10 Noise and Vibration

10.1 Introduction

10.1.1 This chapter of the ES considers the effects of noise and vibration associated with the construction and operation of GCRE on the nearby communities.

10.1.2 The assessment sets out the noise mitigation measures which will be put in place to minimise noise to communities and confirms that no residual adverse significant effects are identified as a result of the operation of the scheme.

10.1.3 This main chapter of the assessment has been kept as concise as possible, with all detail included in the following accompanying appendices:

- Appendix A: Noise survey and baseline
- Appendix B: Policy, assessment criteria and consultation
- Appendix C: Operational and Construction assessment detail, assumptions and limitations
- Appendix D: Glossary

10.2 Overall approach to noise

10.2.1 The primary approach to controlling noise from the facility has been to minimise noise to all the surrounding communities regardless of existing noise levels through the proactive use of appropriate noise mitigation, without introducing other adverse impacts such as visual intrusion. This approach is in line with the Welsh Government's main noise policy document, the Noise and Soundscape Action Plan 2018-2023[1].

10.2.2 This approach of minimising noise levels from the facility to or below the criteria set out in section 10.3 has been adopted for *all* communities near to the scheme, regardless of the measured baseline noise levels at receptors, as it is acknowledged that the existing anthropogenic sources of noise in the area can be sporadic, especially at times when the main roads are not busy, such as night-times.

10.2.3 The noise mitigation provided for the scheme is shown on the following pages in Figures 10.1 to 10.3 along with the noise predictions for day, evening and night-time and is referred to further in the following sections.

[1] https://gov.wales/sites/default/files/publications/2019-04/noise-and-soundscape-action-plan.pdf para 10.3.12

10.2.4 The receptors at which noise assessments have been carried out are shown in Figure 10.1.

10.3 Criteria

10.3.1 The criteria used for the operational noise assessment are set out in Table 10.1. They are based on criteria in British Standard 8233, which sets out guidance on acceptable noise levels in residences – both for overall noise levels (quantified by a metric called the equivalent continuous sound level, denoted by $L_{Aeq,T}$) and for maximum noise levels (denoted by $L_{Amax,F}$).

10.3.2 The external (outdoor) noise levels predicted as part of the operational noise assessment (detailed in the next section) will be compared against the criteria in the last column of the table, to indicate whether any noise impacts are likely.

Table 10.1: Criteria for operational noise assessment

Time period	Noise metric	Internal noise criteria	Acoustic transmission loss of partially open window	External noise criteria*
Daytime, 0700-1900	Overall scheme noise level, $L_{Aeq,T}$	Living areas: 35dB**	15	50dB
Evening, 1900-2300	Overall scheme noise level, $L_{Aeq,T}$	Living areas: 35dB**		50dB
Night-time, 2300-0700	Overall scheme noise level, $L_{Aeq,T}$	Bedrooms: 30dB**		45dB
	Maximum train noise levels, $L_{Amax,F}$	Bedrooms: 45dB***		60dB

*free-field external noise levels
**from BS8233 2014 Table 4
***from BS8233 1999 Table 5 and ProPG

Reduction in noise level from windows

10.3.3 The reduction in noise levels from outside to inside a typical bedroom vary depending on whether windows are open and, if so, how open they are.

10.3.4 The report *Institute of Acoustics & Association of Noise Consultants' Acoustics, Ventilation & Overheating Residential Design Guide 2020* provides typical outdoor-to-indoor corrections for different window

opening configurations[2]. One is for a fully opened window with a correction of 10dB(A) and one is for a partially open window, with a correction of 15dB(A). The two configurations are shown in the picture below:

Picture 1: Two window opening configurations. The configuration on the right is assumed in the assessment.

10.3.5 For the purposes of this assessment, the partially open window has been used, on the assumption that windows are on average unlikely to be opened wider than this at night-time, which is the most sensitive time period for the assessment.

10.3.6 The criteria for the construction noise assessment are included in Appendix 10B.

10.4 Responses to consultation

10.4.1 The following responses were received during the consultation process. These are listed are provided in **Table 10.2**, along with a response from the scheme:

Table 10.2: Consultation responses relating to noise

Concern	Response
Concern expressed about the noise generated – during construction and operation.	The Environmental Impact Assessment contains a comprehensive noise impact assessment which assesses noise (and vibration) during both construction and operational phases of the project, identifies impacts of significance and the mitigation for dealing with them. For construction, contractors will be bound to operate under a code of good practice known as the Construction Environmental Management Plan. Best Practicable Means will be used to minimise noise from construction

[2] Institute of Acoustics & Association of Noise Consultants' Acoustics, Ventilation & Overheating Residential Design Guide 2020, Appendix C https://www.association-of-noise-consultants.co.uk/wp-content/uploads/2020/07/ANC-AVO-Residential-Design-Guide-January-2020-v1.1.pdf

Concern	Response
	activities, including limits on working hours near to sensitive communities. For the operation of the facility, noise mitigation has been included in the scheme including noise barriers to the north, east and south of the test circuits.
Is the proposed track a 'squeal track'?	We are not proposing a squeal track. Measures will be taken to minimise the occurrence of any possible 'squealing' noise (also known as curving noise) from the facility.
Suggestions that construction phase should not be started until the land has been put back, the remedial earthworks finished, and the sound sensor survey has been carried out.	There is a natural sequence to the implementation of the proposal as outlined in the submissions, which sees the land restored alongside the implementation of the complementary earthworks proposals which together ready the sites for the GCRE development. Also, there will be a duty on the contractors building the scheme to use Best Practicable Means to minimise construction noise, regardless of the sound survey results.
Mitigation queries and soil barrier suggested to prevent noise during operation. Query as to whether some villagers would be compensated with double glazing to address noise impacts.	The noise and vibration assessments contained within the Environmental Impact Assessment propose a number of embedded and other mitigation to address noise, including noise barriers and soil earth 'bunds' which act as noise barriers. The assessments demonstrate that these measures would successfully mitigate noise such that compensation and/or off-site measures are not required.
Hours of operation	
Concern about the potential impact of 24/7 operation – in particular continuous noise and impact on residents and environment.	The ability to operate 24/7 will not mean that the facility will in fact operate 24/7. The Environmental Impact Assessment presents a set of operational assumptions in the early chapters which present a picture of how it is envisaged the facility will operate including hours and days of operation. Those assumptions have fed into the impact assessments such as for noise.
Suggestion that the facility should operate for the same hours and the opencast mining operation.	There is a need to tailor the operational requirements to the proposed facility as it is responding to the marker and operational needs of a different market sector.
Environmental issues	
Air pollution / dust.	These are both assessed in depth in the Environmental Impact Assessment both for the construction and operational phases of development.
Vibration.	Vibration fades away very quickly with distance. Due to the distances of dwellings from the facility, there will be no vibration effects from the facility.

10.4.2 This chapter also responds to issues raised by the Local Authorities during the engagement process as follows:

Further detail on mitigation provision, including justification from both noise and visual perspectives. This is dealt with the inclusion of an additional section of the report (section 10.7) and by the inclusion of noise levels both with and without noise fence barriers included in the scheme (

- **Table 10.5**).
- A better explanation of how the assessment assumptions around train flows are averages and that actual usage would vary during a year: this is covered in paragraph 10.6.4.
- Context of the numbers of train events which would take place on the circuits vs the much greater numbers of road traffic passbys on the local A roads: this is covered in paragraph 10.10.6.

