

1 TUNNELLING CONSTRUCTION WORKS – ADDITIONAL NOISE ATTENUATION MEASURES

1.1 NOISE ASSESSMENT OF TUNNELLING WORKS

Introduction.

Additional recent study has determined that it is possible to further reduce, in particular night-time, noise levels by implementing extensive noise mitigation measures at the Aghoos compound. The measures consist of complete enclosure of the key equipment with acoustic cladding. The equipment involved is the separation plant and the generators, that both are required to operate on a 24-hours basis. Other measures included are the day-time use only of bentonite centrifuges.

Implementation of the above mitigation measures significantly reduce generated night-time noise levels, at the expense of a somewhat reduced tunnelling efficiency and additional construction cost. This note describes provides the noise assessment of the construction phase of the proposed development including the further attenuation measures.

1.1.1 Noise Assessment – EIS

The noise impact assessment presented in the EIS prepared in May 2010 identified potential noise impacts associated with the proposed tunnelling construction works associated with the construction of the proposed Corrib onshore pipeline. The noise predicted noise levels associated with the plant and machinery required to undertake the proposed tunnelling works assessed in the EIS is presented in Table 9.8 and Table 9.9 of the EIS. The predicted levels were also incorporated into the calculation of the total cumulative noise levels presented in Table 9.10 of the EIS.

1.1.2 Noise Assessment – EIS Addendum

As outlined in the EIS Addendum document submitted to the Oral Hearing, the noise levels at the sensitive receptors in the area were subsequently assessed for the proposed tunnelling works, taking into consideration reduced noise emissions from the tunnelling plant and machinery.

Subsequent to the preparation of the EIS in May 2010, the tunnelling works design team carried out a review of the noise emissions data associated with the plant and machinery that will be utilised during the construction phase. This review identified scope for additional noise abatement both in the form of specification of alternative equipment with lower noise output and the design of additional noise abatement measures that will reduce the level of noise generated at source in the tunnelling compound at Aghoos. The noise prediction models were revised to take into consideration the revised noise specification for the tunnelling works. The results of the revised prediction models were included in the Addendum document submitted to the hearing, presented in Table 9.8 and Table 9.9 of the EIS Addendum document, and were also incorporated into the calculation of the total cumulative noise levels presented in Table 9.10 of the EIS Addendum. It was found that the total cumulative levels outlined in the EIS had not changed in comparison with the total cumulative noise levels presented in the Addendum document, as a result of the changes to the noise sources within the compounds, due to the influence of construction traffic on the overall cumulative noise levels.

It was also outlined in the EIS Addendum that, in addition to the modifications to the noise sources associated with the tunnelling works at the Aghoos compound, the original proposals associated with the Glengad compound were also modified in order to reduce the potential noise impact associated with site preparation works at the tunnel reception compound and at the LVI compound. The noise assessment presented in the EIS prepared in May 2010 considered the noise impact associated with a diesel powered water pump in use during the night-time at Glengad during the temporary construction works. As outlined in the Addendum document, the site design team revised the assessment regarding the requirement to pump water during the night-time (22:00 – 08:00) and it was outlined in the Addendum that it is now proposed that water will not be pumped from the tunnel

reception pit or the LVI site at Glengad during the night-time during the construction works at either of these sites. This was also incorporated into the revised noise prediction models, the results of which were presented in the Addendum document.

1.1.3 Noise Assessment – Further Noise Reduction to Tunnelling Works

A further programme of noise abatement has now been considered as part of the continuation of the noise attenuation that was being considered by the design team, as was outlined in the statement of evidence presented by Mr. Eamon Kelly. This continuing noise attenuation design consideration has been evolving since the Addendum document was submitted to the Oral Hearing, in conjunction with detailed design considerations in consultation with potential tunnelling contractors, with the capability to undertake the tunnelling construction works for the proposed onshore pipeline. This continuing noise abatement design process has identified further noise abatement measures that could feasibly be implemented with the proposed equipment required to undertake the tunnelling works. The additional noise abatement measures include the construction two separate noise attenuated structures to enclose the power packs and the separation plant respectively at the tunnelling compound at Aghoos. The noise attenuation structures will essentially comprise of large acoustic sheds that will be fitted with noise attenuation panels. These will be installed at the site, in addition to the attenuation that has already been specified for the plant and machinery required for the tunnelling works, as outlined in both the EIS and the subsequent EIS Addendum document.

