9. Noise

Introduction

9.1 This Chapter revisits the Noise Impact Assessment to take into consideration any changes to assessment methodology guidance; undertake updated background noise surveys due to the passage of time; consider the noise impacts of the latest available traffic flows on the local road network for the revised opening year of 2023 (see Chapter 8 'Transport); and consider any additional cumulative assessment required in respect of consented wind turbines.

9.2 This Chapter should be read in conjunction with Chapter 13 'Noise' of the original Environmental Statement (ES) as there are no changes to the predicted source noise levels from the proposed development, both in terms of plant noise and on-site vehicular movements including those along the access road, from those previously considered.

9.3 It should also be noted that the third-party representation submitted to DfI Strategic Planning Division dated 30 September 2018 enclosing a noise assessment prepared by Grainger Acoustics (dated November 2016) did not differ from the information that was taken into consideration previously by the PAC and therefore is not commented on further in this updated Chapter.

Background

9.4 The original EIA submission (March 2014) provided a Noise Impact Assessment of the proposed development at Chapter 13 'Noise' which considered the predicted noise and vibration levels from construction, noise from the operation of the facilities and noise impacts from any change in road traffic associated with the development and its construction.

9.5 An Addendum to the ES was submitted in September 2014 in response to comments received from Antrim Borough Council and Newtownabbey Borough Council Environmental Health Departments (EHDs) and proposed changes to the IBA processing arrangements.

9.6 Further noise evidence was also submitted post the PAC hearing (November 2016) which considered the cumulative noise impact of a nearby consented wind farm. It was emphasised at this time that it is not actually appropriate to combine wind farm noise with noise emitted from industrial sources due to the inherently different noise types, wind considerations and assessment methodologies. A cumulative impact assessment was however undertaken at the request of the PAC and the assessment assumed a worst-case scenario for each source.

9.7 The conclusions of the original ES and subsequent submissions confirmed that:

I. The residual effects of the operational plant are assessed as being slightly adverse on the basis that it will be audible, albeit at a low level, at the nearest noise sensitive receptors and within recognised standards;

II. When assessed against existing noise levels, the impact of the additional traffic on the access route and Boghill Road is assessed as moderate adverse. Should detailed

planning be granted for the new dwelling at 32a/ 38 Boghill Road (see paragraph 9.30) this would be designed and constructed with the knowledge that quarrying could resume and hence a moderate adverse assessment is considered appropriate;

III. In respect of operational traffic noise, the net effect after mitigation is assessed as slight beneficial on properties fronting the access road and Boghill Road compared to the extant quarry permission. The proposed development will generate a defined and consistent level of traffic movements in contrast to quarrying activity with inevitable fluctuations;

IV. In terms of operational noise the assessment of noise impact would be one of minor significance;

V. Construction noise is considered to be no worse than when the site operated daily as a quarry and would be of limited duration. The closest property is 380m from the construction area, although properties directly fronting onto the Boghill Road improvements will suffer disturbance albeit for a limited period and hence the residual effects are assessed as slight adverse;

VI. In terms of construction noise the impact of the proposed scheme is assessed as minor significance; and

VII. The cumulative impact assessment with the nearby consented wind farm concludes that predicted night-time noise limits are not exceeded at nearby noise sensitive receptors as prescribed by ETSU. All receptors were predicted to comfortably comply with the upper day and night-time limits. In addition, the cumulative impact was not found to lead to any breach of any standards or noise limits.

Methodology

9.8 This Addendum has adopted the same methodologies as used in the original ES (see paragraphs 13.10 to 13.39 of the original ES) unless revised as stated below.

BS4142:2014

9.9 The BS4142:2014 '*Methods for Rating and Assessing Industrial and Commercial Sound*' came into effect on 31st October 2014 and replaced the previous version dated 1997.

9.10 The 2014 edition clarifies the application of the standard and recognises the importance of the context in which a sound occurs.

