as a guide to identify eligible properties for noise insulation from 15 years of the opening of the railway line.
- 2.2 The criteria for identifying eligible buildings are as follows:
- a) When the movement of the vehicles takes place during the day-time period, noise is at a level for paragraph (1) to apply if—
 - (i) the relevant noise level is greater by at least 1 dB(A) than the prevailing day-time noise level and is not less than the specified day-time level; and
 - (ii) the noise caused, or expected to be caused, by that movement makes an effective contribution to the relevant noise level of at least 1 dB(A).
 - b) When the movement of the vehicles takes place during the night-time period, noise is at a level for paragraph (1) to apply if—
 - (i) the relevant noise level is greater by at least 1 dB(A) than the prevailing night-time noise level and is not less than the specified night-time level; and
 - (ii) the noise caused, or expected to be caused, by that movement makes an effective contribution to the relevant noise level of at least 1 dB(A).

Where:

- “relevant noise level” means the level of noise, expressed as a level of L_{Aeq} (day-time) or L_{Aeq} (night-time), as the case may be, caused or expected to be caused, by the movement of vehicles using, or expected to use, works forming part of the relevant system concerned or, if there is more than one such system, those works and the works of such other system or systems, as the case may be;
- “prevailing noise level” means the level of noise caused by the movement of vehicles using any relevant system, expressed as a level of the L_{Aeq} (day-time or night-time) immediately before the construction of initial works or additional works or the carrying out of altered works, as the case may be, was begun;
- “specified day-time level” means a noise level of 68 dB L_{Aeq} (day-time);
- “specified night-time level” means a noise level of 63 dB L_{Aeq} (night-time);
- “the day-time period” means the period of 18 hours between 0600 hours and midnight;
- “the night-time period” means the period of 6 hours between midnight and 0600 hours;

2.3 The classes of buildings in respect of which a duty or power is to arise under these Regulations are:

- a) dwellings; and
- b) other buildings used for residential purposes,

which will not be more than 300 metres from the nearest point of the nearest running rail or, if the relevant system has no running rail, the nearest point of the nearest apparatus corresponding thereto, of the initial, additional or altered works, as the case may be, and the expression “eligible building” in these Regulations means a building falling within either of those classes.

2.4 The prediction of railway noise levels have been determined employing the method of calculation specified in The Department of Transport publication “Calculation of Railway Noise” 1995.

3 The Rail Noise Model

- 3.1 To create a noise model various data are required. In particular, it is necessary to know of the actual geographical location of the railway tracks and buildings. Moreover, since the propagation of sound is affected by the intervening terrain, between the train track and the noise receptor of interest, it is necessary to create a 3D noise model and, as such, terrain height information is required.
- 3.2 With regard to the rail tracks it is necessary to know the type of track and the track support structures used in the construction of the railway line.
- 3.3 As for the trains, the required input data includes; train speed, train vehicle composition, number of each vehicle type and the number of trains using the track during the time intervals of interest (day time: 0600 hours – midnight; and night time: midnight – 0600 hours).
- 3.4 Due to the nature of railway operations it is difficult to accurately predict future rail traffic levels. This is because it is dependent upon demand and available train slots. In addition, although a freight train may have a timetable slot the operator of that train may, for commercial reasons, choose not to use the slot. Accordingly the information supplied is deemed to be representative of the likely train movements in the year 2023. Table 1 provides details of the trains used in the noise model.

Table 1: Expected Train Numbers Passing Existing Properties along SAK Line in 2023

Route	Direction	Day	Night	Train Types
Passenger Stirling - Alloa	Eastbound	25	2	Off Peak: C380 EMU Peak: C380x2 EMU
	Westbound	26	1	
Freight Stirling - Kincardine	Eastbound	11	3	Locomotives – Class 66 & Class 56 Wagons 23 x HTA Coal Wagons & 46 x MEA Wagons
	Westbound	11	3	

- 3.5 The information in Table 1 was derived from information provided to AECOM regarding future train movements on the SAK railway line for the year 2018. As stated in Paragraph 3.4 due to the difficulty in predicting future rail traffic data, 2018 was the latest year for which timetable information could be accurately predicted and has therefore been used as a proxy for the 2023 timetable.
- 3.6 The main differences in train composition between the 2008 model and the 2023 model are: an increase in both passenger and freight numbers, which includes a Class 56 locomotive and MEA Wagons. Also, as the line between Stirling and Alloa is expected to be electrified by 2023, the passenger vehicles anticipated to be operating on the route are Class 380 Electrical Multiple Units.
- 3.7 The information provided in Table 1 is representative of the maximum train numbers expected to operate in any one day. Although passenger train movements will remain constant throughout the year, with the exception of reduced weekend services, freight train movements often change due to demand. Therefore, this assessment assumes a worst case scenario of all 14 return freight train movements

occurring each day. However in reality it is likely that fewer than 28 freight trains (14 return journeys) operate in a 24 hour period.

- 3.8 The assumptions stated in paragraphs 2.5 – 2.11 of the previous AECOM modelling report (60051581 JN692DP) have also been applied to the 15 year noise models in order to provide consistency in the noise model. This report is included as Appendix 1.
- 3.9 Furthermore as a consequence of the initial noise modelling, properties that met with the mitigation criteria were subsequently offered mitigation in the form of acoustic barriers. All acoustic barriers which have been offered, accepted by residents and subsequently erected have been included in the 15th year noise models. Barriers which were offered and rejected by residents and barriers which have not yet been erected are not included in the noise model.

4 Data Analysis

- 4.1 At each building within the study area noise levels have been predicted 1m from the façade at both the ground (1.5m receptor height) and first floor (4.5m receptor height) levels.
- 4.2 The maximum predicted noise level at each property was then selected and compared against the relevant noise levels for the day and night time periods (daytime: $L_{Aeq,18hr}$ 68 dB; and night time $L_{Aeq,6hr}$ 63 dB).
- 4.3 This analysis indicates that, in accordance with the guidance contained in The Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996 only one dwelling is predicted to be eligible for noise insulation. This property is 83 Causewayhead Road, Stirling, FK9 5EG.
- 4.4 The predicted relevant noise levels for the aforementioned property are as shown in Table 2.

Table 2: Predicted Relevant Noise Levels at 83 Causewayhead Road

Property	Ground Floor Daytime $L_{Aeq,18hr}$ dB	Ground Floor Night Time $L_{Aeq,6hr}$ dB	First Floor Daytime $L_{Aeq,18hr}$ dB	First Floor Night Time $L_{Aeq,6hr}$ dB
83 Causewayhead Road	64.1	63.5	64.0	63.4

- 4.5 As has been previously described in Section 2 a dwelling will be eligible for insulation should all of the following three criteria be met:
- The relevant noise level (RNL) is greater than the specified noise level (SNL) ($L_{Aeq,18hr}$ 68 dB and $L_{Aeq,6hr}$ 63 dB);
 - The RNL exceeds the prevailing noise levels (PNL) by 1 dB(A); and
 - The noise caused, or expected to be caused, by that movement makes an effective contribution to the RNL of at least 1 dB(A).
- 4.6 Given that prior to the railway line becoming operational in 2008, there were no railway movements on the line, the prevailing noise level is insignificant (the level of noise caused by the movement of vehicles using any relevant system, expressed as a level of the $L_{Aeq,T}$ (day-time or night-time) immediately before the construction of initial works or additional works or the carrying out of altered works, as the case may be, was begun). This is because there were no trains. Table 3 provides a breakdown of the predicted noise levels at 83 Causewayhead Road and whether the insulation criteria is met for both day-time and night-time noise levels at both the ground and first floors.