Similar to the EIS Addendum assessment, the results of the "further reduced noise assessment" represent a conservative assessment of the potential likely construction noise that may be generated at the site. It should also be noted that the "further reduced revised noise assessment" has considered the potential noise impacts associated with the site preparation/enabling works being undertaken at Glengad at the same time as tunnelling work are being undertaken at Aghoos. This scenario is representative of the likely noise impacts associated with a temporary stage of the overall construction programme only. The construction works at Glengad reception compound will extend for a period of approximately 3 months (months 16 – 18, refer to Figure 5.2, Chapter 5 of the EIS), and the LVI compound for a period of approximately 3 months (months 2 – 4, refer to Figure 5.2, Chapter 5 of the EIS), whereas the tunnelling works will extend for a period of approximately 15 months (months 5 – 19, refer to Figure 5.2, Chapter 5 of the EIS).

The assessment presented in the EIS prepared in May 2010 considered a scenario whereby, noise emissions associated with plant servicing the tunnelling compound at na hEachú (Aghoos) would be operational on a continuous basis for the duration of 12 – 14 months, although not all noise sources at na hEachú (Aghoos) would typically operate simultaneously. These noise sources had been input into the model as being operational for 100% of the time on a 24-hour basis. Those noise sources had been modelled in tandem with the site preparation noise sources at the reception pit at Gleann an Ghad (Glengad) in order to predict the potential worst-case noise emissions during the construction phase. As outlined above, the noise predictions have been revised to take account of the modifications both in terms of specification of alternative equipment with lower noise output, the design of additional noise abatement measures to reduce the level of noise generated at source, and the elimination of a number of sources that were previously proposed to operate during the night. In addition to these mitigation measures, this "further reduced" assessment considers the implementation of additional noise abatement measures in the form of construction two separate noise attenuated structures to enclose the power packs and the separation plant respectively at the tunnelling compound at Aghoos.

The noise sources at the reception pit in gleann an Ghad (Glengad) will be present for less than 12 months and will not generate noise on a continuous basis, when present. Night-time works are not anticipated at Gleann an Ghad (Glengad).

The effect of the "further layer" of noise attenuation has the effect of reducing the noise emissions from the tunnelling compound to minimise noise levels from the site to a levels that would be even lower than the predicted levels presented in the EIS Addendum document. The predicted noise levels associated with these further noise reduction measures are presented in Table 1.1 and Table 1.2 below. The revised predicted noise levels have also been taking into account with regard to the calculation of the total cumulative noise levels, which are presented in Table 1.3 below.

The results were compared to existing baseline noise levels in the vicinity of each receptor (both existing ambient noise levels (L_{Aeq}) and existing background noise levels (L_{A90})). The cumulative noise levels are shown for a combination of the predicted levels with both existing ambient noise levels and existing background noise levels. The predicted noise levels were also compared with assessment criteria adopted by the NRA and the Bellanaboy Bridge Terminal EIS.

The following is an explanation of the information provided in Table 1.1:

- Column 2: Is the measured baseline ambient level, i.e. the measured level during the monitoring period (L_{Aeq}) and represents the continuous steady noise level or the average noise level during the survey;
- Column 3: Is the measured baseline background level, i.e. the measured noise level that is equalled or exceeded for 90% of the monitoring period (L_{A90});
- Column 4: Is the predicted construction noise level (L_{Aeq});
- Column 5: Is the difference between the baseline ambient level (L_{Aeq}) in Column 2 and the predicted construction noise level (L_{Aeq}) in Column 4 and is used to determine the impact rating in Column 7;
- Column 6: Is the cumulative noise level arising from the combination of the baseline ambient level (L_{Aeq}) in Column 2 and the predicted construction level (L_{Aeq}) in Column 4;
- Column 7: Is the impact rating based on the information in Column 5 and compared with Table 9.2;
- Column 8: Is the difference between the baseline background level (L_{A90}) in Column 3 and the predicted construction noise level (L_{Aeq}) in Column 4 and is used to determine the impact rating in Column 10;
- Column 9: Is the cumulative noise level arising from the combination of the baseline background level (L_{A90}) in Column 3 and the predicted construction level (L_{Aeq}) in Column 4;
- Column 10: Is the impact rating based on the information in Column 8 and compared with Table 9.2; and
- Column 11: Is the comparison of the cumulative noise level in Column 9 with the NRA Guideline value of 65 dB(A).