9.11 In this Noise Addendum, BS4142:2014 has been used to assess the potential impact of the proposed plant, activities and on-site vehicular movements, including traffic on the access road to the development, where noise of an industrial nature dominates.

9.12 The procedure compares the measured or predicted noise level from the source in question, i.e. the 'specific noise level' measured in terms of a LAeq,Tr value, immediately outside a receptor, with the background noise level, measured in terms of a LA90,T value.

9.13 Where appropriate a character correction (rating penalty) is added to the specific sound level to account for acoustic features such as tonality, impulsivity, intermittency and other. This can be approached using either the Subjective, Objective or Reference Method. The 1997 methodology used a set rating level penalty of 5dB(A) for discernible sounds regardless of perceptibility. For this assessment the subjective methodology of BS4142:2014 has been applied which uses the rating levels identified in the table below.

Table 9.1 BS4142:2014 Rating Levels

Acoustic Feature	Perceptibility		
	Just	**Clearly**	**Highly**
Tonality	+2	+4	+6
Impulsivity	+3	+6	+9
Other	+3	+3	+3
Intermittency	+3	+3	+3

9.14 The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs.

9.15 Clause 11 of BS4142:2014 states that to obtain an initial estimate of the impact of the specific sound, the measured background sound level (Clause 8) should be subtracted from the rating level (Clause 9), and the following considered:

a) Typically, the greater this difference, the greater the magnitude of the impact.

b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.

c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.

d) The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

9.16 Where the initial estimate of the impact needs to be modified due to the context, all pertinent factors must be taken into consideration, these are discussed in Section 11 of BS4142:2014.

9.17 The previous statement in BS4142:1997 (paragraph 1) "*The method is not suitable when the background and the rating noise levels are both very low*" as in the case of some receptors at this site at night (i.e. 30 dB(A) and 35 dB(A) respectively). This statement has been replaced in

BS4142:2014 with *"Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially at night*" when the sound levels can be so low additional sound may not be discernible and so reference is made to absolute levels as a cross check of relevant of the methodology, which is designed to assess likely impact of increased sound levels.

WHO Environmental Noise Guidelines 2018

9.18 The WHO Environmental Noise Guidelines came into effect on 10th October 2018 and replaced the previous WHO Guidelines for Community Noise 1999.

9.19 These guidelines separately consider outdoor exposure to environmental noise from road traffic, railway traffic, aircraft, wind turbines as well as outdoor and indoor exposure during leisure activities. The guidelines are source specific and not environment specific. The Guideline Development Group (GDG) agreed not to develop specific recommendations for occupational and industrial noise.

9.20 Moreover, the guidelines do not include recommendations about any kind of multiple exposure. No attempt has been made to combine noise from multiple sources for any particular health outcome.

9.21 The WHO 2018 Guidelines have been considered in this Noise Addendum when assessing both the potential impact of road traffic noise generated by the proposed access road, and in the assessment of the potential cumulative impact of the proposed development with local consented wind turbines.

9.22 Although WHO 2018 does not combine multiple noise sources and, as stated above, a combined assessment is not actually appropriate, given the concerns raised previously regarding the cumulative effects of the consented wind turbines, this assessment has combined the noise effects of the proposed development, the consented wind farm and other wind turbines proposed/approved in the local vicinity.

Explanation of Baseline Conditions

Background Noise Survey

9.23 An updated survey of existing background noise was completed by Atkins Ltd in December 2018. As such, Paragraphs 13.40 to 13.53 of the original ES have been reviewed and, where required, are updated below. Tables 13.2 and Table 13.3 are now superseded by Tables 9.2 and 9.3. However, Figure 13.1 remains correct as the 2018 noise surveys were undertaken in the same locations as the 2012 surveys, namely:

- Location 01 – in the vicinity of No.62 Upper Hightown Road;
- Location 02 – in the vicinity of No.120 Flush Road;
- Location 03 – in the vicinity of No.65 Flush Road;

- Location 04 – No.40 Boghill Road; and
- Location 05 – No.32 Boghill Road.