10.5 Calculation methodology

Construction noise

10.5.1 The outline assessment of effects from construction on noise sensitive receptors was carried out using the ABC method from Annex E of BS 5228-1. The full details are contained in Appendix 10C.

Operational noise from the test tracks

10.5.2 The dominant noise from the rolling stock test track and the infrastructure test track will be from trains running at speeds of greater than 40km/h. The relevant calculation method is Calculation of Rail Noise 1996 and this has been used to predict train noise to sensitive receptors using the noise prediction software package SoundPLAN.

10.5.3 Noise prediction packages such as SoundPLAN are used when there are complicated noise sources which need to be assessed. SoundPLAN is capable of performing calculations under several different calculation methodologies including Calculation of Rail Noise 1996 and ISO 9613-2.

Washery: calculation methodology

10.5.4 The calculations for the noise sources at the washery were carried out using the methodology set out in ISO 9613-2. Sound powers were established for the various sources (slow-moving trains, maintenance shed, train wash) based on measurements from other similar projects, and the calculation of noise propagation to nearby receptors carried out with the implementation of ISO 9613-2 in the noise modelling software package SoundPLAN (see paragraph 10.5.3 for more detail about SoundPLAN).

10.6 Noise assessment: scheme operation

10.6.1 For the purposes of assessing noise from the facility during its operation, three features of the scheme have been assessed:

- The rolling stock test track

- The infrastructure test track
- The sidings and facilities in and around the old washery site (the washery)

These features are described in detail in the project description in Chapter 3.

Rolling stock test track

10.6.2 The rolling stock test track will be used to test trains at speeds of up to 110mph.

10.6.3 The rolling stock test track will be open for business to clients all year '24/7': the flexibility for the facility to run into the evenings and night-time periods when required is important to enable to clients to meet tight testing deadlines. However, it is unlikely that the scheme facilities will be constantly in use 365 days a year with no downtime and it is also likely that testing will more commonly occur during the daytime than the evenings/night-times.

10.6.4 Reasonable worst-case assumptions have been developed for the purposes of the assessment, in the form of average usage for daytime, evenings and night-times. To be clear, the use of the test tracks is likely to vary over the year.

10.6.5 The assumptions are as follows:

- when in use, a train would typically complete approximately 20 circuits of the test track per hour, and a typical train is assumed to be 12 cars (carriages) in length;
- on average over a typical year, the rolling stock test track has been assumed to be in active use for five daytimes (defined as 0700-1900) out of every seven
- on average over a typical year, the rolling stock test track has been assumed to be in active use for five evenings (defined as 1900-2300) out of every seven
- on average over a typical year, the rolling stock test track has been assumed to be in active use for two night-times (defined as 2300-0700) out of every seven

10.6.6 The number of laps of the circuits these assumptions equate to is set out in Appendix C, along with other assumptions for the calculations.

10.6.7 In order to minimise train noise from the test track to nearby communities – especially considering that the test track will be in use during some evenings and night-times – noise mitigation has been

included in the design. This mitigation is described in detail in section 10.7.

Infrastructure test track

10.6.8 The high tonnage infrastructure test track would be used to test railway infrastructure such as rails, trackform and track foundations by running a heavy freight train around the test track at speeds of up to 40mph.

10.6.9 The high tonnage infrastructure test track will be open for business to clients all year '24/7': the flexibility for the facility to run into the evenings and night-time periods when required is important to enable clients to meet tight testing deadlines. However, it is unlikely that the scheme facilities will be constantly in use 365 days a year with no downtime and it is also likely that testing will more commonly occur during the daytime than the evenings/night-times.

10.6.10 Unlike the rolling stock test track, the high tonnage infrastructure test track has been assumed to operate seven days a week (as opposed to five) in order to maximise the tonnage which can be run over any rail infrastructure which is 'on-test'.

10.6.11 To reflect the above, the following reasonable worst-case assumptions have been used for the assessment:

- The typical train used to stress-test infrastructure would comprise of two locomotives pulling 40 freight wagons;
- When in use, the train would complete approximately 14 circuits of the test track per hour
- on average over a typical year, the high tonnage infrastructure test track has been assumed to be in active use for seven daytimes (defined as 0700-1900) out of every seven
- on average over a typical year, the high tonnage infrastructure test track has been assumed to be in active use for five evenings (defined as 1900-2300) out of every seven
- on average over a typical year, the high tonnage infrastructure test track has been assumed to be in active use for two night-times (defined as 2300-0700) out of every seven

10.6.12 The number of laps of the circuits these assumptions equate to is set out in Appendix C, along with other assumptions for the calculations.

10.6.13 Much of the infrastructure test track is in cutting and hence earthworks will provide some noise mitigation: this has been taken into account in the noise predictions.

10.6.14 On the southern side of the test track, the noise mitigation provided for the rolling stock test track will also provide noise shielding from

the infrastructure test track to nearby communities. This mitigation is described in detail in section 10.7.

Washery facility

10.6.15 The facility on the site of the old washery will include a maintenance shed, a train wash, a train decommissioning facility and railway sidings.

10.6.16 The washery facility will see only a small fraction of the number of movements and activities which would be found at a train depot servicing an operational train fleet, which would stable and maintain a large number of trains every night. Rather, the facility will see sporadic train movements around the site - primarily during the day, but occasionally at night - between the sidings, maintenance shed, train wash and the test tracks.

10.6.17 Noise sources would consist of trains moving at low speeds (around 5mph) around the facility, noise breakout from the maintenance shed and decommissioning facility and noise from the train wash. All of these noise sources have been included in the assessment.

10.6.18 The assumptions for the various noise sources in the washery are shown in figure 10.5.

10.6.19 Along with the descriptions of activities given below, information on the noise source levels assumed in the assessment are given in Appendix C in Table 3.

10.6.20 A summary of the envisaged washery activities is included below in table 10.3:

Table 10.3: Summary of washery activities assumed in the noise assessment

Activity	Daytime (0700-1900)	Evening (1900-2300)	Night-time (2300-0700)
Slow-moving trains	Yes: 20 sets of movements	Yes: 4 sets of movements	Yes: 1 sets of movements.
Maintenance shed	Yes, with doors assumed open	Yes, with doors shut	Yes, with doors shut
Train Wash	Yes, assumed on 10% of the time	No	No
Decommissioning facility	Yes, activity assumed for 10% of the time	No	No

Slow-moving trains

10.6.21 To assess possible noise effects from trains moving about the washery, a set of typical envisaged train movements has been defined in consultation with project railway engineers. These movements, all assumed to take place at a speed of 5mph, are as follows:

- A train moving from eastern sidings backing out to the western sidings then through the train wash to the headshunt and back;
- A train from the western sidings moving to the maintenance shed and back;
- A train moving from the eastern sidings to the test tracks and back

10.6.22 As a reasonable worst-case assumption, in the noise assessment 20 sets of the above movements have been assumed to occur during the daytime; 4 sets during the evening and 1 set during the night-time.