Table 3: Breakdown of Insulation Criteria for 83 Causewayhead Road

Floor Assessed	Time Period	Noise Levels		Insulation Criteria		
		Relevant Noise Level ($L_{Aeq,T}$ dB(A))	Prevailing Noise Level ($L_{Aeq,T}$ dB(A))	Is RNL Greater Than SNL	Is RNL 1dB greater than PNL	Does noise from train movements contribute to the RNL by at least 1dB
Ground Floor	Daytime (06:00 – 00:00)	64.1	N/A	No	Yes	Yes
	Night-time (06:00 – 00:00)	63.5	N/A	Yes	Yes	Yes
First Floor	Daytime (06:00 – 00:00)	64.0	N/A	No	Yes	Yes
	Night-time (06:00 – 00:00)	63.4	N/A	Yes	Yes	Yes

- 4.7 As can be seen in Table 3, 83 Causewayhead Road is predicted to be eligible for noise insulation in terms of night-time noise levels at both the ground and first floor levels in accordance with The Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996.
- 4.8 It should be noted that as stated in paragraph 2.11 of the previous AECOM modelling report (60051581 JN692DP) “...although local barriers were used in the calibration of the time table noise models, these features were removed for the final noise mapping process. They were removed because they are not deemed to be permanent structures’.
- 4.9 During site surveys since the opening of the railway line, it has been noted that 83 Causewayhead Road has a close boarded timber fence around the eastern garden adjacent to the railway line. If this existing barrier was included in the noise model it would be anticipated to reduce the relevant noise level at the ground floor level of 83 Causewayhead Road to below $L_{Aeq,6hr}$ 63 dB. However the barrier will have little or no effect at first floor level and 83 Causewayhead Road would still be eligible for noise insulation in terms of night-time noise at the first floor.

5 Summary and Conclusions

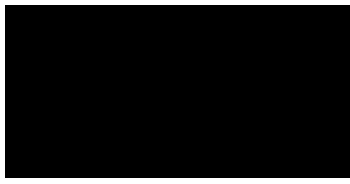
- 5.1 Noise modelling has been undertaken using predicted future rail traffic volumes in 2018 as a proxy for the year 2023, which is the 15th year following the (re)opening of the SAK railway line.
- 5.2 Predicted noise levels at the ground and first floors of dwellings have been assessed against the noise insulation eligibility criteria contained in The Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996.
- 5.3 The outcome of this assessment in accordance with The Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996 indicates that only one dwelling is predicted to be eligible for noise insulation. This identified dwelling is 83 Causewayhead Road where the night time eligibility criterion is met for both the ground and first floors. However, if the existing close boarded timber fence was to be included in the model it is anticipated that noise levels 1m from the façade of 83 Causewayhead Road, at ground floor level, would be reduced to below $L_{Aeq,6hr}$ 63 dB and thus only first floor noise levels would meet with the night-time eligibility criteria.

Appendix 1 – Copy of AECOM Report 60051581 JN862DP, SAK Noise Modelling/Mapping

Predicted Timetable Train Noise and Associated Impacts
Stirling Alloa Kincardine Railway Line
Noise Modelling/Mapping

Clackmannanshire Council
October 2009

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Stirling Alloa Kincardine Railway Line Noise Modelling/Mapping

Rev No	Comments	Date
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1 Introduction

- 1.1 This report compliments previous Stirling-Alloa-Kincardine (SAK) reports published on the Clackmannanshire Council's internet website. In an earlier report (Rail Noise Assessment – Stirling-Alloa-Kincardine Rail Link (26th May 2009)) it was stated that of the 11 sample properties, where noise level measurements were undertaken 2 were shown to possibly require daytime noise mitigation. Following on from these noise level measurements a noise modelling exercise has been undertaken to produce noise contours that facilitates the analysis of noise impacts at over 6200 properties within a 600m corridor along the new SAK rail route. Of these properties none qualify for day or night time noise insulation in terms of the adopted Railway Noise Insulation Regulations as set in Section 3.4 of the previous report (26th May 2009).
- 1.2 With regard to maximum train pass-by noise levels ($L_{A_{Max,fast}}$), these have not been predicted as part of the noise modeling process. However, as stated in the aforementioned report of the 26th May 2009 *"If the assessment of night-time noise and the provision of mitigation is considered on the same basis as has previously been addressed by the Scottish Parliament in respect the: Edinburgh Tram Lines Glasgow Airport Rail Link (GARL) and Edinburgh Airport Rail Link (EARL) i.e. both that the maximum level which should not be exceeded more than twice in any one hour is in fact 82dB $L_{A_{Max,fast}}$. On this basis the threshold value is likely to be exceeded at East Neuk Cottage and The Gables and at present we are advised that there is no evidence to suggest that the number of occurrences are being exceeded."*
- 1.3 This document presents background information relating to the noise modelling and mapping of rail noise from the recently re-opened SAK railway line. The section of railway that has been modelled is that from Stirling railway station to Longannet power plant. The noise maps that have been produced have been based upon the combined freight and passenger timetables and can be viewed in Appendix 2, of this report. The maps cover an area 300m either side of the rail tracks, and the total length of track that has been modelled is 21km. The total area covered by the maps extends over an area equal to 14 km², and for this area noise levels have been determined on a 10m x 10m grid at a height of 1.5m above the ground. From these predicted noise levels noise level contour maps have been produced. The noise maps have been coloured according to the legend shown in Figure 1 (next page), with a sample of a mapped area reproduced in Figure 2 (next page).
- 1.4 As can be seen, the colour scheme for each 5dB noise band is not a single solid fill colour; instead progressive colours have been used. This feature enables the viewer to more readily see where within the noise band their property lies.