9.24 In order to establish the background noise levels current in 2018, Brüel & Kjær Type 2250 Type 1 Sound Level Meters (SLM) were sited at each of the previous five representative locations and monitored background noise levels between Friday 30th November and Thursday 6th December 2018.

9.25 All surveys were undertaken in free-field locations and were in accordance with advice given on 'Precautions against Interference' and 'Weather Conditions' contained in British Standard 4142:2014.

9.26 As previously, the background noise level was measured at each location in A-weighted decibels in a range of statistical indices that describe the variation in noise levels, including the level exceeded for 90% of the time (L_{A90}) and the equivalent continuous sound level (L_{Aeq}).

9.27 The following tables summarise the background noise levels used in the original ES and this updated Chapter.

9.28 BS4142:2014 indicates that the typical background noise levels to which the predicted future noise from the proposed development will be compared should be reliable and suitably representative, and not necessarily simply the lowest or the mode level[1].

[1] BS41428:2014 *Methods for Rating and Assessing Industrial and Commercial Sound*, Commentary on 8.1:
In using the background sound level in the method for rating and assessing industrial and commercial sound it is important to ensure that values are reliable and suitably represent both the particular circumstances and periods of interest. For this purpose, the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods.

Table 9.2 Summary of Background Noise Survey Results: Daytime

Location		Survey 2012 # / 2013		Survey 2018 $		Background Adopted		Comment 2011/2012 v 2018
		LAeq	LA90	LAeq	LA90	LAeq	LA90	
Location 01	No.62 Upper Hightown Road (in the vicinity thereof)	47.22	35.52	40.0	36.8		36	No change small increase in LA_{90} level
Location 02	No.120 Flush Road (in the vicinity thereof)	43.04	34.37	41.3	34.7		34	No Change small increase in LA_{90} level
Location 03	No.65 Flush Road (in the vicinity thereof)	53.75	39.40	35.7	31.3		32	Reduced Background
Location 04	No.40 Boghill Road	50.48	38.06 36 *	49.6	39.1	50.5	38 36	No Change
Location 05	No.32 Boghill Road	42.16	36.21	42.09	38.06	42.2	36	No Change

Notes: # Noise Survey 2012 by Atkins Ltd between Tuesday 14th and Monday 20th August 2012. Derived from Lowest Three 1-hour periods.

* Noise Survey 2013 by Northern Group Systems (Environmental Health) between Thursday 3rd and Thursday 10th October 2013. LA90,10minutes.

$ Noise Survey 2018 by Atkins Ltd between Friday 30th November and Thursday 6th December 2018. Representative (25 % ile) LAeq,15mins / 1 hour and LA_{90},15mins / 1 hour.

Table 9.3 Summary of Background Noise Survey Results: Night-time

Location		Survey 2012 # / 2013		Survey 2018 $		Background Adopted		Comment
		LAeq	LA90	LAeq	LA90	LAeq	LA90	
Location 01	No.62 Upper Hightown Road (in the vicinity thereof)	32.72	26.71	31.72	27.35		27	No change, small increase in LA_{90}
Location 02	No.120 Flush Road (in the vicinity thereof)	32.26	29.66	31.92	27.02		27	Slight decrease
Location 03	No.65 Flush Road (in the vicinity thereof)	49.60	35.06	30.58	25.64		26	Large decrease
Location 04	No.40 Boghill Road	32.72	31.56 31 *	38.70	34.23		32 31	No change, slight increase
Location 05	No.32 Boghill Road	36.82	34.88	36.00	33.93		35	No change slight increase in LA_{90}

Notes: # Noise Survey 2012 by Atkins Ltd between Tuesday 14th and Monday 20th August 2012. Derived from Lowest Three 1-hour periods.

* Noise Survey 2013 by Northern Group Systems (Environmental Health) between Thursday 3rd and Thursday 10th October 2013. LA_{90},10minutes.