10.6.23 The above assumptions cover the reasonable worst-case for train movements both from those trains at the depot for testing and for trains which are at the facility for medium or long-term storage.

10.6.24 It is anticipated that the vast majority of train movements within the facility during the night-time will be electric-powered. However, occasionally a diesel-hauled train may deliver a train to the facility – or collect one - during the night. This would not, however, materially affect the predicted noise levels.

10.6.25 All train movements at night-time in the washery area would be powered with electric (non-diesel) traction – either by the trains themselves, or though the use of an electric shunter.

10.6.26 For the maintenance shed, maintenance activities have been assumed to be active continuously for the purposes of the assessment, creating an internal reverberant sound pressure level of 70dB(A) within the shed. The assessment assumes the shed doors would be open throughout the daytime as a reasonable worst-case assumption: however, they will be closed for much of this time in reality. When the shed doors are open during the day, an air curtain has been assumed to be active on the shed doors which has a noise level of 80dB(A) at 1m. During the night-time, maintenance has been assumed to continue with but with the shed doors closed and the air curtains off.

10.6.27 If decommissioning of trains is carried out on site then this would consist of the dismantling of trains to retain components which could then be re-used. The outdoor dismantling works would be carried out on the apron to the north of the maintenance sheds: this would consist of the use of hand-held power tools and the occasional use of a crane and would occur during daytime only. Some further dismantling works may occur inside the maintenance sheds themselves and would be no more noisy than routine maintenance works. No scrapping, crushing or shredding operations would take place on the site as form part of the decommissioning works.

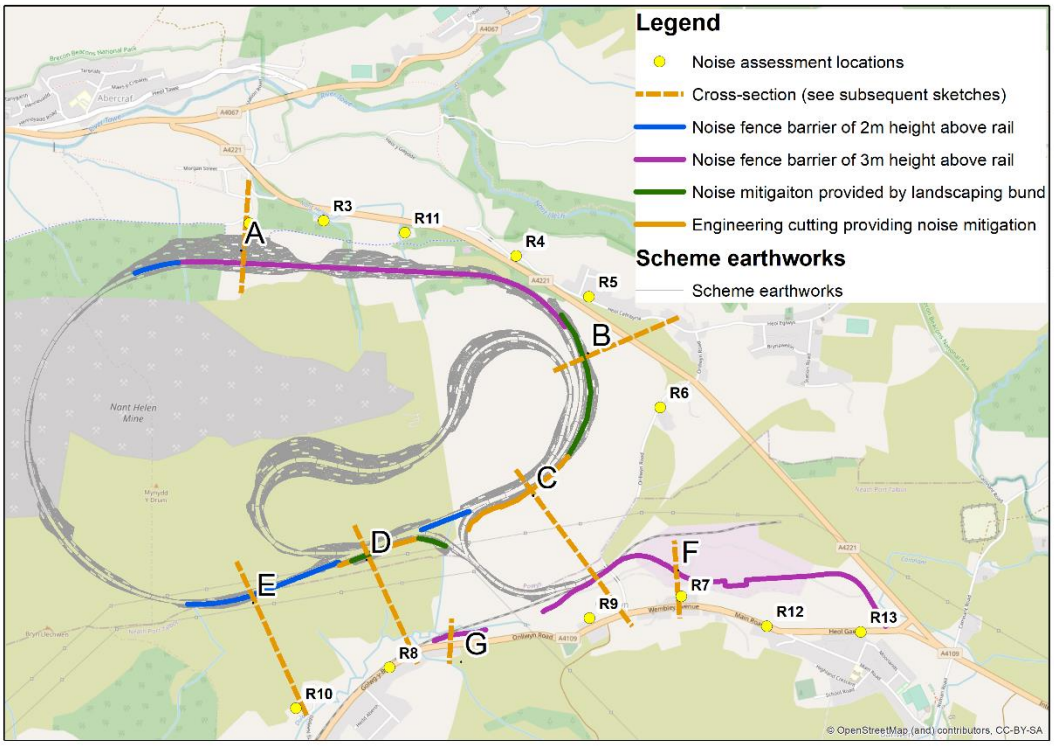
10.6.28 Outdoor decommissioning/train dismantling activities would not take place during evening or night-time.

10.6.29 In order to minimise noise breakout from the washery facilities, western sidings and headshunt to nearby communities, a noise barrier of 3m above rail height has been assumed to be located alongside their southern perimeter. This noise barrier may double as a security/perimeter fence.

10.6.30 Noise from the train wash has also been included in the predictions. It has been assumed that the wash will be in use for 10% of the time during the daytime but inactive during the evenings and night-times.

10.7 Mitigation provision and context

10.7.1 The scheme has been split into six areas (A-F) to communicate the rationale behind the mitigation design, as shown in the sketch below:



10.7.2 The context behind the mitigation for each area is set out in the following section.

Mitigation principles

10.7.3 The general approach to mitigation design is to minimise the environmental impacts of the scheme as far as reasonably practicable, and to do this from a multi-disciplinary point of view. This means that consideration of noise, visual, ecology and cultural heritage impacts have all been taken into account and a holistic set of mitigation proposals is presented as part of this application. The detail of the mitigation may alter at the detailed design stage, but the principle of 'not environmentally worse than' will be maintained to ensure that no new worse environmental effects result from this.

Area-specific mitigation context

10.7.4 Note that a figure showing all of the cross-sections included in this section is included as Figure 14.4.

Area A

10.7.5 This section of the scheme faces the national park to the north. The noise mitigation included in the scheme is a 3m noise fence barrier placed close to the rolling stock test track.

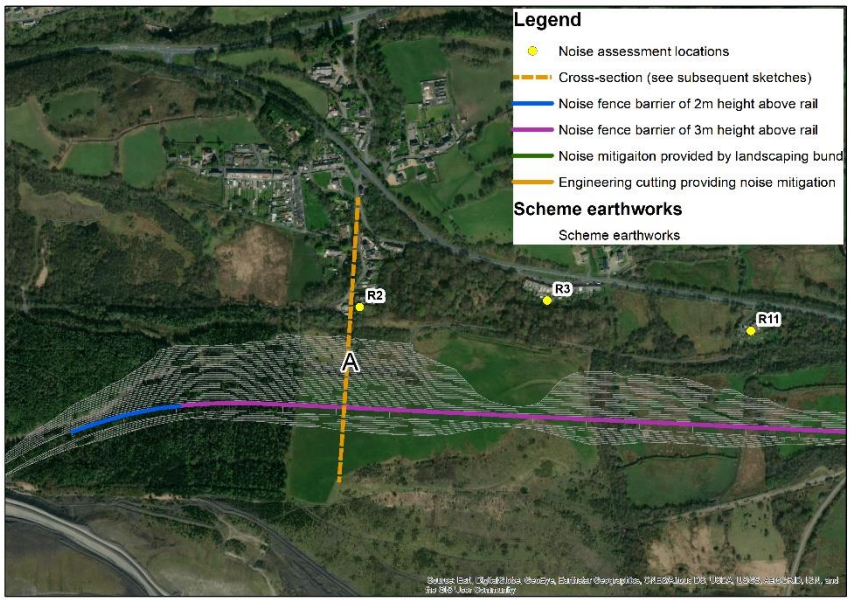
10.7.6 Landscape bunding has not been used in the location because this would have increased the land-take of the scheme to the north by

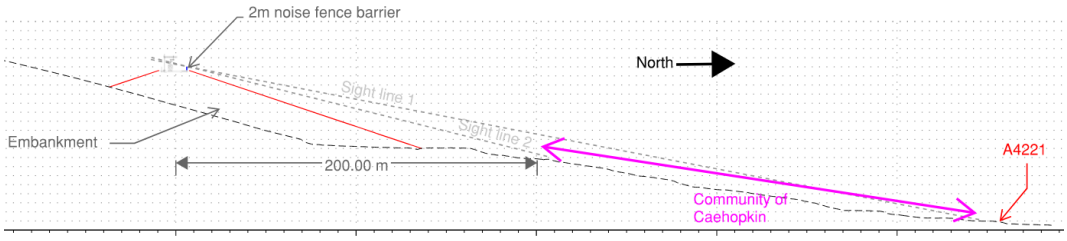
many tens of metres where the boundary is already close to residential properties.