Figure 1: Colour Scheme used for Railway Noise Band Maps

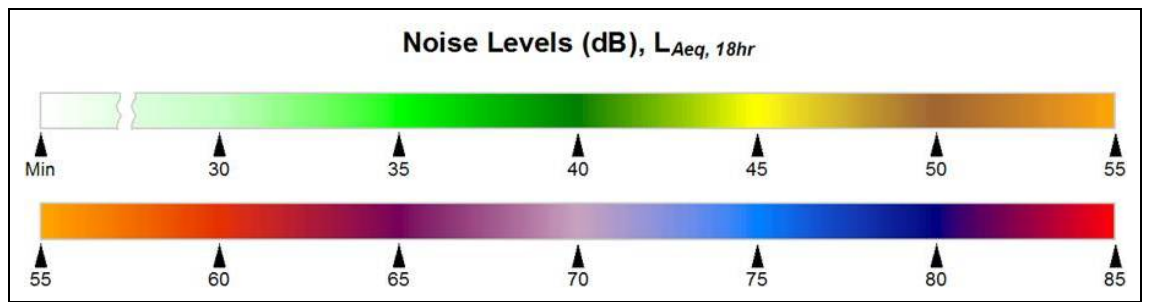
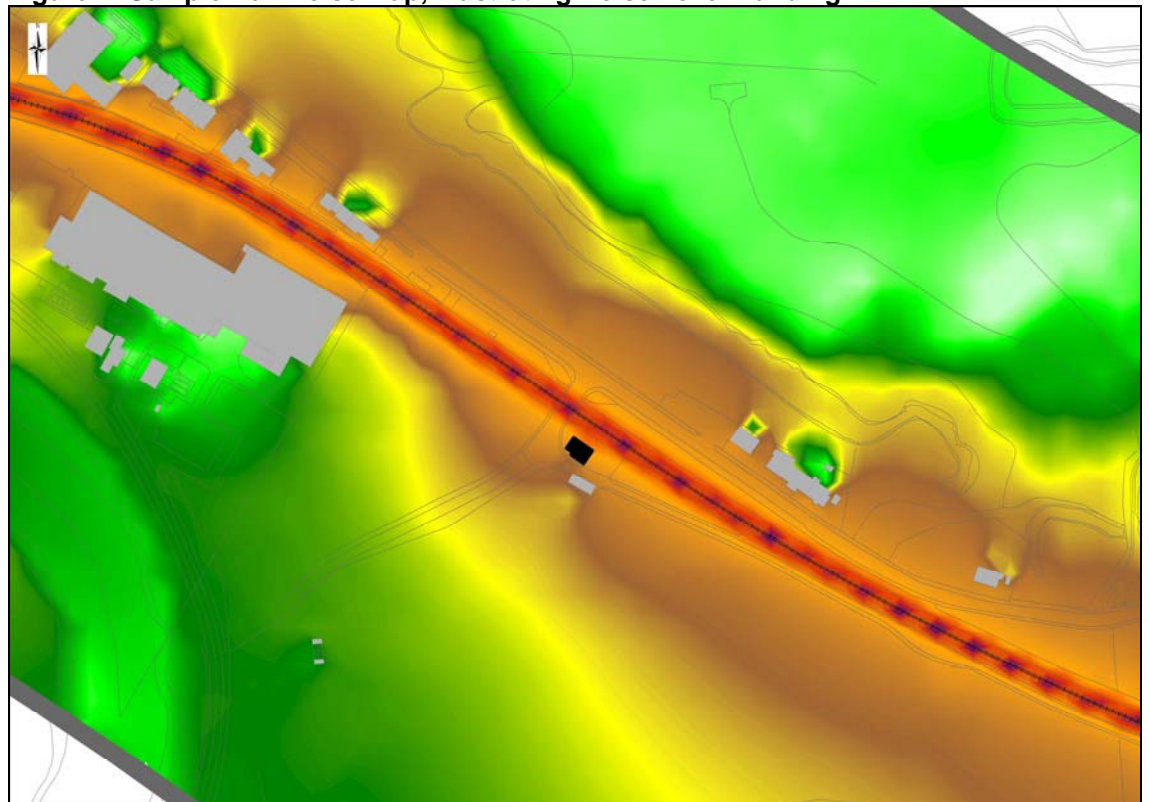


Figure 2: Sample Rail Noise Map, Illustrating Noise Level Banding



2 The Rail Noise Model

- 2.1 The main train noise model covers a time period that extends from 06:00 – Midnight and includes all passenger and freight trains timetabled to operate between Stirling and Longannet power station in that time period
- 2.2 To create a noise model various data are required. In particular, it is necessary to know the actual geographical location of the railway tracks and buildings. Moreover, since the propagation of sound is affected by the intervening terrain, between the train track and the noise receptor of interest, it is necessary to create a 3D model and, as such, terrain height information is required.
- 2.3 With regard to the rail tracks it is necessary to know the type of track and the track support structures used in the construction of the railway line.
- 2.4 As for the trains, the required input data includes; train speed, train vehicle composition, number of each vehicle type and the number of trains using the track during the time interval of interest. Table 1 provides details of the trains used in the model. The number of trains was determined from timetable information.

Table 1: Train Numbers Passing Existing Properties along S-A-K Line

Route	Direction	Day (06:00 – 24:00)	Night (00:00 – 06:00)	Train Types
Passenger Stirling – Alloa	Eastbound	19	0	Off peak: C170 DMU Peak: C170+C158 DMU
	Westbound	19	0	
Freight Stirling – Kincardine	Eastbound	8	4	Class 66 Locomotive 23 x HTA Coal Wagons
	Westbound	9	3	

- 2.5 A difficulty with modelling freight train noise is determining exactly when the train is or is not operating on full power, as this affects the location of where the dominant train noise source is located. When not on full power the dominant train noise source is located at the rail head and when on full power it is located 4m above the rail head. For modelling purposes trains have been modelled as operating at full power where the train is being driven on a positive incline, i.e., is climbing. Moreover, it should be appreciated that when modelling the train noise, local features such as (garden) walls and barriers have not been included in the model. This is because this data is not readily available. However, by not including this information the predicted noise levels are worst case.
- 2.6 To provide confidence in the final rail time tabled noise modelling output the train noise was first modelled using the same number of trains as were found to use the track during the second day of noise level measurements (the second day of noise level measurements were used because more trains operated on that day), and these predicted noise levels were then compared with the measured results. Thus, if the predicted and measured noise levels

correlated well with each other, alternate train models, using timetabled train movements, could be created and regarded as being representative of the actual train noise levels for that particular level of track usage.

- 2.7 Following an initial inspection of the predicted noise levels for locations at which noise levels had been measured it was found that at a number of locations there was an unacceptable difference between the predicted and measured noise levels. However, analysis of photographs taken whilst on site showed that at a number of locations, for example, “The Gables, 75 Grange Road and others, there were local screens that were acting as acoustic barriers. Once these features were added to the noise model, the predicted and measured noise levels were in much better agreement.
- 2.8 However, at two locations, namely, 138 Ladysneuk Road and East Neuk cottage, the predicted noise level differences were 2.9 and 3.5 dB, respectively, higher than the measured noise levels. Neither of these properties appeared to have local barriers. These noise level differences are likely to occur due to factors out with the model. These factors may include: variance in the track conditions; trains not operating on full power where they are assumed to do so in the model; variance between the digital ground model and the actual terrain; difference in train speeds, and perhaps local screens located between the track and the receptor location of interest, again, not included in the model
- 2.9 With local barriers in place, as identified in site location photographs, the noise level differences between the measured and predicted noise levels are as shown in Table 2.

Table 2: Predicted Versus Measured Noise Levels

Receiver	Measured L _{Aeq,18hr} (dB)	Predicted L _{Aeq,18hr} (dB)	Noise Level Difference (dB)
2 Dumyat Road Causewayhead*	-	43.8	43.8
138 Ladysneuk Road, Causewayhead	55.0	57.9	2.9
East Neuk Cottage, Causewayhead	59.7	63.2	3.5
The Gables, near Cambus	54.3	53.6	-0.7
75 Grange Road, Alloa	57.3	57.4	0.1
24 Kingswell Park, Alloa	53.1	51.0	-2.1
22 Park Place, Alloa	52.4	53.1	0.7
101 Devonway, Clackmannan	53.5	54.5	1.0
Hamewith, Clackmannan	45.1	44.9	-0.2
23 Brucefield Crescent, Clackmannan	52.2	52.1	-0.1
Station House, Kincardine	55.6	54.3	-1.3

*Due to nearby construction work uncorrupted railway noise measurements not possible.