$ Noise Survey 2018 by Atkins Ltd between Friday 30th November and Thursday 6th December 2018. Representative (25%ile) LAeq,15mins / 1 hour and LA90,15mins / 1 hour.

Potential Noise Sensitive Receptors

9.29 Following an online review of planning applications submitted and/or approved in the intervening period since the original NIA was undertaken[2], there are no additional noise sensitive receptors to consider. Any additional properties approved or built since are further than those already assessed. As such it remains appropriate to assess the eight previous receptors as the closest representative receptors to the proposed scheme.

9.30 The proposed property with outline planning permission (T/2013/0099/O) referred to as No.32a Boghill Road in the previous Noise ES Chapter (and included in the noise assessment) seems to be referred to as No.38 Boghill Road on Northern Ireland's Planning Portal. Under Planning Application Reference T/2013/0099/O, permission was granted on 22/08/2013 for a dwelling on a farm. It is understood that this proposed property has not yet been constructed, and that no associated reserved matters application was made, and as such the outline planning permission has now lapsed. However, calculations have still been updated for this potential property due to its proximity to the scheme, and most notably the proposed access road. For clarity, this property is henceforth referred to as No.32a / 38 Boghill Road. Table 13.5 (in the original ES) Noise Sensitive receptors therefore remain valid.

Assessment: Predicted Environmental Effects and their Significance (Operation)

Key Noise Sources

9.31 The key noise sources and materials remain unchanged and hence Table 13.6 – Table 13.8 and Figure 13.3 in the original ES remain unchanged.

Noise Impact due to Operational Site

9.32 The operational noise impact has been re-assessed to take into consideration the updated BS4142:2014 methodology and updated background noise levels and the results presented in the following table.

9.33 The night-time assessment indicates that the proposed scheme will have a 'negligible significance' impact on the three assessed Boghill Road properties and on No.62 Upper Hightown Road. For Nos. 65 and 133 Flush Road and Upper High Town, the scheme's impact on these properties is considered to be of 'minor adverse significance' due to the low noise levels. For No.120 Flush Road the impact is considered to be of 'moderate adverse significance' again due to the low noise levels.

[2] http://epicpublic.planningni.gov.uk/

Table 9.4 BS4142 Noise Assessment: Night-time Noise Levels (Table 13.10)

Receptor	Specific Noise Level, dB LAeq[1]	Rating Level, dB LAeq	Measured Night-time Background Level , dB LA90	Assessment Level, (dB LAr – LA90)	Impact Significance taking Context into Account
Outline Planning Property 32a / 38 Boghill Road	31.8	34	35	-1	Proposed noise is below background. Negligible Significance
32 Boghill Road (Survey Location 05)	32.2	34	35	-1	Proposed noise is below background. Negligible Significance
40 Boghill Road (Survey Location 04)	30.1	32	32	0	Proposed noise equals background. Negligible Significance
40 Boghill Road (Survey Location 04) NGS Survey	30.1	32	31	+1	Negligible Significance
65 Flush Road (Location 03)	27.1	29	26	+3	Rating and Background Noise Level very low. Minor Adverse Significance

[1] Model R9 December 2013 free-field (Table 13.9).

Receptor	Specific Noise Level, dB LAeq[1]	Rating Level, dB LAeq	Measured Night-time Background Level , dB LA90	Assessment Level, (dB LAr – LA90)	Impact Significance taking Context into Account
120 Flush Road (Survey Location 02)	32.7	35	27	+8	Rating and Background Noise Level very low. Moderate Adverse Significance
133 Flush Road	30.1	32	27	+5	Rating and Background Noise Level very low. Minor Adverse Significance
62 Upper Hightown Road (Survey Location 01)	25.9	28	27	+1	Negligible Significance
Upper High Town	27.5	30	27	+3	Rating and Background Noise Level very low. Minor Adverse Significance

9.34 The daytime assessment summarised in Table 9.5 below indicates that the proposed scheme impact will have a 'negligible significance' for No.65 Flush Road and Upper High Town. The scheme's impact on No. 62 Upper Hightown Road is considered to be of 'minor adverse significance', and of 'moderate adverse significance' for Nos. 120 and 133 Flush Road due to the relative noise levels compared to background, but ignoring the context of the former quarrying activities.