10.7.7 The noise fence barriers will be opaque and solid, with a timber outer finish. They will provide visual mitigation by shielding some of the scheme infrastructure, including blocking the glare of the train headlights which would otherwise produce potential visual impacts during the hours of darkness.

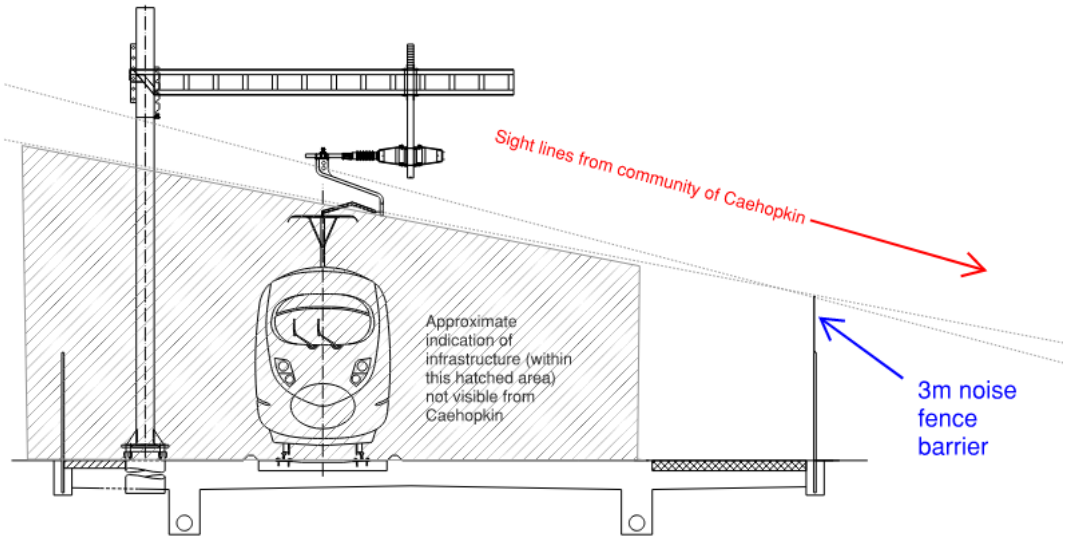
10.7.8 The embankment slopes will be planted with woodland, which will further decrease visual impacts of the scheme as the trees mature.

10.7.9 Two cross-section sketches are shown below of the mitigation at this location in the context of the nearest community. They show the worst-case visual sight-lines (that is, not taking account of the visual mitigation provided by planting).





Cross-section along the dashed orange line shown in the sketch above. To scale. Note that the dots represent a 5m grid



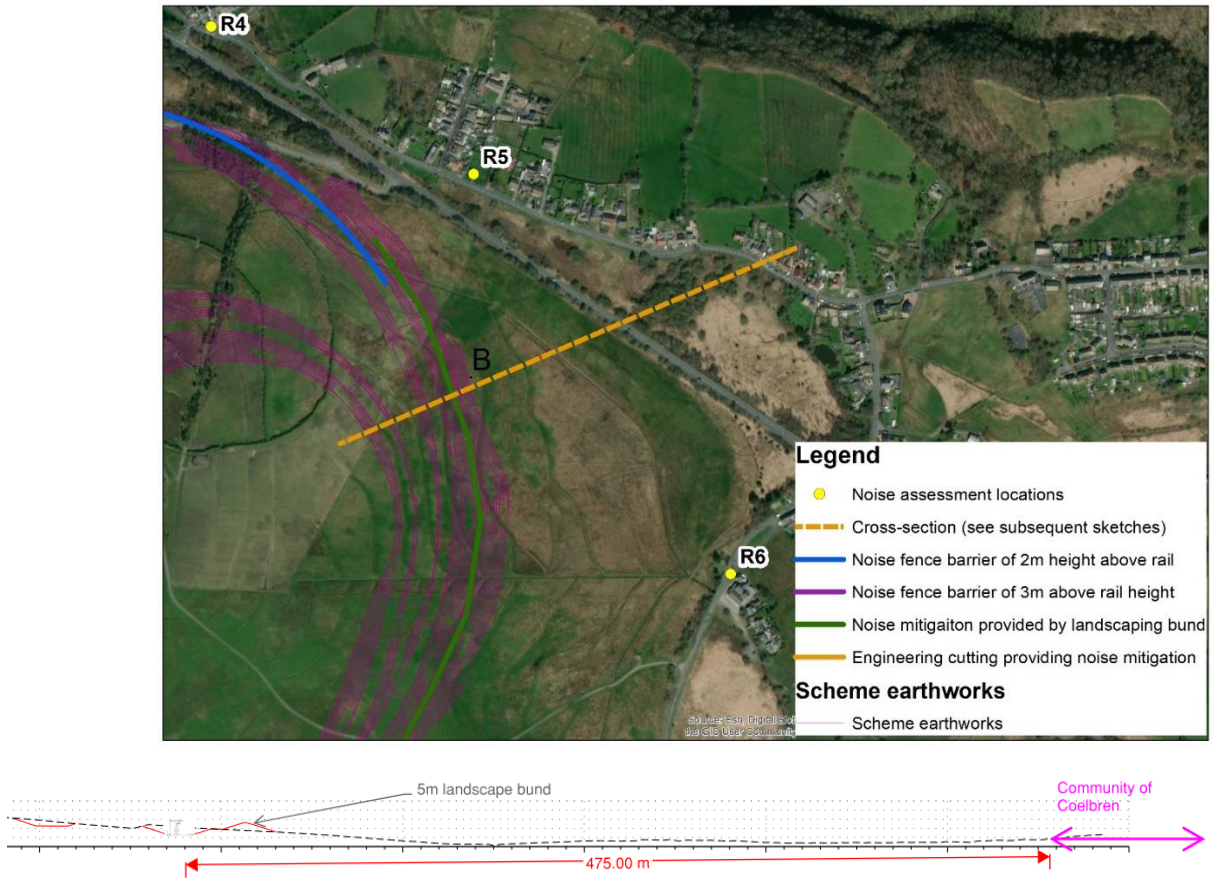
10.7.10 Initially a 2m noise barrier was included in the design to the north of the circuits. During the process of engagement with the local authorities, this was increased to 3m. This increase gives an improvement of 1-2dB(A) to the magnitude of noise mitigation (relative to a 2m noise barrier) for the receptors north of the circuit (receptors R2, R3, R4 and R11 in the noise assessment).