- 2.10 Through the modelling process it is possible to apply correction terms to the noise maps that will adjust the predicted noise level maps so that they agree with the measured noise levels at the measured locations, which in turn adjusts the predicted noise levels at all other locations.. See, for example, Paragraph 2.8. As a result, once the corrections have been applied the model reflects the measured noise levels.

- 2.11 It should be noted that although local barriers were used in the calibration of the time table noise models, these features were removed for the final noise mapping process. They were removed because they are not deemed to be permanent structures.
- 2.12 The output from the noise modelling can be viewed as a series of six maps that cover the mapped area from Stirling to Longannet. They can be viewed in Appendix 2.
- 2.13 Subsequent to this initial noise modelling process site visits were undertaken along the route of the SAK railway line so as to determine the extent of existing barriers/fences that act as acoustic screening at properties adjacent to the railway. These site visits occurred on 26th, 27th and 28th of August 2009.
- 2.14 The locations and heights of barriers that act as acoustic screens to the railway noise were then added to the SAK railway noise model and noise impact analysis, for all residential properties, was undertaken with barriers in place. A summary of the noise impacts is presented in Section 3, below.

3 Data Analysis

- 3.1 In addition to the production of noise maps, façade noise levels have been determined for each property at a location 1m from their façades. Using this data it is possible to predict which buildings exceed the ES criteria for mitigation. These criteria state that the noise level from the trains must exceed $L_{Aeq,18hr}$ 55dB and must exceed the pre-existing ambient noise level by 5dB.
- 3.2 The noise model provides the façade $L_{Aeq,18hr}$ noise levels for the train noise, but clearly does not give the pre-existing ambient noise level at each and every property potentially affected by the train noise. However, measurements have been undertaken at sample measurement locations. This measured data, from both the Environmental Statement (ES) and AECOM, have been used as a proxy for ambient noise levels at properties located near to where the measurements were undertaken. Thus, it is possible to provide an indication of the properties most likely to meet the mitigation criteria.
- 3.3 When determining whether or not there is a 5dB increase in the train noise $L_{Aeq,18hr}$, above the pre-existing ambient noise level the following procedure has been adopted: prior to subtracting the ambient noise level from the $L_{Aeq,18hr}$, the ambient noise level has been rounded down to the nearest whole number and the train noise $L_{Aeq,18hr}$ has been rounded up to the nearest whole number. Clearly by rounding down the pre-existing noise level and rounding up the train noise level a conservative approach to determine potential properties that may require noise mitigation has been adopted.
- 3.4 A full list of properties that exceed the $L_{Aeq,18hr}$ train noise level threshold of 55dB can be viewed in Appendix 1.
- 3.5 There are 62 residential properties that meet both criteria (exceed $L_{Aeq,18hr}$ 55dB and exceed pre-existing ambient noise levels by 5dB), and these are listed below: (It should be noted that indicative ambient noise levels are not available for all locations. However, as can be seen in Appendix 2, the measured indicative $L_{Aeq,16hr}$ is greater than that of the predicted train $L_{Aeq,18hr}$ and, as such the pre-existing ambient $L_{Aeq,18hr}$ is also likely to be greater than train $L_{Aeq,18hr}$.)

Table 1: Properties Predicted to Comply with Noise Mitigation Criteria

Address	Predicted $L_{Aeq,18hr}$ Train Noise Level	Pre-Existing Ambient $L_{Aeq,18hr}$ Noise Level	Noise Level Exceedence
75 Grange Road, Alloa, FK10 1LU	63.0	55.0	8.0
77 Grange Road, Alloa, FK10 1LU	63.0	55.0	8.0
The Gables, Alloa Road, Cambus, FK10 2NT	63.0	49.0	14.0
Woodside House, Alloa Road, Cambus, FK10 2NT	62.0	53.0	9.0
25 Alexandra Drive, Alloa, FK10 2DQ	61.0	55.0	6.0
8 Alloa Road, Cambus, FK10 2NT	62.0	53.0	9.0
6 The Sheillings, Cambus, FK10 2NN	61.0	53.0	8.0
4 The Sheillings, Cambus, FK10 2NN	61.0	53.0	8.0
20 The Sheillings, Cambus, FK10 2NN	61.0	53.0	8.0
2 The Sheillings, Cambus, FK10 2NN	61.0	53.0	8.0
18 The Sheillings, Cambus, FK10 2NN	61.0	53.0	8.0
22 The Sheillings, Cambus, FK10 2NN	61.0	53.0	8.0
8 The Sheillings, Cambus, FK10 2NN	60.0	53.0	7.0
10 The Sheillings, Cambus, FK10 2NN	60.0	53.0	7.0
12 The Sheillings, Cambus, FK10 2NN	60.0	53.0	7.0
14 The Sheillings, Cambus, FK10 2NN	60.0	53.0	7.0
16 The Sheillings, Cambus, FK10 2NN	61.0	53.0	8.0
24 The Sheillings, Cambus, FK10 2NN	61.0	53.0	8.0
26 The Sheillings, Cambus, FK10 2NN	60.0	53.0	7.0
37 Moubray Gardens, Cambus, FK10 2NQ	61.0	53.0	8.0
39 Moubray Gardens, Cambus, FK10 2NQ	61.0	53.0	8.0
35 Moubray Gardens, Cambus, FK10 2NQ	61.0	53.0	8.0
41 Moubray Gardens, Cambus, FK10 2NQ	61.0	53.0	8.0
43 Moubray Gardens, Cambus, FK10 2NQ	61.0	53.0	8.0
33 Moubray Gardens, Cambus, FK10 2NQ	60.0	53.0	7.0
45 Moubray Gardens, Cambus, FK10 2NQ	61.0	53.0	8.0
47 Moubray Gardens, Cambus, FK10 2NQ	61.0	53.0	8.0
49 Moubray Gardens, Cambus, FK10 2NQ	61.0	53.0	8.0
51 Moubray Gardens, Cambus, FK10 2NQ	59.0	53.0	6.0
16 Ochil View, Kincardine, FK10 4QG	61.0	46.0	15.0
18 Ochil View, Kincardine, FK10 4QG	57.0	46.0	11.0
19 Ochil View, Kincardine, FK10 4QG	57.0	46.0	11.0
20 Ochil View, Kincardine, FK10 4QG	56.0	46.0	10.0
24 Ochil View, Kincardine, FK10 4QG	58.0	46.0	12.0
25 Ochil View, Kincardine, FK10 4QG	59.0	46.0	13.0
Ochil View, Clackmannan, FK10 4DJ	59.0	46.0	13.0
17 Ochil View, Kincardine, FK10 4QG	61.0	46.0	15.0
11 Craig Crescent, Causewayhead, FK9 5LR	59.0	49.0	10.0
13 Craig Crescent, Causewayhead, FK9 5LR	58.0	49.0	9.0
15 Craig Crescent, Causewayhead, FK9 5LR	58.0	49.0	9.0
17 Craig Crescent, Causewayhead, FK9 5LR	57.0	49.0	8.0
19 Craig Crescent, Causewayhead, FK9 5LR	58.0	49.0	9.0
9 Craig Crescent, Causewayhead, FK9 5LR	58.0	49.0	9.0
38 Wallace Gardens, Causewayhead, FK9 5LS	56.0	49.0	7.0
42 Wallace Gardens, Causewayhead, FK9 5LS	58.0	49.0	9.0