Interpretation of Table 1.2 is similar to the above.

Table 9.8: "Further Reduced" Revised Predicted Construction works Daytime Noise Levels at Noise Sensitive Locations during Construction Phase

Noise Sensitive Receptor	Measured Baseline Ambient Level dB L _{Aeq}	Measured Baseline Background Level dB L _{A90}	Predicted ^{Note1} Construction Noise level dB L _{Aeq}	Difference between Baseline L _{Aeq} & Predicted Level dB L _{Aeq}	Cumulative ^{Note2} Noise level dB L _{Aeq} & L _{A90}	Impact Rating (L _{Aeq})	Difference between Baseline L _{A90} & Predicted Level dB L _{Aeq}	Cumulative ^{Note2} Noise level dB L _{Aeq} & L _{A90}	Impact Rating (L _{A90})	Compliance with NRA Assessment Criteria (65dB(A))
N1	44.1	38.3	48.2	4.1	49.6	Minor	9.9	48.6	Moderate	✓
N2	48.8	30.9	50.9	2.1	53.0	Not Significant	20.0	50.9	Severe	✓
N3a	46.5 ^(N3b)	38.6 ^(N3b)	45.6	-0.9	49.1	No change	7.0	46.4	Moderate	✓
N3b	46.5	38.6	50.8	4.3	52.2	Minor	12.2	51.1	Major	✓
N4	46.5 ^(N6)	34.9 ^(N6)	43.0	-3.5	48.1	No change	8.1	43.6	Moderate	✓
N5	43.0	27.8	34.5	-8.5	43.6	No change	6.7	35.3	Moderate	✓
N6	46.5	34.9	36.8	-9.7	46.9	No change	1.9	39.0	Not significant	✓
N7	38.0	30.6	35.9	-2.1	40.1	No change	5.3	37.0	Minor	✓
N8	43.2	37.8	34.4	-8.8	43.7	No change	-3.4	39.4	No change	✓
N9	49.2	40.4	33.4	-15.8	49.3	No change	-7.0	41.2	No change	✓
N10	41.9	31.3	32.9	-9.0	42.4	No change	1.6	35.2	Not significant	✓
N11	51.9	40.0	29.9	-22.0	51.9	No change	-10.1	40.4	No change	✓
N12	48.8	31.1	31.8	-17.0	48.9	No change	0.7	34.5	Not significant	✓
N13	44.6	28.5	31.0	-13.6	44.8	No change	2.5	32.9	Minor	✓
N14	43.9	37.4	31.9	-12.0	44.2	No change	-5.5	38.5	No change	✓
N15	40.3	33.1	30.6	-9.7	40.7	No change	-2.5	35.0	No change	✓
N16	42.8	31.9	30.3	-12.5	43.0	No change	-1.6	34.2	No change	✓
N17	58.7	32.6	30.0	-28.7	58.7	No change	-2.6	34.5	No change	✓
N18	41.5	33.4	33.5	-8.0	42.1	Not Significant	0.1	36.5	No change	✓
N19	48.6	35.9	36.5	-12.1	48.9	No change	0.6	39.2	Not significant	✓
N20	46.5	28.7	44.1	-2.4	48.5	N/A ^{Note3}	15.4	44.2	N/A ^{Note3}	N/A ^{Note3}

Note 1: Noise level at sensitive receptor as a result of construction plant only.

Note 2: Addition of Measured Baseline Level and Predicted Construction noise. dBs are logarithmic values, therefore cannot be added together arithmetically as is done for linear values.

Note 3: N20 is a vacant property, owned by SEPIL and is not a noise sensitive receptor as such. Therefore, impacts at this property have not been assessed.