Area B

10.7.11 This section of the scheme faces the community of Coelbren to the east. The noise mitigation included in the scheme is a 5m landscape bund placed to the east of the rolling stock test track. A bund was chosen in this area due to the space available and the suitability of the landform to accommodate the bund.

10.7.12 The bund also provides visual mitigation by visually screening the test tracks.

10.7.13 A cross-section sketch is shown below of the mitigation at this location in the context of the nearest community.

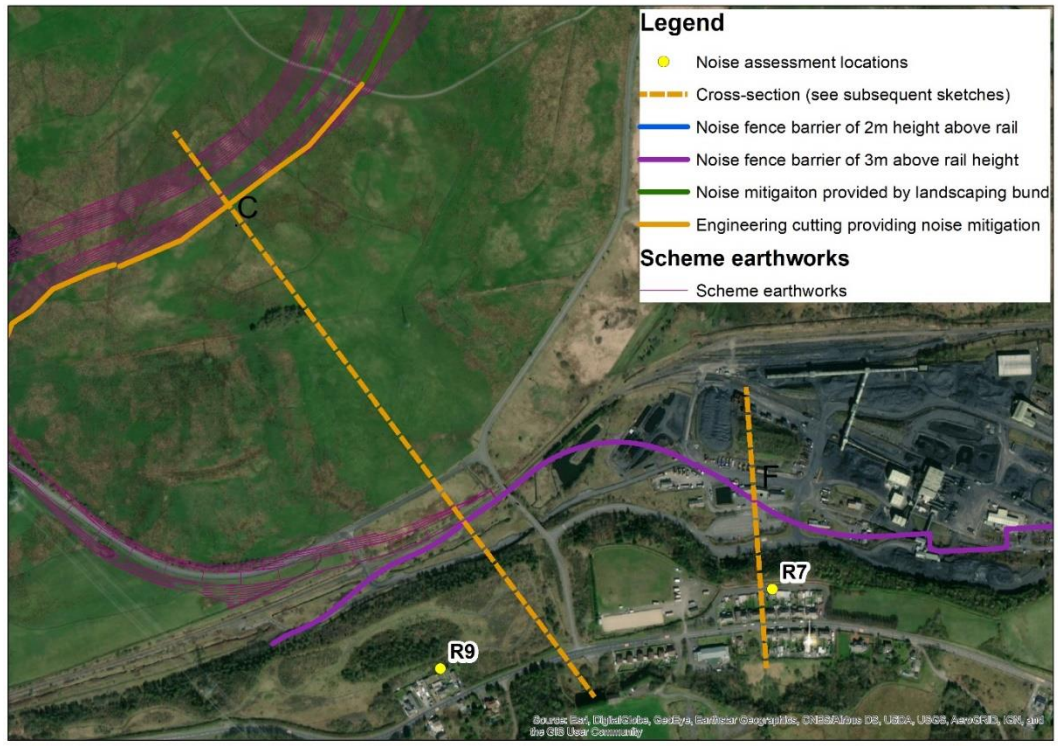


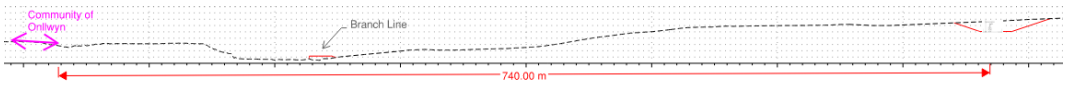
Cross-section along the dashed orange line shown in the sketch above. To scale. Note that the dots represent a 5m grid

Area C

10.7.14 This section of the scheme faces the community of Onllwyn to the south. The engineering cuttings in which the test tracks sit provide the noise mitigation by acting as a noise barrier.

10.7.15 A cross-section sketch is shown below of the mitigation at this location in the context of the nearest community. They show the worst-case visual sight-lines (that is, not taking account of the visual mitigation provided by planting).





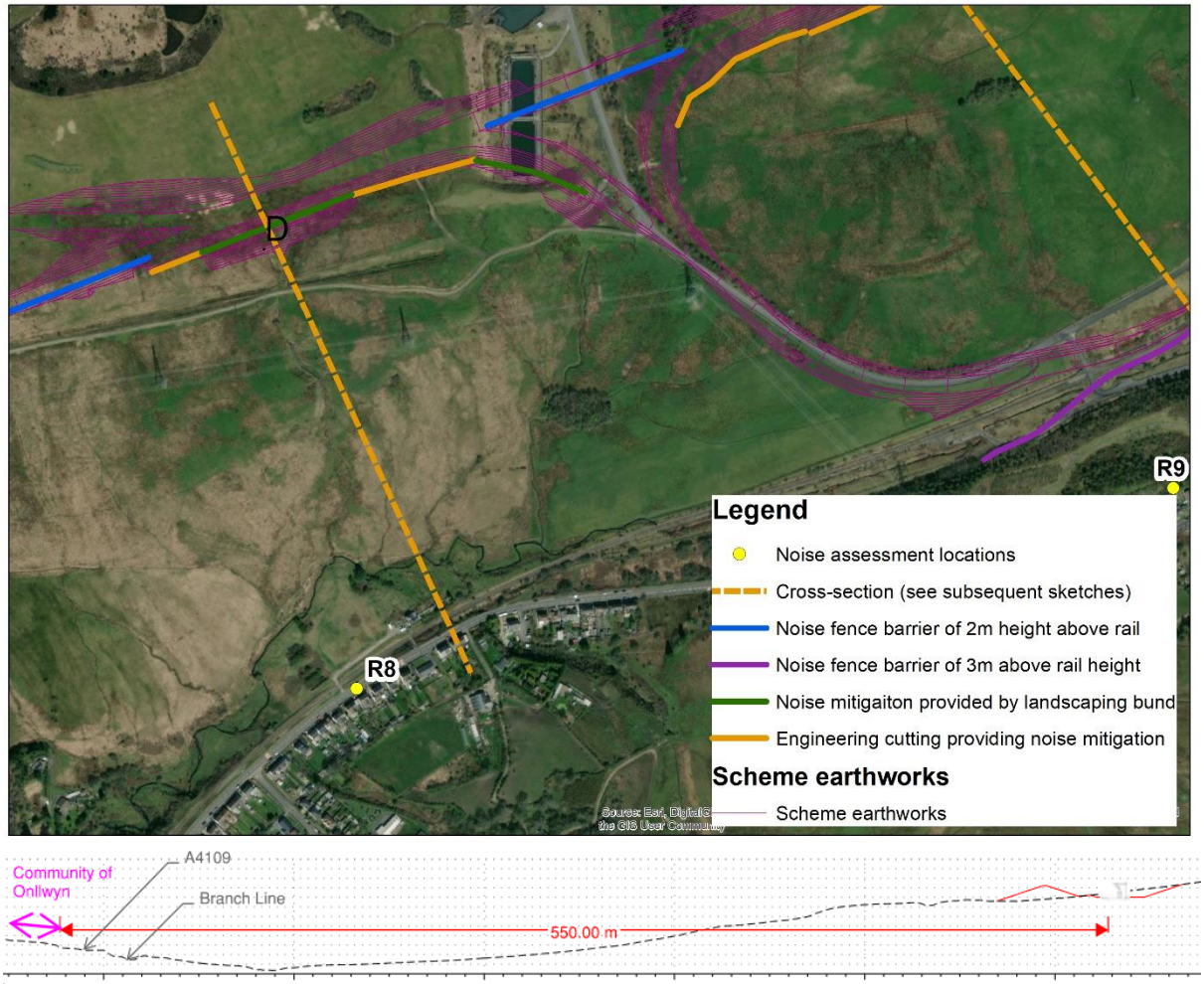
Cross-section along the dashed orange line (close to R9) shown in the sketch above. To scale. Note that the dots represent a 5m grid