9.35 Traffic noise from the access road will be the dominant noise source during the daytime for the three assessed Boghill Road properties, as such a BS4142:2014 assessment is not considered to be entirely appropriate as the traffic impact is dominant over the potential impact of the operational noise, and as such the potential impact indicated by the BS4142 assessment is skewed by the traffic. The impact of the proposals on the three assessed Boghill Road properties would be more appropriately assessed by considering the operational traffic impact not using BS4142:2014, but these properties have been included in the table below for completeness.

Table 9.5 BS4142 Noise Assessment: Daytime Noise Levels (Table 13.11)

Receptor	**Specific Noise Level, dB LAeq[3]**	**Rating Level, dB LAeq**	**Measured Day-time Background Level, dB LA90**	**Assessment Level, (dB LAr – LA90)**	**Impact Significance taking Context into Account**
Outline Planning Property 32a / 38 Boghill Road	52.0	54	36	+18	Noise from Access Route dominant
32 Boghill Road (Location 05)	46.2	48	36	+12	Noise from Access Route dominant
40 Boghill Road (Location 04)	50.4	52	38	+14	Noise from Access Route dominant
40 Boghill Road (Location 04) NGS Survey	50.4	52	36	+16	Noise from Access Route dominant
65 Flush Road (Location 03)	31.3	33	32	+1	Negligible Significance
120 Flush Road (Location 02)	39.1	41	34	+7	Moderate Adverse Significance

[3] Model R9 December 2013 free-field (Table 13.9).

Receptor	Specific Noise Level, dB LAeq[3]	Rating Level, dB LAeq	Measured Day-time Background Level, dB LA90	Assessment Level, (dB LAr – LA90)	Impact Significance taking Context into Account
133 Flush Road	38.2	40	34	+6	Moderate Adverse Significance
62 Upper Hightown Road (Location 01)	37.1	39	36	+3	Minor Adverse Significance
Upper High Town	34.1	36	36	0	Proposed noise equals background. Negligible Significance

Noise Impact due to Operational Traffic

9.36 The predicted noise impact due to operational traffic has been revisited to take into consideration the new background noise levels, WHO 2018 Guidelines, the latest traffic data on local road network and the revised opening year of 2023.

Operational *Assessment: Traffic - Site Access*

9.37 This assessment of the impact of site access traffic in the original ES remains unchanged but is included for completeness. The traffic flows and speeds on the access road remain as previously assessed. The 2018 survey confirms that the previously assessed background noise levels used at Locations 04 and 05 are still valid. The original appraisal of daytime noise on the access road remains unchanged and as such is copied in the following table from the original ES Table 13.12.

Table 9.6 Access Road vs Daytime Noise Levels (Table 13.12)

Receptor	Peak Hr Noise Level dB LAeq	Measured Day-time Background Level dB LAeq	Combined	Difference	Significance
40 Boghill Road (Location 04)	50.4	50.5	53.5	3.0 dB(A)	Minor Adverse
34 Boghill Road (Location 04)	57.6	50.5	58.4	7.9 dB(A)	Moderate Adverse
Outline Planning Property 32a / 38 Boghill Road (Location 05)	52.0	42.2	52.4	10.2 dB(A)	Substantial Adverse
32 Boghill Road (Location 05)	46.2	42.2	47.7	5.5 dBA	Moderate Adverse
26 Boghill Road (Location 05)	46.6	42.2	47.9	5.7 dB(A)	Moderate Adverse

9.38 In the event that the proposed development is not implemented the established use of the site as a quarry with unrestricted planning permission will continue and has the potential to scale up to meet market demand.

9.39 Since the original assessment the WHO 2018 guidelines for road traffic noise has been introduced which uses Lden to assess the impact of traffic noise.