Table 9.8: "Further Reduced" Revised Predicted Construction works Daytime Noise Levels at Noise Sensitive Locations during Construction Phase (continued)

Noise Sensitive Receptor	Measured Baseline Ambient Level dB L _{Aeq}	Measured Baseline Background Level dB L _{A90}	Predicted ^{Note 1} Construction Noise level dB L _{Aeq}	Difference between Baseline L _{A90} & Predicted Level dB L _{Aeq}	Cumulative ^{Note 2} Noise level dB L _{Aeq} & L _{A90}	Impact Rating (L _{A90})	Difference between Baseline L _{A90} & Predicted Level dB L _{A90}	Cumulative ^{Note 2} Noise level dB L _{Aeq} & L _{A90}	Impact Rating (L _{A90})	Compliance with NRA Assessment Criteria (65dB(A))
N21	49.9	33.1	17.6	-32.3	49.9	No change	-15.5	33.2	No change	✓
N22	62.8	37.9	12.5	-50.3	62.8	No change	-25.4	37.9	No change	✓
N23	57.1	28.6	15.0	-42.1	57.1	No change	-13.6	28.8	No change	✓
N24	47.9	35.9	18.9	-29.0	47.9	No change	-17.0	36.0	No change	✓
N25	57.9	38.8	22.0	-35.9	57.9	No change	-16.8	38.9	No change	✓
N26	63.5	38.0	20.5	-43.0	63.5	No change	-17.5	38.1	No change	✓

Note 1: Noise level at sensitive receptor as a result of construction plant only.

Note 2: Addition of Measured Baseline Level and Predicted Construction noise. dBs are logarithmic values, therefore cannot be added together arithmetically as is done for linear values.

The results indicate that the predicted daytime construction noise level associated with site works will not exceed the NRA assessment criteria for construction works or the 65dB(A) limit as applied to the terminal construction works, but as expected will rise significantly above (>3dB(A)) existing baseline levels at a number of properties in the area. There will be a minor negative temporary to short-term impact at N1 and N3b. It should be noted that N1 represents a monitoring point near the proposed LVI compound at Gleann an Ghad (Glengad) and there is no property located at this point. N3b represents a monitoring point located to the south of Glengad in close proximity to the L1202 and a residential property located off the L1202. It is predicted that there will be a minor significant negative temporary to short-term impact at the sensitive receptor located in close proximity to N3b based on the existing ambient (L_{Aeq}) noise levels.

As shown in Column 10, the results indicate that the predicted noise levels will have a minor significant negative short-term impact at two locations (N7 and N13), a moderate significant negative temporary to short-term impact at four locations (N1, N3a, N4 and N5) based on the existing background (L_{A90}) noise levels in the area. It is predicted that there will be a major significant negative temporary to short-term impact at one property (N3b). The results indicate that there will be a profound significant negative temporary impact at one property (N2) based on the existing background (L_{A90}) noise levels in the area. It should be noted that the revised assessment has considered the potential noise impacts associated with the site preparation/enabling works being undertaken at Glengad at the same time as tunnelling work are being undertaken at Aghoos. This scenario is representative of the likely noise impacts associated with a temporary stage of the overall construction programme only.

As shown in Column 6, the predicted cumulative noise levels are expected to range between L_{eq} 40.1dB(A) and 63.5dB(A), although it should be noted that whereas the cumulative level of 40.1dB(A) at the sensitive receptor N7 is attributable to the predicted construction noise level, the cumulative level at the sensitive receptor N22 of 62.8(A) is based on the existing ambient noise level. It must also be borne in mind that these elevated noise levels are temporary to short-term impacts during the construction phase. The predicted daytime construction noise levels would not be considered excessive for construction works. However, considering the existing low baseline noise level the perceived impact will be significant (>3dBs) at up to six properties (although one of these properties is not a sensitive receptor as such) with a profound significant negative (>15dB(A)) impact at one property. The tolerance for elevated noise levels during construction is generally increased if it is known that the works are to be completed within a short-term time frame.

Table 9.9: "Further Reduced" Revised Predicted Construction works Night-time Noise Levels at Noise Sensitive Locations during Construction Phase