Area D

10.7.16 This section of the scheme faces the community of Onllwyn to the south. The shallow engineering cuttings in which the test tracks sit have been enhanced with additional landscape bunds to provide noise mitigation by acting as a noise barrier.

10.7.17 Care has been taken in this area in the earthworks and bunding design so not to impinge near the Scheduled Ancient Monument.

10.7.18 A cross-section sketch is shown below of the mitigation at this location in the context of the nearest community. They show the worst-case visual sight-lines.

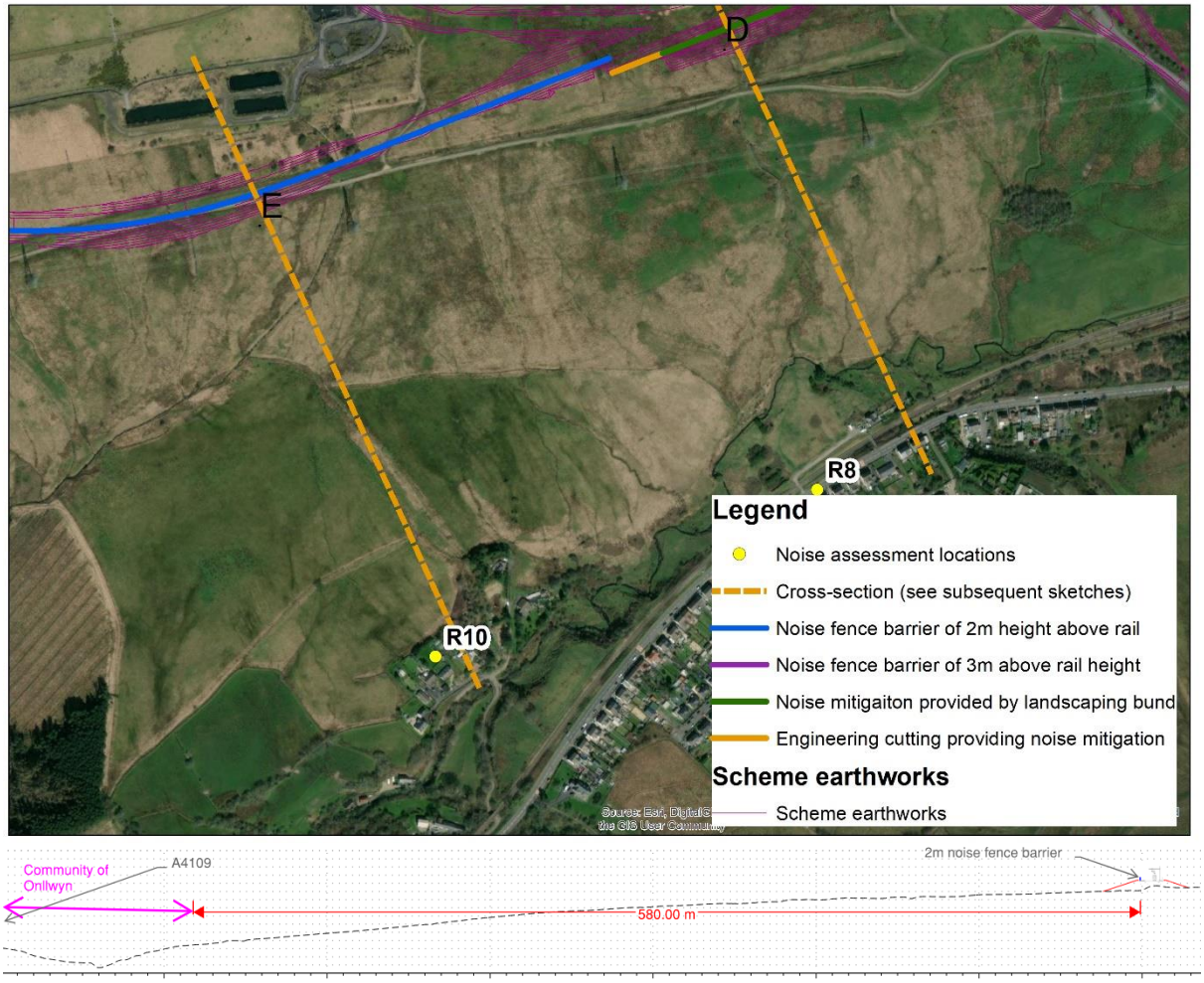


Cross-section along the dashed orange line shown in the sketch above. To scale. Note that the dots represent a 5m grid

Area E

10.7.19 This section of the scheme faces the community of Onllwyn to the south. Due to the close proximity to the Scheduled Ancient Monument, a noise fence barrier provides the noise mitigation instead of a landscape bund.

10.7.20 A cross-section sketch is shown below of the mitigation at this location in the context of the nearest community. They show the worst-case visual sight-lines.