9.40 It is suggested in the guidelines that Lden is to be below 53 dB which is the equivalent noise over a 24-hour period, whereas Table 9.6 above utilised peak hour traffic data only and hence a worst case scenario if you use peak hour instead of 24 hour noise.

9.41 Peak HGV flows are 42/hr, but average daytime flows are 24/hr which is approximately a halving of traffic and hence road generated noise will be about 3 dB less averaged over the day and there are effectively no HGVs after 19:00 hrs. Ignoring variation in daytime flows/ noise levels, to allow the use of existing conservative predictions the log average of peak day and high night-time predictions including background noise are only greater than 53dB for 34

Boghill Road which, without correction for the variation in flows, is predicted to be 56 dB(A) (59 (day) and 44 (night) respectively). As stated, this is a worse-case scenario being based on a peak of 42 HGV / hr for day and evening 7 days a week from the proposed plant with no extra traffic at night Saturday afternoon or Sunday. The table below shows the calculations for the most critical properties i.e. No.34 Boghill Road (56), No. 32a / 38 Boghill Road (51) and No.120 Flush Road (50). With the exception of No.34 Boghill Road, all other assessed properties in the vicinity of the access road will be compliant.

Table 9.7 WHO Assessment re Site Access Road (worse-case-properties)

Receptor	Daytime			Night-time			Calculated Average Noise Level
	Predicted LAeq 1 hr	Background LAeq	Combined LAeq 1 hr	Predicted LAeq 15 min	Background LAeq	Combined LAeq 15 min	
34 Boghill Road (Location 04)	57.6	51.5	58.5	30.1	43.7	43.9	56
Outline Planning Property 32a / 38 Boghill Road (Location 05)	52.0	47.4	53.3	31.8	44.3	44.5	51
120 Flush Road (Location 02)	39.1	51.3	51.6	32.7	43.6	44.0	50

Notes: Background Noise used is the Log Average of the 2018 Noise Survey at the relevant Survey Location.

The predicted noise levels are a worse-case-scenario since they have used peak HGV flows and ignored the real variation in HGV flows.

The average noise level was derived by calculating the log average of the Daytime Combined LAeq and the Night-time Combined LAeg.

No.34 Boghill Road and No.32a / 38 Boghill Road was assessed since they have the loudest Daytime Source LAeq.

No. 120 Flush Road was assessed since it had the loudest Night-time Source LAeq

Operational Assessment: Traffic – Local Road Network

9.42 The assessment of operational traffic noise on the local road network has followed the same methodology as the original NIA, i.e. DMRB 11.3.7[3], but has been revisited to take into consideration the updated Opening Year and Design Year, and to reflect changes in traffic flows on the local road network. Accordingly, Paragraphs 13.93 to 13.97 and Table 13.14 of the original ES have now been updated by the following.

9.43 The revised assessment, summarised in the following table, identifies that the change in noise level on each of the assessed road links is below +1dB. This was also the case in Table 13.14 of the original ES 2014, and as such the conclusion of the original assessment that the change in noise levels from scheme traffic on the local road network is insignificant remains valid.

[3] The Highways Agency, Design Manual for Roads and Bridges (DMRB), Volume 11 - Environmental Assessment, Section 3 - Environmental Assessment Techniques, Part 7 – Noise and Vibration 2011.

Table 9.8 Predicted Change in Noise Levels on Key Road Links

Link No.	Link Description	2038 without Development			2038 with Development			Predicted Noise – Without Development	Predicted Noise With Development	Change in Noise level L10 18 hr
		AADT	% HGV's	Speed MPH	AADT	% HGV's	Speed MPH			
1	Boghill Road	777	9.3%	60	1023	19.4%	60	N/A	N/A	N/A
2	Hydepark Road	5940	2.0%	60	6186	4.1%	60	69.5	70.0	0.5
2a	Hydepark Road	6454	2.1%	60	6703	4.0%	60	69.8	70.4	0.6
3	Hightown Road	12258	3.0%	40	12478	4.0%	40	69.7	70	0.3
3a	Hightown Road	17302	2.4%	40	17521	3.2%	40	71.0	71.3	0.3
4	Mallusk Road	13598	3.2%	40	13786	4.2%	40	70.2	70.6	0.4
4a	Mallusk Road	16731	8.2%	40	16921	9.0%	40	72.3	72.5	0.2
5	Scullions Road	26927	9.2%	40	27045	9.4%	40	74.6	74.7	0.1