Noise Sensitive Receptor	Measured Baseline Ambient Level (Night-time) dB L _{Aeq}	Measured Baseline Background Level (Night-time) dB L _{A90}	Predicted Construction Noise level (Night-time) dB L _{Aeq}	Difference between Baseline L _{Aeq} & Predicted Level (Night-time) dB L _{Aeq}	Cumulative Noise level (Night-time) dB L _{Aeq} & L _{A90}	Impact Rating (L _{Aeq})	Difference between Baseline L _{A90} & Predicted Level (Night-time) dB L _{A90}	Cumulative Noise level (Night-time) dB L _{Aeq} & L _{A90}	Impact Rating (L _{A90})	Compliance with EPA & WHO Assessment Criteria (45dB(A))
N1	39.5 ^(N2)	25.0 ^(N2)	0.4	-39.1	39.5	No change	-24.6	25.0	No change	✓
N2	39.5	25.0	0.8	-38.7	39.5	No change	-24.2	25.0	No change	✓
N3a	39.5 ^(N2)	25.0 ^(N2)	7.6	-31.9	39.5	No change	-17.4	25.1	No change	✓
N3b	39.5 ^(N2)	25.0 ^(N2)	1.4	-38.1	39.5	No change	-23.6	25.0	No change	✓
N4	47.3 ^(N7)	42.1 ^(N7)	8.3	-39.0	47.3	No change	-33.8	42.1	No change	✓
N5	34.6 ^(N13)	26.6 ^(N13)	9.5	-25.1	34.6	No change	-17.1	26.7	No change	✓
N6	47.3 ^(N7 - 16/03/10)	42.1 ^(N7 - 16/03/10)	9.3	-38.0	47.3	No change	-32.8	42.1	No change	✓
N6	43.0 ^(N7 - 18/09/07)	35.9 ^(N7 - 18/09/07)	9.3	-33.7	43.0	No change	-26.6	35.9	No change	✓
N7	47.3 ^(16/03/10)	42.1 ^(16/03/10)	10.6	-36.7	47.3	No change	-31.5	42.1	No change	✓
N7	43.0 ^(18/09/07)	35.9 ^(18/09/07)	10.6	-32.4	43.0	No change	-25.3	35.9	No change	✓
N8	34.6 ^(N13)	26.6 ^(N13)	5.3	-29.3	34.6	No change	-21.3	26.6	No change	✓
N9	34.6 ^(N13)	26.6 ^(N13)	5.4	-29.2	34.6	No change	-21.2	26.6	No change	✓
N10	34.7	26.0	12.6	-22.1	34.7	No change	-13.4	26.2	No change	✓
N11	34.6 ^(N13)	26.6 ^(N13)	5.7	-28.9	34.6	No change	-20.9	26.6	No change	✓
N12	34.6 ^(N13)	26.6 ^(N13)	6.4	-28.2	34.6	No change	-20.2	26.6	No change	✓
N13	34.6	26.6	8.3	-26.3	34.6	No change	-18.3	26.7	No change	✓
N14	34.7 ^(N15)	26.0 ^(N15)	14.2	-20.5	34.7	No change	-11.8	26.3	No change	✓
N15	34.7	26.0	17.7	-17.0	34.8	No change	-8.3	26.6	No change	✓
N16	34.7 ^(N15)	26.0 ^(N15)	19.0	-15.7	34.8	No change	-7.0	26.8	No change	✓
N17	34.6 ^(N13)	26.6 ^(N13)	18.1	-16.5	34.7	No change	-8.5	27.2	No change	✓
N18	34.7 ^(N15)	26.0 ^(N15)	25.8	-8.9	35.2	No change	-0.2	28.9	No change	✓
N19	37.9 ^(N20 - 12/03/10)	22.6 ^(N20 12/03/10)	26.3	-11.6	38.2	No change	3.7	27.8	Minor	✓
N19	31.3 ^(N19 - 26/06/07)	20 ^(N19 26/06/07)	26.3	-5.0	32.5	No change	6.3	27.2	Moderate	✓
N20	37.9 ^(12/03/10)	22.6 ^(12/03/10)	31.8	-6.1	38.9	N/A ^{Note3}	9.2	32.3	N/A ^{Note3}	N/A ^{Note3}
N20	35.8 ^(06/01/09)	28.1 ^(06/01/09)	31.8	-4.0	37.3	N/A ^{Note3}	3.7	33.3	N/A ^{Note3}	N/A ^{Note3}

Note 1: Noise level at sensitive receptor as a result of construction plant only. Note 2: Addition of Measured Baseline Level and Predicted Construction noise. dBs are logarithmic values, therefore cannot be added together arithmetically as is done for linear values. Results are based on night-time data from 24hour baseline measurements and predicted night-time construction noise levels. Note 3: N20 is a vacant property, owned by SEPIL and is not a noise sensitive receptor as such. Therefore, impacts at this property have not been assessed.