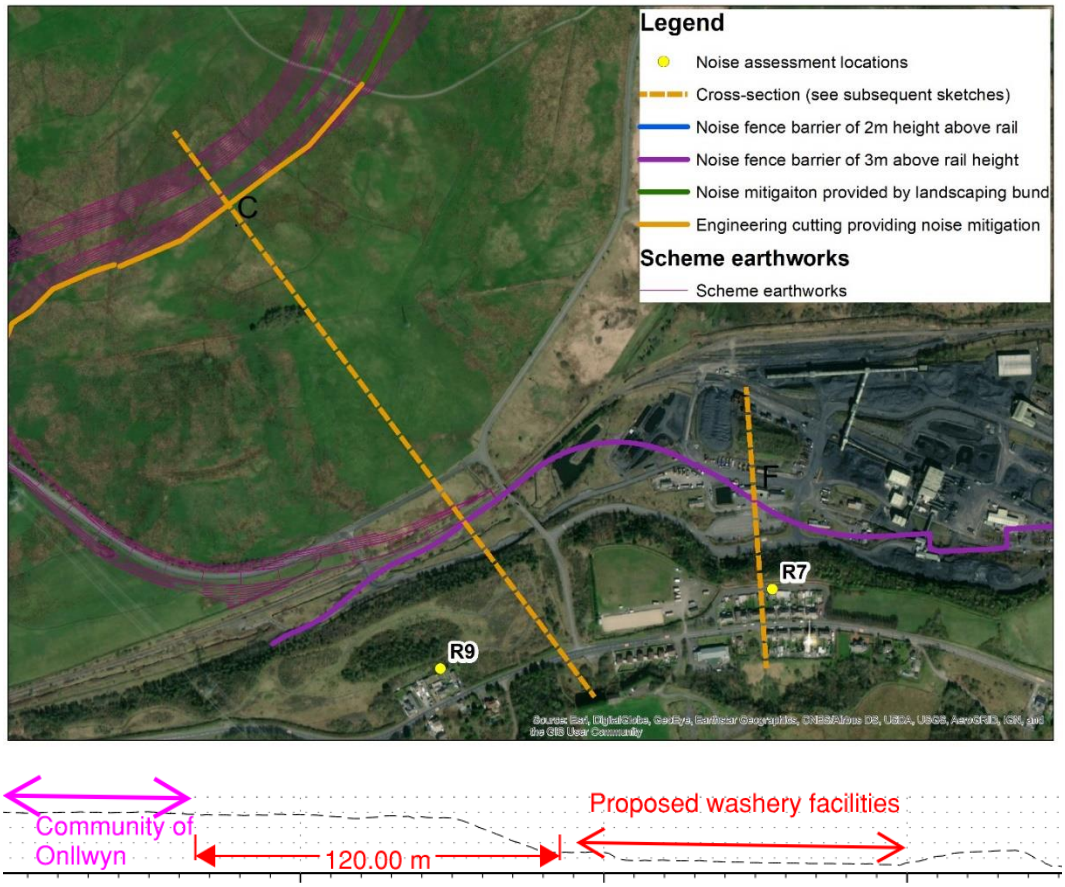
Cross-section along the dashed orange line shown in the sketch above. To scale. Note that the dots represent a 5m grid

Area F

10.7.21 This section of the scheme faces the community of Onllwyn to the south. The washery facilities will be screened from view of the nearby community by the natural landform and the existing planting.

10.7.22 A noise barrier will be provided alongside the facility to minimise noise to communities.

10.7.23 A cross-section sketch is shown below of the mitigation at this location in the context of the nearest community. They show the worst-case visual sight-lines (without planting).



Sketch showing cross-section F (near receptor R7). To scale. Note that the dots represent a 5m grid

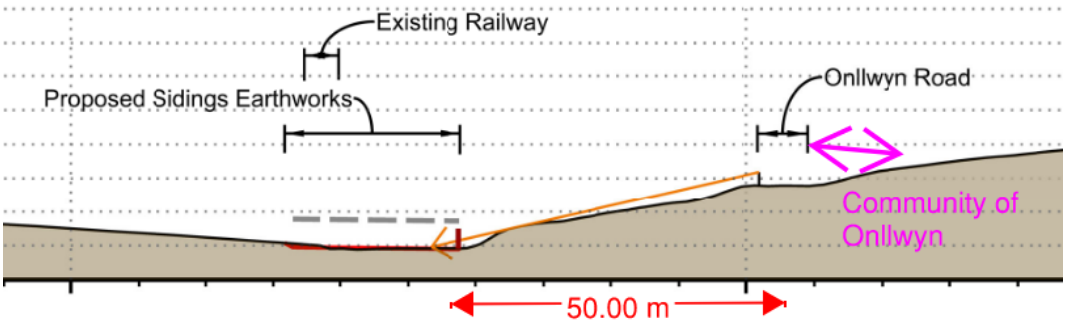
Area G

10.7.24 This section of the scheme features some railway sidings which would be used for medium or long-term storage of trains. faces the community of Onllwyn to the south. The washery facilities will be screened from view of the nearby community by the natural landform and the existing planting.

10.7.25 A noise barrier will be provided alongside the facility to minimise noise to communities.

10.7.26 A cross-section sketch of cross-section 'G' is shown below of the mitigation at this location in the context of the nearest community. They show the worst-case visual sight-lines (without planting).

10.7.27 Note that further detailed cross-sections of this area are included in Figure 9.17 in the landscape and visual impact assessment.



Cross-section along the dashed orange line 'G' shown in the sketch above. To scale. Note that the dots represent a 5m grid

10.8 Combined noise predictions and assessment

10.8.1 The predicted noise level from all three groups of sources (rolling stock test track, high tonnage infrastructure test track, washery & sidings) have been summed together and the results are presented in Table 10.5 and shown in Figures 10.1 to 10.3.

10.8.2 Existing (baseline) noise levels are shown in Table 10.4. A comparison of levels with and without noise fence barriers is provided intable 10.5, in which any exceedances of the criteria set out in Table 10.1 are highlighted in red.

Table 10.4: Existing noise levels at sensitive receptors

Receptor (See Fig 10.1)	Existing noise levels based on noise survey			
	Daytime $L_{Aeq,T}$ 0700-1900	Evening $L_{Aeq,T}$ 1900-2300	Night-time $L_{Aeq,T}$ 2300-0700	Maximum noise level, night-time 2300-0700 $L_{Amax,F}$
R1	46	41	38	55
R2	46	41	38	55
R3	46	41	38	55
R4	51	42	43	61
R5	51	42	43	61
R6	56	56	34	62
R7	49	51	44	67
R8	48	47	33	59
R9	49	51	44	67
R10	48	47	33	59
R11	46	41	38	55
R12	49	51	44	67
R13	49	51	44	67
R14	56	56	34	62

Table 10.5: Scheme noise levels with and without noise fence barriers

Receptor (See Fig 10.1)	Total overall predicted scheme noise level, $L_{Aeq,T}$ without noise fence barriers				Exceedances of criteria without noise fence barriers?	Mitigation area (see section 10.7)	Reduction in LAeq noise levels due to noise fence barriers	Total overall predicted scheme noise level, $L_{Aeq,T}$ with noise fence barriers				Exceedances of criteria with noise fence barriers?
	Daytime $L_{Aeq,T}$ 0700-1900	Evening $L_{Aeq,T}$ 1900-2300	Night-time $L_{Aeq,T}$ 2300-0700	$L_{Amax,F}$				Daytime $L_{Aeq,T}$ 0700-1900	Evening $L_{Aeq,T}$ 1900-2300	Night-time $L_{Aeq,T}$ 2300-0700	$L_{Amax,F}$	
R1	29	29	26	56	No	to the west	0	29	29	26	56	No
R2	48	48	45	68	Yes	A	-7	41	41	37	58	No
R3	47	47	44	68	Yes	A	-7	40	40	37	58	No
R4	49	49	46	69	Yes	A	-8	41	41	38	59	No
R5	43	43	39	67	Yes	B	-1	42	42	39	57	No
R6	39	37	34	57	No	B	0	39	38	35	54	No
R7	48	35	31	49	No	F	-3	45	33	29	49	No
R8	42	42	38	53	No	D	-5	37	37	33	53	No
R9	42	38	34	50	No	C	-2	40	36	31	50	No
R10	43	43	40	58	No	E	-7	36	36	33	53	No
R11	50	50	46	69	Yes	A	-9	41	41	38	59	No
R12	37	22	21	48	No	F	-2	35	22	18	48	No
R13	34	27	23	47	No	F	-1	33	27	23	47	No
R14	43	37	32	57	No	C	-1	42	35	31	57	No