Description of Proposed Mitigation Measures (Operational)

9.44 No changes to the proposed mitigation measures are proposed with respect to noise.

Assessment: Predicted Environmental Effects and their Significance & Mitigation (Construction)

9.45 The assessment of potential noise and vibration impact during the construction phase of the proposed scheme remains as per the previous ES Chapter 13 Noise, as the plant design and construction remains unchanged.

Assessment: Residual Effects and their Significance Taking Mitigation into Account

Operational Noise: Activities

9.46 No changes to the original ES 2014 are proposed.

Operational Noise: Traffic

9.47 No changes to the original ES 2014 are proposed.

Construction Noise

9.48 No changes to the original ES 2014 are proposed.

Assessment: Cumulative Impact – Arc21 and Consented Local Windfarms

9.49 A cumulative noise impact assessment was provided as post-hearing evidence in November 2016 to consider the cumulative impact of the nearby consented Ballyutoag wind farm. This cumulative assessment has now been revisited to also account for wind turbines within a 3.5km radius of the proposed development site approved since the previous 2016 assessment.

9.50 As was emphasised in the November 2016 Cumulative Assessment, it remains considered that it is not actually appropriate to combine wind farm noise with noise emitted from industrial sources due to the inherently different noise types, wind speeds and assessment methodologies.

9.51 The revised cumulative impact assessment has been based on the Noise Assessment Reports identified in Table 9.9 below and follows the same ETSU[4] methodology as the November 2016 assessment, again assuming a worst-case scenario for each source.

[4] The Assessment and Rating of Noise from Wind Farms, ETSU R 97, published September 1996, (hereafter referred to as ETSU).

Table 9.9 Cumulative Noise Impact Assessment: Reports Used

Noise Source	Report Used in Cumulative Noise Impact Assessment			
	Planning App Ref	**Report Title**	**Dated**	**Reference**
arc21 – proposed Plant and Traffic Noise on adjoining Road Network	T/2014/0114/F	Hightown Quarry, Boghill Road, County Antrim: Residual Waste Treatment Project, Environmental Statement, Chapter 13 Noise	March 2014	Table 13.9
Wind Farm & Wind Turbines included in PAC Submission (updated assessment thereof)	LA03-2016-0214-F	Proposed Single Wind Turbine 430m North of No 60 Ballyutoag Road, Ballyutoag, Belfast, Antrim, BT14 8ST Noise Impact Assessment Rev 6	15/03/2018	Tables 17, 18 and 19
1 no. Wind Turbine	Z-2014-1553-F	Noise Impact Assessment for a Wind Turbine with a Maximum Output of 2 MW situated approximately 320 meters SE of 43 Flush Road, Ballysillan Upper, Belfast	06/01/2015	Page 8 of PDF
1 no. Wind Turbine	Z-2015-10010-F	Cumulative Noise Impact Assessment for a Wind Turbine with a Maximum Output of 2 MW situated approximately 630 meters SE of 43 Flush Road, Ballysillan Upper, Belfast	17/04/2015	Page 23 (Both Tables) & Page 21 of PDF

9.52 The representative NSRs considered in the November 2016 FEI were selected since they were closest to both the proposed development and Ballyutoag wind farm and were included as receptors in both assessment reports.