Table 9.9: "Further Reduced" Revised Predicted Construction works Night-time Noise Levels at Noise Sensitive Locations during Construction Phase (continued)

Noise Sensitive Receptor	Measured Baseline Ambient Level (Night-time) dB L_{Aeq}	Measured Baseline Background Level (Night-time) dB L_{A90}	Predicted ^{Note 1} Construction Noise level (Night-time) dB L_{Aeq}	Difference between Baseline L_{Aeq} & Predicted Level (Night-time) dB L_{A90}	Cumulative ^{Note 2} Noise level (Night-time) dB L_{Aeq} & L_{A90}	Impact Rating (L_{Aeq})	Difference between Baseline L_{A90} & Predicted Level (Night-time) dB L_{Aeq}	Cumulative ^{Note 2} Noise level (Night-time) dB L_{Aeq} & L_{A90}	Impact Rating (L_{A90})	Compliance with EPA & WHO Assessment Criteria (45dB(A))
N21	38.7	23.4	0.7	-38.0	38.7	No change	-22.7	23.4	No change	✓
N22	38.7 ^(N21)	23.4 ^(N21)	0.1	-38.6	38.7	No change	-23.3	23.4	No change	✓
N23	38.7 ^(N21)	23.4 ^(N21)	0.1	-38.6	38.7	No change	-23.3	23.4	No change	✓
N24	38.7 ^(N21)	23.4 ^(N21)	1.1	-37.6	38.7	No change	-22.3	23.4	No change	✓
N25	38.7 ^(N21)	23.4 ^(N21)	5.3	-33.4	38.7	No change	-18.1	23.5	No change	✓
N26	38.7 ^(N21)	23.4 ^(N21)	3.0	-35.7	38.7	No change	-20.4	23.4	No change	✓

Note 1: Noise level at sensitive receptor as a result of construction plant only.

Note 2: Addition of Measured Baseline Level and Predicted Construction noise. dBs are logarithmic values, therefore cannot be added together arithmetically as is done for linear values.

The results indicate that the predicted night-time construction noise levels associated with site works will not exceed the EPA or the WHO assessment criterion of 45dB(A) for night-time noise levels at any of the noise sensitive receptors, and will not give rise to any significant noise impacts at sensitive receptors in the area generally, based on the existing ambient (L_{Aeq}) night-time noise levels in the area. It is acknowledged that night-time noise levels have not been measured at all of the sensitive receptors in the area. However, night-time levels have been extrapolated to the other sensitive receptors in the area based on noise surveys carried out at other receptors in the area. A conservative approach has been taken in terms of extrapolating the noise levels to the different receptors, taking into consideration different surveys in a general area and the location which recorded lower levels of ambient or background noise, which could reasonably be taken as indicative of noise levels at receptors where monitoring was not undertaken.

The results also indicate that the predicted night-time construction noise levels will generally not give rise to any significant noise impacts at sensitive receptors in the area, based on the existing background (L_{A90}) night-time noise levels in the area, with the exception of one property, N19 where it is predicted that there will be a minor to moderate significant negative short-term impact based on noise surveys carried out in the area in March 2010 and September 2007 respectively. Noise surveys were carried out at N20 on 12th March 2010, which is located in close proximity to the sensitive receptor N19, the results of this monitoring are provided in the EIS prepared in May 2010. Noise surveys were carried out at a sensitive receptor located opposite N19 on 26th September 2007, the results of which were provided in the EIS prepared in 2009 (receptor labelled N5 in the 2009 EIS). The predicted night-time construction noise levels are representative of the likely noise impacts associated with a the short-term construction programme, whereby night-time construction activities will only be undertaken at the Aghoos tunnelling compound.

It is noted that whereas the predicted night-time construction noise level during the construction phase will be within the EPA and WHO guidelines criterion of 45 dB(A) for night-time noise levels at all of the sensitive receptors in the area, the existing night-time ambient noise level at the sensitive receptor N7 was recorded at L_{eq} 47.3 dB(A) on 16th March 2010. The predicted cumulative noise levels in the area based on the ambient level of 47.3 dB(A) are therefore raised above the criterion of 45 dB(A). However, the existing night-time ambient noise level at the sensitive receptor N7 was recorded at L_{eq} 43.0 dB(A) on 18th September 2007. The predicted cumulative noise levels in the area based on the ambient level of 43.0 dB(A) are with the criterion of 45 dB(A).