10.9 BS4142 assessment results

10.9.1 An assessment of night-time noise at the washery has been carried out under British Standard 4142[3]. A breakdown of noise from the different noise sources at the washery is presented below in Table 10.6:

Table 10.6: BS4142 assessment of the washery

Receptor	Scheme noise levels: $L_{Aeq,1900\text{-}2300}$ (Evening (Eve)); $L_{Aeq,2300\text{-}0700}$ (Night)								Baseline levels (LA90,10mins)		Rating level (total scheme noise level + 3dB(A))*		BS4142 Assessment (Rating level over background)	
	Slow-moving trains		Train wash		Maintenance shed		Total Washery noise							
	Eve	Night	Eve	Night	Eve	Night	Eve	Night	Evening	Night	Evening	Night	Evening	Night
R6	20	14	Inactive	Inactive	-11	-11	20	14	28	24	23	17	-5	-7
R7	28	22			1	1	28	22	26	26	31	25	5	-1
R8	19	13			-18	-18	19	14	32	29	22	17	-10	-12
R9	30	24			-9	-9	30	24	26	26	33	27	7	1
R12	15	9			-5	-5	15	10	26	26	18	13	-8	-13
R13	19	13			0	0	19	14	26	26	22	17	-4	-9
R14	29	23			0	0	29	23	28	24	32	26	4	2

*A correction of +3 is applied based on the advice set out in section 9.2 of BS4142: "*Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied*"

[3] BS4142 2014: *Methods for rating and assessing industrial and commercial sound*

10.10 Results & Conclusions

10.10.1 For the daytime and evening periods, the envisaged noise mitigation in the form of noise barriers and/or bunds keeps the overall ($L_{Aeq,T}$) noise levels from the facilities below 50dB(A) at all communities.

10.10.2 During daytimes and evenings, noise levels inside dwellings - assuming a typical 15dB(A) reduction provided by an open window - will therefore be kept below the 35dB(A) criterion set out in Table 10.1.

10.10.3 Keeping external noise levels below this level of 50dB(A) also meets the guidance from the World Health Organization (WHO) on noise levels for outdoor spaces[4].

10.10.4 For the night-time period, the noise mitigation keeps overall noise levels from the facilities below the level of 45dB$L_{Aeq,T}$ at all communities and hence noise levels inside bedrooms to below the 30dB(A)$L_{Aeq,T}$ criterion set out in Table 10.1.

10.10.5 The assessment has also considered maximum noise levels from the trains which would be tested on the rolling stock test track. At all residential receptors, the maximum noise levels ($L_{Amax,F}$) generated by the trains using the rolling stock test track will be below the criteria set out in Table 10.1.

Scheme in context with existing road traffic

10.10.6 When the rolling stock test track is in use five days out of seven, trains on test will complete an average of ~200 laps of the circuit over the daytime and evening combined. For comparison, the A4221 – an A road with national speed limits and no noise barriers, which is much closer to most of the communities to the north of the circuit than the test track will be - has a daily flow of ~3800 road vehicles.

BS4142 assessment results

10.10.7 The BS4142 assessment results have been presented for evening and night-time periods. During these periods, the background noise levels – that is, between passbys of cars on the local roads – are relatively low.

10.10.8 The 4142 assessment include all sources of noise from the washery. At night-time, the loudest source of noise from the washery will be the occasional slow-moving trains moving around the washery at 5mph.

[4] Guidelines for community noise, World Health Organization, Birgitta Berglund et al https://www.who.int/docstore/peh/noise/Comnoise-1.pdf

The only other source of noise at night-time - the maintenance building – will be much quieter.

10.10.9 BS4142 sets out that a rating level over background difference of +5 is likely to be an indication of adverse impact and +10 an indication of significant adverse impact.

10.10.10 On this basis, adverse impacts would be indicated during the evening at receptors R7 and R9 (due to differences of +5 and +7 being predicted respectively).

10.10.11 During the night-time, no adverse effects are identified.

10.10.12 Overall, no significant effects have been identified from the BS4142 assessment.

Fixed plant on site buildings

10.10.13 Information is not currently available about any fixed plant which may be installed on buildings onsite, such as the maintenance shed and/or the control building/offices.

10.10.14 When such information becomes available (during detailed design), the BS4142 assessment will be updated to include this additional fixed plant and design measures (such as the placement of equipment and attenuators) included as necessary to ensure no likely significant effects occur.

Summary of likely significant effects

10.10.15 No likely significant effects from noise are predicted during the construction or operation of the scheme.

10.11 Construction noise assessment

10.11.1 An assessment of construction noise impacts has been carried out and is reported in Appendix 10C.

10.11.2 In summary, no likely significant effects due to construction noise are expected at any receptors during the construction period.

10.11.3 However, some temporary noise impacts may be experienced at houses in Onllwyn to the north of the A4109 Wembley Avenue, closest to the existing washery facility, represented by receptor R7 (see Figure 10.1), whilst the existing buildings on the washery site are being demolished.

10.11.4 Construction noise is more difficult to predict accurately than operational noise: this is because construction methods and equipment can differ in reality from those assumed in the assessment, depending on site conditions.

10.11.5 For this reason, a good practice and the primary mechanism for minimising construction noise and vibration is the Construction Environmental Management Plan (CEMP), which contains measures known as Best Practicable Means which will be used during the construction phase to minimise noise. These include standard working hours and specific measures to reduce noise from construction plant. The outline CEMP is included as part of this application (Appendix 3A).

10.12 Vibration

10.12.1 Vibration decays away much more rapidly through the ground with increasing distance than does noise through the air: vibration impacts are therefore only likely within tens of metres of construction or operational activities. The closest dwelling to the facility is over 100 metres away.

10.12.2 No likely significant vibration effects are predicted due to either construction or operation of the facility.

10.13 Traffic associated with the scheme

Road traffic

10.13.1 The potential additional traffic associated with the scheme has been quantified as part of this application. Traffic flow data were analysed to establish whether this additional traffic would result in any material increases in noise levels during either the construction period, or during the day-to-day operation of the facility.

10.13.2 Traffic flows are likely to increase by approximately 15% on the A4017 west of Ollwyn during both construction and operation of the facility: however, this translates to less than a 3dB increase in noise levels along the road and hence would not cause any likely significant effects for communities alongside the road.

10.13.3 The details of the analysis of road traffic is contained in Appendix 10C.

Rail traffic

10.13.4 The additional possible rail traffic along the branch line serving the facility - between Onllwyn and the main lines running along the coast - is limited by the fact that it is single track and can only accommodate one train on it at a time.

10.13.5 Trains are likely to be used during the construction period to deliver materials such as rail ballast and long lengths of rail for the construction of the facility.

10.13.6 During the operation of the facility, trains arriving at the facility for test may arrive along the branch line, hauled by a diesel locomotive.

10.13.7 Overall, the low frequency of expected rail movements along the branch line means no likely significant effects are expected during the construction or operational phases.

Noise from fixed plant

10.13.8 At this early stage of design it is not known exactly what fixed plant (such as cooling, ventilation or electrical equipment) may be installed across the facility. A detailed assessment has therefore not been carried out at this stage.

10.13.9 Assessments of noise from fixed plant and design of any required mitigation will be carried out at detailed design stage in line with British Standard 4142.