Address	Predicted $L_{Aeq,18hr}$ Train Noise Level	Pre-Existing Ambient $L_{Aeq,18hr}$ Noise Level	Noise Level Exceedence
44 Wallace Gardens, Causewayhead, FK9 5LS	58.0	49.0	9.0
46 Wallace Gardens, Causewayhead, FK9 5LS	58.0	49.0	9.0
48 Wallace Gardens, Causewayhead, FK9 5LS	58.0	49.0	9.0
56 Wallace Gardens, Causewayhead, FK9 5LS	57.0	49.0	8.0
58 Wallace Gardens, Causewayhead, FK9 5LS	62.0	49.0	13.0
Flat 1 48, Alloa Road, Causewayhead, FK9 5LN	62.0	55.0	7.0
54 Alloa Road, Causewayhead, FK9 5LN	61.0	55.0	6.0
56 Alloa Road, Causewayhead, FK9 5LN	61.0	55.0	6.0
Flat 2 48, Alloa Road, Causewayhead, FK9 5LN	62.0	55.0	7.0
Flat 3 48, Alloa Road, Causewayhead, FK9 5LN	62.0	55.0	7.0
Flat 4 48, Alloa Road, Causewayhead, FK9 5LN	62.0	55.0	7.0
Flat 5 48, Alloa Road, Causewayhead, FK9 5LN	62.0	55.0	7.0
8 Craiglea, Causewayhead, FK9 5EE	62.0	55.0	7.0
34 Craiglea, Causewayhead, FK9 5EE	61.0	55.0	6.0
36 Craiglea, Causewayhead, FK9 5EE	61.0	55.0	6.0
38 Craiglea, Causewayhead, FK9 5EE	61.0	55.0	6.0
40 Craiglea, Causewayhead, FK9 5EE	61.0	55.0	6.0

3.6 As previous stated (Paragraphs 2.13 and 2.14) noise level predictions have been undertaken with identified existing acoustic screens added to the SAK noise model. With these acoustic screens in place

3.7 A summary of the SAK modelling output, following the introduction of existing barriers, is presented in Table 3.

Table 3: Summary of the Effects of Existing Acoustic Screening

Effects of Barriers	Count
Existing Barriers Successful	18
Existing Barriers Insufficient	7
Barrier Failed – Only Partial Screening from Existing Barriers	18
No Existing Barriers	19

3.8 Hence, the total number of properties still requiring mitigation has reduced by 18, from 62 to 44.

3.9 Table 4 provides an updated list of the properties in Table 3. The predicted noise levels are those following the introduction of existing barriers/fences at these properties, where they exist. This table also presents the effectiveness of the existing barrier.

Table 4: Properties and Existing Noise Screening Results

Address	Predicted L _{Aeq,18hr} Train Noise Level	Pre- Existing Ambient L _{Aeq,18hr} Noise Level	Noise Level Exceedence	Result of Existing Barriers (Where Applicable)
75 Grange Road, Alloa	64	55	9	No Mitigation Offered
77 Grange Road, Alloa	58	55	3	Successful
The Gables, Alloa Road, Cambus	64	49	15	No Mitigation Offered
Woodside House, Alloa Road, Cambus	60	53	7	Insufficient
25 Alexandra Drive, Alloa	61	55	6	No Mitigation Offered
8 Alloa Road, Cambus	60	53	7	Insufficient
6 The Sheillings, Cambus	59	53	6	Fail - Partial screening
4 The Sheillings, Cambus	60	53	7	Fail - Partial screening
20 The Sheillings, Cambus	59	53	6	Fail - Partial screening
2 The Sheillings, Cambus	60	53	7	Fail - Partial screening
18 The Sheillings, Cambus	59	53	6	Fail - Partial screening
22 The Sheillings, Cambus	60	53	7	Fail - Partial screening
8 The Sheillings, Cambus	59	53	6	Fail - Partial screening
10 The Sheillings, Cambus	58	53	5	Successful
12 The Sheillings, Cambus	58	53	5	Successful
14 The Sheillings, Cambus	59	53	6	Fail - Partial screening
16 The Sheillings, Cambus	60	53	7	Fail - Partial screening
24 The Sheillings, Cambus	59	53	6	Fail - Partial screening
26 The Sheillings, Cambus	58	53	5	Successful
37 Moubray Gardens, Cambus	61	53	8	No Mitigation Offered
39 Moubray Gardens, Cambus	61	53	8	No Mitigation Offered
35 Moubray Gardens, Cambus	61	53	8	No Mitigation Offered
41 Moubray Gardens, Cambus	61	53	8	No Mitigation Offered
43 Moubray Gardens, Cambus	61	53	8	No Mitigation Offered
33 Moubray Gardens, Cambus	60	53	7	No Mitigation Offered
45 Moubray Gardens, Cambus	61	53	8	No Mitigation Offered
47 Moubray Gardens, Cambus	61	53	8	No Mitigation Offered
49 Moubray Gardens, Cambus	61	53	8	No Mitigation Offered
51 Moubray Gardens, Cambus	59	53	6	No Mitigation Offered
16 Ochil View, Kincardine	61	46	15	No Mitigation Offered
18 Ochil View, Kincardine	54	46	8	Successful
19 Ochil View, Kincardine	49	46	3	Successful
20 Ochil View, Kincardine	49	46	3	Successful
24 Ochil View, Kincardine	58	46	12	No Mitigation Offered
25 Ochil View, Kincardine	57	46	11	Insufficient
Ochil View, Clackmannan	59	46	13	No Mitigation Offered
17 Ochil View, Kincardine	61	46	15	No Mitigation Offered
11 Craig Crescent, Causewayhead	56	49	7	Fail - Partial screening
13 Craig Crescent, Causewayhead	56	49	7	Fail - Partial screening
15 Craig Crescent, Causewayhead	55	49	6	No Mitigation Offered
17 Craig Crescent, Causewayhead	55	49	6	No Mitigation Offered
19 Craig Crescent, Causewayhead	56	49	7	Fail - Partial screening

Address	Predicted $L_{Aeq,18hr}$ Train Noise Level	Pre- Existing Ambient $L_{Aeq,18hr}$ Noise Level	Noise Level Exceedence	Result of Existing Barriers (Where Applicable)
9 Craig Crescent, Causewayhead	56	49	7	Fail - Partial screening
38 Wallace Gardens, Causewayhead	54	49	5	Successful
42 Wallace Gardens, Causewayhead	56	49	7	Fail - Partial screening
44 Wallace Gardens, Causewayhead	56	49	7	Fail - Partial screening
46 Wallace Gardens, Causewayhead	57	49	8	Fail - Partial screening
48 Wallace Gardens, Causewayhead	57	49	8	Fail - Partial screening
56 Wallace Gardens, Causewayhead	56	49	7	Insufficient
58 Wallace Gardens, Causewayhead	57	49	8	Insufficient
Flat 1 48, Alloa Road, Causewayhead	62	55	7	Successful
54 Alloa Road, Causewayhead	61	55	6	Insufficient
56 Alloa Road, Causewayhead	61	55	6	Insufficient
Flat 2 48, Alloa Road, Causewayhead	62	55	7	Successful
Flat 3 48, Alloa Road, Causewayhead	62	55	7	Successful
Flat 4 48, Alloa Road, Causewayhead	62	55	7	Successful
Flat 5 48, Alloa Road, Causewayhead	62	55	7	Successful
8 Craiglea, Causewayhead	53	55	-2	Successful
34 Craiglea, Causewayhead	56	55	1	Successful
36 Craiglea, Causewayhead	57	55	2	Successful
38 Craiglea, Causewayhead	52	55	-3	Successful
40 Craiglea, Causewayhead	52	55	-3	Successful

3.10

Although the *Railway Noise Insulation Regulations*¹ strictly only apply in England and Wales, using the criteria stated in these regulations as a guide, no properties meet with the criteria for the installation of noise insulation. That is, there are no properties exposed to rail noise that meet all of the following criteria:

- the combined expected maximum rail traffic noise level (i.e. the relevant noise level from the new or altered railway) must not be less than the specified noise levels (68 dB $L_{Aeq,18h}$ daytime (06:00-24:00) and 63 dB $L_{Aeq,6h}$ night-time (24:00- 06:00).
- the relevant noise level is at least 1.0 dB(A) more than the prevailing noise level.
- the contribution to the increase in the relevant noise level from the new or altered railway must be at least 1.0 dB(A).