The predicted cumulative noise level is expected to range between L_{eq} 32.5dB(A) and 47.3dB(A) based on the measured ambient levels. However, it should be noted that in both instances the predicted cumulative noise level is primarily attributable to the existing ambient night-time noise levels given that the existing ambient levels are 31.3dB(A) at the sensitive receptor N19, and 47.3dB(A) at the sensitive receptor N7 respectively. The corresponding predicted construction noise levels are 26.3dB(A) at N19 and 10.6dB(A) at N7 respectively. It should also be noted that the predicted night-time construction noise levels are short-term impacts.

The predicted night-time construction noise levels would not be considered excessive for construction works and will not give rise to a significant negative impact at any of the noise sensitive receptors in the area, even taking into account the existing low baseline noise levels in the area. The predicted night-time construction noise levels will however give rise to a minor to moderate significant negative short-term impact at one property (N19) based on the background noise levels recorded in the area. The predicted night-time construction noise level at all properties is considered acceptable given that the levels are within the EPA and WHO guidelines levels and given significant noise abatement measures have been incorporated into the design of the construction works compounds in order to minimise noise emissions associated with the construction phase.

Table 9.10: "Further Reduced" Revised Predicted Construction Traffic Noise Levels at Noise Sensitive Locations during Construction Phase

Noise Sensitive Receptor	Measured Baseline Ambient Level (Daytime) dB L _{Aeq}	Measured / Calculated ^{Note 1} Baseline L _{den} Level (day, evening, night) dB L _{den}	Predicted ^{Note 2} Construction Traffic Noise level (2011 DS) (Daytime) dB L _{Aeq}	Difference between Baseline L _{Aeq} & Predicted Level (Daytime) dB L _{Aeq}	Cumulative ^{Note 3} Noise level (Daytime) dB L _{Aeq} & L _{den}	Impact Rating (L _{Aeq})	Total Cumulative ^{Note 4} Construction Noise and Construction Traffic Noise level (Daytime) dB L _{Aeq}	Compliance with NRA Assessment Criteria (65dB(A))
N1	44.1	43.1	42.1	-2.0	46.2	No change	50.3	✓
N2	48.8	52.2	52.3	+3.5	53.9	Minor	55.7	✓
N3a	46.5 ^(N3b)	38.6 ^(N3b)	57.1	+10.6	57.5	Major	57.7	✓
N3b	46.5	38.6	57.9	+11.4	58.2	Major	58.9	✓
N4	---	---	---	---	---	---	---	✓
N5	43.0	42.0	52.5	+9.5	53.0	Moderate	53.0	✓
N6	46.5	45.5	40.5	-6.0	47.5	No change	47.8	✓
N7	38.0	56.0	40.8	+2.8	42.6	Minor	43.5	✓
N8	43.2	42.2	40.7	-2.5	45.1	No change	45.5	✓
N9	49.2	48.2	54.5	+5.3	55.6	Minor	55.6	✓
N10	41.9	40.9	43.0	+1.1	45.5	Not significant	45.7	✓
N11	51.9	50.9	51.5	-0.4	54.7	No change	54.7	✓
N12	48.8	47.8	52.2	+3.4	53.8	Minor	53.9	✓
N13	44.6	44.2	53.3	+8.7	53.8	Moderate	53.9	✓
N14	43.9	42.9	43.5	-0.4	46.7	No change	46.9	✓
N15	40.3	44.9	42.3	+2.0	44.4	Minor	44.6	✓
N16	42.8	41.8	42.5	-0.3	45.7	No change	45.8	✓
N17	58.7	57.7	64.4	+5.7	65.4	Moderate	65.4	✓
N18	41.5	40.5	44.2	+2.7	46.1	Minor	46.3	✓
N19	48.6	47.6	63.7	+15.1	63.8	Major	63.8	✓
N20	46.5	45.0	59.2	+12.7	59.4	N/A ^{Note 5}	59.6	N/A ^{Note 5}

Note 1: L_{den} noise level calculated based on 24-hr noise data used for N2, N7, N13, N15, and N20, L_{den} noise level calculated based on 15-minute short period noise surveys for other noise sensitive locations.

Note 2: Noise level at sensitive receptor as a result of construction traffic only.