9.53 The representative NSRs considered in this revised Cumulative Impact Assessment are the same as previously assessed, but have been referred to as different names in previous reports, so for clarity the names are summarised in Table 9.10 below. The noise assessment reports for the 2no. single wind turbines SE of No.43 Flush Road did not include No.s 65 (55), 120 and 133 Flush Road; as such data for the nearest available equivalent locations has been utilised and will represent a worst-case scenario since these turbines are located further away from the 3 no. previously assessed properties.

Table 9.10 Cumulative Noise Impact Assessment: NSRs Assessed

Arc 21 Name	**Earlier Evidence**[5]	**No.60 Ballyutoag Rd Wind Turbine Report LA03-2016-0214-F**	**No.43 Flush Road Wind Turbine Reports Z-2014-1553-F Z-2015-10010-F**
No.65 Flush Road *(= No.55 Flush Road)*	H13	NSR4	Closest available = NSR B No.53 Flush Rd
No. 120 Flush Road	H12	NSR16	Closest available = NSR A No.67 Flush Rd
No.133 Flush Road	H11	NSR17	Closest available = NSR A No.67 Flush Rd

Conclusion of the Cumulative Assessment

9.54 The revised ETSU assessment is contained in Appendix 9.1 (daytime) and Appendix 9.2 (night-time).

9.55 Using the same wind turbine assessment methodology as used previously, none of the 3no. NSRs exceeded the night-time noise limits as prescribed by ETSU.

[5] The Properties H11, H12 and H13 referred to in earlier evidence presented at the arc21 Planning Enquiry were included in the noise reports submitted in support of Ballyutoag Wind Farm (T/2014/0478/F) regarding 5no. Wind Turbines located 1km north of No.71 Ballyutaog Road. These reports were utilised in Atkins Ltd's initial Cumulative Assessment Response (08/11/2016), and were as follows:

- Hayes McKenzie, Ballyutoag Wind Farm, Environmental Noise Impact Assessment, Report HM:2805_R1_EXT3, 03/11/2014; and subsequent
- tcir renewables, Ballyutoag Wind Farm, Addendum to Environmental Statement, October 2015, Addendum 2, prepared by Hayes McKenzie Partnership Ltd, 19/02/2015.

9.56 The cumulative impact also complied with the Daytime Limits at wind speeds above 4m/s for each of the 3no. assessed properties.

9.57 The Daytime Limit was exceeded by < 1dB(A) for No.120 and No.133 Flush Road at the low wind speed of 4 m/s (i.e. +0.2 and +0.9 dB(A), respectively).

9.58 1dB(A) is generally considered to be the smallest audible change in noise level that can be perceived, and then only under ideal listening conditions. In addition, the revised cumulative impact assessment has assumed a worst-case scenario for each source. As such, it is concluded that the revised cumulative impact does not result in any breach of any standards or noise limits. The original conclusions therefore remain unchanged.

9.59 WHO 2018 guidelines for wind turbine noise suggests Lden is to be below 45 dB which is the equivalent noise over a 24-hr period. The assessment methodology for wind farms use variable noise levels depending on wind speed and the parameter LA90 not LAeq. The commonly used estimated difference between LA90 and LAeq is 2 dB(A). Taking the worst affected property which is 120 Flush Road, the maximum predicted combined noise level is 42.5 dB LA_{90}, which is equivalent to 44.5 LAeq which, in turn, is below the WHO guidelines for wind turbines of 45 dB.

Conclusions

9.60 The original ES considered the potential noise and vibration impacts from the proposed development on its surroundings, both during construction and operational use.

9.61 In terms of operational noise, the original ES assessed that the noise impact of the proposed development would be of Minor Significance. This re-assessment, incorporating updated assessment methodology, recent background noise data and traffic flows for the new opening year, concludes that the operational noise of the proposed scheme remains as per the previous conclusions identified in ES Chapter 13 Noise.

9.62 In terms of construction noise and vibration, the original ES assessed the impact of the proposed scheme as Minor Significance. A re-assessment of construction noise and vibration is not required, therefore no changes to the original ES 2014 are proposed, and the original conclusions identified in ES Chapter 13 Noise remain valid.