¹ SI No. 428: *Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996*

4 Summary

- 4.1 Rail Noise maps have been created for the SAK railway line from Stirling station to Longannet power station using timetabled train movements. These maps have been contoured as shown in the introduction of this report and can be viewed in Appendix 2.
- 4.2 Façade noise levels have been determined for each and every building within 300m of the modeled rail tracks.
- 4.3 Although the *Railway Noise Insulation Regulations*¹ strictly only apply in England and Wales (as explained in the 26th May 2009 report, the application of the criteria as set out in these regulations shows that the predicted noise levels at properties along the length of the railway line are such that no properties meet with the qualifying criteria in relation to noise insulation.
- 4.4 In addition, 62 properties were predicted to experience façade noise levels from trains that exceed $L_{Aeq,18hr}$ 55dB and exceed the pre-existing ambient noise level by 5dB and, as such, meet with the Scott Wilson Environmental Statement's criteria for noise mitigation. However, this relates to predicted noise levels without existing barriers/fences, which may act as acoustic screening at these properties.
- 4.5 Therefore, following site survey visits to these properties, the original SAK railway noise model was augmented with existing barriers/fences at these properties. With these noise barriers in place the number of properties that meet with the aforementioned mitigation criteria reduces by 18, from 62 to 44 properties.

Appendix 1

Table of Unmitigated Predicted Façade Noise Levels and Indicative Pre-existing Ambient Noise Levels

Address	Predicted L _{Aeq,18hr} Train Noise dB	Pre- Existing Ambient L _{Aeq,16hr} dB	Pre- Existing Ambient L _{Aeq,18hr} dB	Level Exceeded 16 hr dB	Level Exceeded 18 hr dB	L _{Aeq,16hr} Exceed	L _{Aeq,18hr} Exceed
75 Grange Road, Alloa, FK10 1LU	63	55	55	8	8	Exceed	Exceed
77 Grange Road, Alloa, FK10 1LU	63	55	55	8	8	Exceed	Exceed
80 Grange Road, Alloa, FK10 1LU	58	55	55	3	3	No	No
27 Dirleton Gardens, Alloa, FK10 1NL	56	55	55	1	1	No	No
48 Dirleton Gardens, Alloa, FK10 1NL	58	55	55	3	3	No	No
2 Mitchell Crescent, Alloa, FK10 1NN	56	55	55	1	1	No	No
7 Alloa Road, Cambus, FK10 2NT	58	53	53	5	5	No	No
12 Station Road, Alloa, FK10 2NY	58	53	53	5	5	No	No
The Gables, Alloa Road, Cambus, FK10 2NT	63	49	49	14	14	Exceed	Exceed
Forthvale, Alloa Road, Cambus, FK10 2NT	56	53	53	3	3	No	No
Woodside House, Alloa Road, Cambus, FK10 2NT	62	53	53	9	9	Exceed	Exceed
25 Alexandra Drive, Alloa, FK10 2DQ	61	55	55	6	6	Exceed	Exceed
8 Alloa Road, Cambus, FK10 2NT	62	53	53	9	9	Exceed	Exceed
6 The Sheilings, Cambus, FK10 2NN	61	53	53	8	8	Exceed	Exceed
4 The Sheilings, Cambus, FK10 2NN	61	53	53	8	8	Exceed	Exceed
20 The Sheilings, Cambus, FK10 2NN	61	53	53	8	8	Exceed	Exceed
2 The Sheilings, Cambus, FK10 2NN	61	53	53	8	8	Exceed	Exceed
18 The Sheilings, Cambus, FK10 2NN	61	53	53	8	8	Exceed	Exceed
22 The Sheilings, Cambus, FK10 2NN	61	53	53	8	8	Exceed	Exceed
1 The Sheilings, Cambus, FK10 2NN	56	53	53	3	3	No	No
8 The Sheilings, Cambus, FK10 2NN	60	53	53	7	7	Exceed	Exceed
10 The Sheilings, Cambus, FK10 2NN	60	53	53	7	7	Exceed	Exceed
12 The Sheilings, Cambus, FK10 2NN	60	53	53	7	7	Exceed	Exceed
14 The Sheilings, Cambus, FK10 2NN	60	53	53	7	7	Exceed	Exceed
16 The Sheilings, Cambus, FK10 2NN	61	53	53	8	8	Exceed	Exceed
24 The Sheilings, Cambus, FK10 2NN	61	53	53	8	8	Exceed	Exceed
26 The Sheilings, Cambus, FK10 2NN	60	53	53	7	7	Exceed	Exceed
37 Moubray Gardens, Cambus, FK10 2NQ	61	53	53	8	8	Exceed	Exceed
39 Moubray Gardens, Cambus, FK10 2NQ	61	53	53	8	8	Exceed	Exceed
35 Moubray Gardens, Cambus, FK10 2NQ	61	53	53	8	8	Exceed	Exceed
41 Moubray Gardens, Cambus, FK10 2NQ	61	53	53	8	8	Exceed	Exceed
43 Moubray Gardens, Cambus, FK10 2NQ	61	53	53	8	8	Exceed	Exceed
53 Moubray Gardens, Cambus, FK10 2NQ	56	53	53	3	3	No	No
33 Moubray Gardens, Cambus, FK10 2NQ	60	53	53	7	7	Exceed	Exceed
45 Moubray Gardens, Cambus, FK10 2NQ	61	53	53	8	8	Exceed	Exceed
47 Moubray Gardens, Cambus, FK10 2NQ	61	53	53	8	8	Exceed	Exceed
49 Moubray Gardens, Cambus, FK10 2NQ	61	53	53	8	8	Exceed	Exceed
51 Moubray Gardens, Cambus, FK10 2NQ	59	53	53	6	6	Exceed	Exceed
29 Kingswell Park, Alloa, FK10 3RW	57	52	52	5	5	No	No
16 Ochil View, Kincardine, FK10 4QG	61	46	46	15	15	Exceed	Exceed
18 Ochil View, Kincardine, FK10 4QG	57	46	46	11	11	Exceed	Exceed
19 Ochil View, Kincardine, FK10 4QG	57	46	46	11	11	Exceed	Exceed
20 Ochil View, Kincardine, FK10 4QG	56	46	46	10	10	Exceed	Exceed
24 Ochil View, Kincardine, FK10 4QG	58	46	46	12	12	Exceed	Exceed
25 Ochil View, Kincardine, FK10 4QG	59	46	46	13	13	Exceed	Exceed
Northfields, Clackmannan, FK10 4DJ	57	60	60	-3	-3	No	No
Station House, Station Road, Kincardine, FK10 4LT	56	53	53	3	3	No	No