Note 3: Addition of Measured Baseline Level and Predicted Construction noise. dBs are logarithmic values, therefore cannot be added together arithmetically as is done for linear values.

Note 4: Addition of Measured Baseline Level and Predicted Total Construction noise (traffic and site related construction works). dBs are logarithmic values, therefore cannot be added together arithmetically as is done for linear values.

Note 5: N20 is a vacant property, owned by SEPIL and is not a noise sensitive receptor as such. Therefore, impacts at this property have not been assessed.

Table 9.10: "Further Reduced" Revised Predicted Construction Traffic Noise Levels at Noise Sensitive Locations during Construction Phase (continued)

Noise Sensitive Receptor	Measured Baseline Ambient Level (Daytime) dB L _{Aeq}	Measured / Calculated Baseline L _{den} Level (day, evening, night) dB L _{den}	Predicted Construction Noise level (Daytime) dB L _{Aeq}	Difference between Baseline L _{Aeq} & Predicted Level (Daytime) dB L _{Aeq}	Cumulative Noise level (Daytime) dB L _{Aeq} & L _{den}	Impact Rating (L _{Aeq})	Total Cumulative Construction Noise and Construction Traffic Noise level (Daytime) dB L _{Aeq}	Compliance with NRA Assessment Criteria (65dB(A))
N21	49.9	51.8	54.5	+4.6	55.8	Minor	55.8	✓
N22	62.8	61.8	63.0	+0.2	65.9	Not significant	65.9	x
N23	57.1	56.1	60.0	+2.9	61.8	Minor	61.8	✓
N24	47.9	46.9	38.0	-9.9	48.3	No change	48.3	✓
N25	57.9	56.9	60.0	+2.1	62.1	Not significant	62.1	✓
N26	63.5	62.5	57.6	-5.9	64.5	No change	64.5	✓

Note 1: L_{den} noise level calculated based on 24-hr noise data used for N2, N7, N13, N15, and N20, L_{den} noise level calculated based on 15-minute short period noise surveys for other noise sensitive locations.

Note 2: Noise level at sensitive receptor as a result of construction traffic only.

Note 3: Addition of Measured Baseline Level and Predicted Construction noise. dBs are logarithmic values, therefore cannot be added together arithmetically as is done for linear values.

Note 4: Addition of Measured Baseline Level and Predicted Total Construction noise (traffic and site related construction works). dBs are logarithmic values, therefore cannot be added together arithmetically as is done for linear values.

The results indicate that the predicted construction traffic noise level on its own will not exceed the NRA assessment criteria for construction works or the 65dB(A) limit as applied to the Terminal construction works, but as expected will temporarily, rise significantly above (>3dB(A)) existing baseline levels. The predicted cumulative noise level incorporating the construction traffic noise levels and the baseline ambient noise levels indicate that the NRA criterion of 65dB(A) L_{eq, 1hour} will be exceeded slightly (0.9 dB) at one property, N22, situated in close proximity to the junction of the R313 and the L1204. The predicted construction noise level at this property, which is attributable to construction traffic, is 63.0dB(A) and is therefore within the NRA assessment criterion of 65dB(A). However, the existing ambient noise level at this property was measured at a level of 62.8dB(A) L_{eq} and it is as a result of this baseline noise level that the cumulative noise level (65.9 dB(A)) during the construction phase will be raised slightly above 65dB(A) on a temporary basis. It should be noted that the construction traffic noise levels have been predicted using the heaviest volume of traffic, which is expected to occur during Month 2 of the overall 26-month construction programme; therefore, construction traffic levels during the remainder of the construction period would be expected to be lower at this receptor.

The results also indicate that the predicted construction traffic noise levels will have a minor significant negative temporary impact at eight properties (N2, N7, N9, N12, N15, N18, N21 and N23); a moderate significant negative temporary impact at three properties (N5, N13 and N17); and a major significant negative temporary impact at three properties (N3a, N3b and N19) based on the existing ambient (L_{Aeq}) noise levels in the area. The predicted construction traffic noise levels and indeed the predicted total cumulative construction noise levels, which incorporate the existing ambient noise with both the predicted site works and construction traffic noise levels, are within the NRA assessment criteria of 65dB(A) at all of the noise sensitive receptors, with the exception of N22 as described above.