Address	Predicted L _{Aeq,18hr} Train Noise dB	Pre- Existing Ambient L _{Aeq,16hr} dB	Pre- Existing Ambient L _{Aeq,18hr} dB	Level Exceeded 16 hr dB	Level Exceeded 18 hr dB	L _{Aeq,16hr} Exceed	L _{Aeq,18hr} Exceed
2 Northfield Gardens, Clackmannan, FK10 4DG	60	61	60	-1	0	No	No
1 Villa Place, Clackmannan, FK10 4HZ	58						
2 Villa Place, Clackmannan, FK10 4HZ	56						
Ochil View, Clackmannan, FK10 4DJ	59	46	46	13	13	Exceed	Exceed
19 Brucefield Crescent, Clackmannan, FK10 4DE	57	59	58	-2	-1	No	No
21 Brucefield Crescent, Clackmannan, FK10 4DE	57	59	58	-2	-1	No	No
23 Brucefield Crescent, Clackmannan, FK10 4DE	57	59	58	-2	-1	No	No
8C Hetherington Drive, Clackmannan, FK10 4HQ	59	59	58	0	1	No	No
8D Hetherington Drive, Clackmannan, FK10 4HQ	59	59	58	0	1	No	No
17 Ochil View, Kincardine, FK10 4QG	61	46	46	15	15	Exceed	Exceed
1 Forth Place, Stirling, FK8 1UD	59						
3 Forth Place, Stirling, FK8 1UD	59						
1 Forthview, Stirling, FK8 1TZ	56						
2 Forthview, Stirling, FK8 1TZ	56						
3 Forthview, Stirling, FK8 1TZ	56						
4 Forthview, Stirling, FK8 1TZ	56						
65 Alloa Road, Causewayhead, FK9 5LJ	58	55	55	3	3	No	No
56 Causewayhead Road, Causewayhead, FK9 5EZ	58	64		-6		No	
58 Causewayhead Road, Causewayhead, FK9 5EZ	57	64		-7		No	
60 Causewayhead Road, Causewayhead, FK9 5EZ	57	64		-7		No	
62 Causewayhead Road, Causewayhead, FK9 5EZ	57	64		-7		No	
64 Causewayhead Road, Causewayhead, FK9 5EZ	59	64		-5		No	
66 Causewayhead Road, Causewayhead, FK9 5EZ	59	64		-5		No	
68 Causewayhead Road, Causewayhead, FK9 5EZ	58	64		-6		No	
70 Causewayhead Road, Causewayhead, FK9 5EZ	58	64		-6		No	
72 Causewayhead Road, Causewayhead, FK9 5EZ	58	64		-6		No	
76 Causewayhead Road, Causewayhead, FK9 5HB	58	64		-6		No	
78 Causewayhead Road, Causewayhead, FK9 5HB	59	64		-5		No	
2A Buchanan Drive, Causewayhead, FK9 5HF	58	64		-6		No	
100 Causewayhead Road, Causewayhead, FK9 5HJ	56	64		-8		No	
114 Causewayhead Road, Causewayhead, FK9 5HJ	56	64		-8		No	
116 Causewayhead Road, Causewayhead, FK9 5HJ	56	64		-8		No	
118 Causewayhead Road, Causewayhead, FK9 5HJ	56	64		-8		No	
88 Causewayhead Road, Causewayhead, FK9 5HJ	58	64		-6		No	
90 Causewayhead Road, Causewayhead, FK9 5HJ	58	64		-6		No	
92 Causewayhead Road, Causewayhead, FK9 5HJ	57	64		-7		No	
94 Causewayhead Road, Causewayhead, FK9 5HJ	57	64		-7		No	
96 Causewayhead Road, Causewayhead, FK9 5HJ	56	64		-8		No	
98 Causewayhead Road, Causewayhead, FK9 5HJ	56	64		-8		No	
11 Craig Crescent, Causewayhead, FK9 5LR	59	50	49	9	10	Exceed	Exceed
13 Craig Crescent, Causewayhead, FK9 5LR	58	50	49	8	9	Exceed	Exceed
15 Craig Crescent, Causewayhead, FK9 5LR	58	50	49	8	9	Exceed	Exceed
17 Craig Crescent, Causewayhead, FK9 5LR	57	50	49	7	8	Exceed	Exceed
19 Craig Crescent, Causewayhead, FK9 5LR	58	50	49	8	9	Exceed	Exceed
9 Craig Crescent, Causewayhead, FK9 5LR	58	50	49	8	9	Exceed	Exceed
38 Wallace Gardens, Causewayhead, FK9 5LS	56	50	49	6	7	Exceed	Exceed
42 Wallace Gardens, Causewayhead, FK9 5LS	58	50	49	8	9	Exceed	Exceed
44 Wallace Gardens, Causewayhead, FK9 5LS	58	50	49	8	9	Exceed	Exceed
46 Wallace Gardens, Causewayhead, FK9 5LS	58	50	49	8	9	Exceed	Exceed
48 Wallace Gardens, Causewayhead, FK9 5LS	58	50	49	8	9	Exceed	Exceed
56 Wallace Gardens, Causewayhead, FK9 5LS	57	50	49	7	8	Exceed	Exceed
58 Wallace Gardens, Causewayhead, FK9 5LS	62	50	49	12	13	Exceed	Exceed
70A Causewayhead Road, Causewayhead, FK9 5EZ	59	64		-5		No	
80 Alloa Road, Causewayhead, FK9 5PN	62	63	63	-1	-1	No	No
The Old School, Alloa Road, Causewayhead, FK9 5PN	58	55	55	3	3	No	No

Address	Predicted L _{Aeq,18hr} Train Noise dB	Pre- Existing Ambient L _{Aeq,16hr} dB	Pre- Existing Ambient L _{Aeq,18hr} dB	Level Exceeded 16 hr dB	Level Exceeded 18 hr dB	L _{Aeq,16hr} Exceed	L _{Aeq,18hr} Exceed
138 Ladysneuk Road, Causewayhead, FK9 5NR	60	55	55	5	5	No	No
79 Alloa Road, Stirling, FK9 5PN	57	55	55	2	2	No	No
Flat 1 48, Alloa Road, Causewayhead, FK9 5LN	62	55	55	7	7	Exceed	Exceed
50 Alloa Road, Causewayhead, FK9 5LN	60	55	55	5	5	No	No
52 Alloa Road, Causewayhead, FK9 5LN	60	55	55	5	5	No	No
54 Alloa Road, Causewayhead, FK9 5LN	61	55	55	6	6	Exceed	Exceed
56 Alloa Road, Causewayhead, FK9 5LN	61	55	55	6	6	Exceed	Exceed
58 Alloa Road, Causewayhead, FK9 5LN	60	55	55	5	5	No	No
60 Alloa Road, Causewayhead, FK9 5LN	60	55	55	5	5	No	No
62 Alloa Road, Causewayhead, FK9 5LN	60	55	55	5	5	No	No
64 Alloa Road, Causewayhead, FK9 5LN	60	55	55	5	5	No	No
2 Abbey Craig Court, Causewayhead, FK9 5LQ	59	55	55	4	4	No	No
4 Abbey Craig Court, Causewayhead, FK9 5LQ	59	55	55	4	4	No	No
6 Abbey Craig Court, Causewayhead, FK9 5LQ	59	55	55	4	4	No	No
8 Abbey Craig Court, Causewayhead, FK9 5LQ	59	55	55	4	4	No	No
10 Abbey Craig Court, Causewayhead, FK9 5LQ	58	55	55	3	3	No	No
12 Abbey Craig Court, Causewayhead, FK9 5LQ	58	55	55	3	3	No	No
14 Abbey Craig Court, Causewayhead, FK9 5LQ	57	55	55	2	2	No	No
1 Abbey Craig Court, Causewayhead, FK9 5LQ	59	55	55	4	4	No	No
3 Abbey Craig Court, Causewayhead, FK9 5LQ	59	55	55	4	4	No	No
5 Abbey Craig Court, Causewayhead, FK9 5LQ	59	55	55	4	4	No	No
7 Abbey Craig Court, Causewayhead, FK9 5LQ	59	55	55	4	4	No	No
9 Abbey Craig Court, Causewayhead, FK9 5LQ	58	55	55	3	3	No	No
11 Abbey Craig Court, Causewayhead, FK9 5LQ	58	55	55	3	3	No	No
15 Abbey Craig Court, Causewayhead, FK9 5LQ	57	55	55	2	2	No	No
2B 0, Buchanan Drive, Causewayhead, FK9 5HF	58	64		-6		No	
2C 0, Buchanan Drive, Causewayhead, FK9 5HF	58	64		-6		No	
2D 0, Buchanan Drive, Causewayhead, FK9 5HF	58	64		-6		No	
2E 0, Buchanan Drive, Causewayhead, FK9 5HF	58	64		-6		No	
2F 0, Buchanan Drive, Causewayhead, FK9 5HF	58	64		-6		No	
22 Blenheim Court, Causewayhead, FK9 5EA	62	64		-2		No	
67 Causewayhead Road, Causewayhead, FK9 5EG	59	64		-5		No	
69 Causewayhead Road, Causewayhead, FK9 5EG	61	64		-3		No	
Flat 2 48, Alloa Road, Causewayhead, FK9 5LN	62	55	55	7	7	Exceed	Exceed
Flat 3 48, Alloa Road, Causewayhead, FK9 5LN	62	55	55	7	7	Exceed	Exceed
Flat 4 48, Alloa Road, Causewayhead, FK9 5LN	62	55	55	7	7	Exceed	Exceed
Flat 5 48, Alloa Road, Causewayhead, FK9 5LN	62	55	55	7	7	Exceed	Exceed
16 Craiglea, Causewayhead, FK9 5EE	58	55	55	3	3	No	No
6 Craiglea, Causewayhead, FK9 5EE	56	55	55	1	1	No	No
18 Craiglea, Causewayhead, FK9 5EE	60	55	55	5	5	No	No
14 Craiglea, Causewayhead, FK9 5EE	59	55	55	4	4	No	No
10 Craiglea, Causewayhead, FK9 5EE	59	55	55	4	4	No	No
8 Craiglea, Causewayhead, FK9 5EE	62	55	55	7	7	Exceed	Exceed
20 Craiglea, Causewayhead, FK9 5EE	60	55	55	5	5	No	No
22 Craiglea, Causewayhead, FK9 5EE	60	55	55	5	5	No	No
12 Craiglea, Causewayhead, FK9 5EE	59	55	55	4	4	No	No
32 Craiglea, Causewayhead, FK9 5EE	56	55	55	1	1	No	No
34 Craiglea, Causewayhead, FK9 5EE	61	55	55	6	6	Exceed	Exceed
36 Craiglea, Causewayhead, FK9 5EE	61	55	55	6	6	Exceed	Exceed
16 Blenheim Court, Causewayhead, FK9 5EA	56	64		-8		No	
19 Blenheim Court, Causewayhead, FK9 5EA	62	64		-2		No	
10 Blenheim Court, Causewayhead, FK9 5EA	56	64		-8		No	
11 Blenheim Court, Causewayhead, FK9 5EA	56	64		-8		No	
12 Blenheim Court, Causewayhead, FK9 5EA	56	64		-8		No	
14 Blenheim Court, Causewayhead, FK9 5EA	56	64		-8		No	

Address	Predicted $L_{Aeq,18hr}$ Train Noise dB	Pre- Existing Ambient $L_{Aeq,16hr}$ dB	Pre- Existing Ambient $L_{Aeq,18hr}$ dB	Level Exceeded 16 hr dB	Level Exceeded 18 hr dB	$L_{Aeq,16hr}$ Exceed	$L_{Aeq,18hr}$ Exceed
15 Blenheim Court, Causewayhead, FK9 5EA	56	64		-8		No	
17 Blenheim Court, Causewayhead, FK9 5EA	59	64		-5		No	
18 Blenheim Court, Causewayhead, FK9 5EA	59	64		-5		No	
20 Blenheim Court, Causewayhead, FK9 5EA	62	64		-2		No	
46 Craiglea, Causewayhead, FK9 5EE	60	55	55	5	5	No	No
48 Craiglea, Causewayhead, FK9 5EE	60	55	55	5	5	No	No
71 Causewayhead Road, Causewayhead, FK9 5EG	61	64		-3		No	
73 Causewayhead Road, Causewayhead, FK9 5EG	62	64		-2		No	
21 Blenheim Court, Stirling, FK9 5EA	62	64		-2		No	
38 Craiglea, Causewayhead, FK9 5EE	61	55	55	6	6	Exceed	Exceed
40 Craiglea, Causewayhead, FK9 5EE	61	55	55	6	6	Exceed	Exceed
42 Craiglea, Causewayhead, FK9 5EE	60	55	55	5	5	No	No
44 Craiglea, Causewayhead, FK9 5EE	60	55	55	5	5	No	No
50 Craiglea, Causewayhead, FK9 5EE	57	64		-7		No	
59 Causewayhead Road, Causewayhead, FK9 5EG	60	64		-4		No	
61 Causewayhead Road, Causewayhead, FK9 5EG	60	64		-4		No	
63 Causewayhead Road, Causewayhead, FK9 5EG	60	64		-4		No	
65 Causewayhead Road, Causewayhead, FK9 5EG	59	64		-5		No	
75 Causewayhead Road, Causewayhead, FK9 5EG	62	64		-2		No	
77 Causewayhead Road, Causewayhead, FK9 5EG	63	64		-1		No	
79 Causewayhead Road, Causewayhead, FK9 5EG	63	64		-1		No	
81 Causewayhead Road, Causewayhead, FK9 5EG	63	64		-1		No	
83 Causewayhead Road, Causewayhead, FK9 5EG	64	64		0		No	

Appendix 2

Graphics showing unmitigated $L_{Aeq,18hr}$ noise levels, in 5dB noise bands, have been created for the Stirling-Alloa-Kincardine railway line. They can be viewed by following the following links:

[Stirling Section: SAK 5dB Noise Band Map](#)

[Tullibody Section: SAK 5dB Noise Band Map](#)

[Alloa Section: SAK 5dB Noise Band Map](#)

[Clackmannan Section: SAK 5dB Noise Band Map](#)

[Kincardine Section: SAK 5dB Noise Band Map](#)

[Longannet Section: SAK 5dB Noise Band Map](#)