HORIZON NUCLEAR POWER

WYLFA NEWYDD

ENERGY WORKING FOR BRITAIN

Wylfa Newydd Project

6.3.5 ES Volume C - Project-wide effects C5 - Noise and vibration effects of traffic

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5 Noise and vibration effects of traffic

5.1 Introduction

5.1.1 This chapter describes the assessment of potential noise and vibration effects of traffic.

5.1.2 The assessment considers the effects of noise and vibration on both residential and non-residential receptors within the study area as a result of the operation of the A5025 Off-line Highway Improvements and road traffic changes associated with the Wylfa Newydd Project.

5.1.3 The changes in traffic noise and vibration levels assessed and reported in this chapter take into account the physical changes in the road alignments and other engineering features associated with the A5025 Off-line Highway Improvements as well as the consequent changes in road traffic flows, composition and traffic speeds associated with the Wylfa Newydd Project. This includes the traffic associated with the construction and eventual operation of the Power Station.

5.1.4 This chapter does not assess the effects of construction noise and vibration for the A5025 Off-line Highway Improvements. These are reported in chapter G6 (noise and vibration) (Application Reference Number: 6.7.6). Furthermore, the effects of construction noise and vibration associated with the new access road to the Power Station, and the new accesses to the Off-Site Power Station Facilities are reported in chapters D6 (noise and vibration) (Application Reference Number: 6.4.6) and E6 (noise and vibration) (Application Reference Number: 6.5.6) respectively. Indirect effects on the Welsh language and culture are assessed in volume B of the Welsh Language Impact Assessment (Application Reference Number: 8.21) taking into account effects on quality of life and the amenity of the local area.

5.1.5 Please refer to chapter B6 (noise and vibration) (Application Reference Number: 6.2.6) for the technical basis for the assessment including a summary of legislation, policy and guidance; key points arising in consultation that have guided the noise and vibration assessment; and assessment methodologies and criteria.

5.2 Study area

5.2.1 This section describes the study areas relevant to the noise and vibration effects of traffic.

5.2.2 The overall area of interest for this assessment is split into geographical sections, which together cover a length of approximately 20km, ranging from Holyhead to Tregele (south to north). The sections are defined below and are shown on the key to figures C5-1 to C5-3 (Application Reference Number: 6.3.32).

- Logistics Centre at Parc Cybi – Junction 2 of the A55 and surrounding road links associated with the Logistics Centre. Northeast of Junction 2 is an industrial estate, to the northwest of the junction is Holyhead, which

is an urban area of mixed residential and commercial properties. To the west of Junction 2 is Kingsland, made up of residential buildings and two schools. South and southeast of the junction the surrounding area is rural, and to the east of the junction is located Penrhos industrial estate.

- Park and Ride facility at Dalar Hir – Junction 4 of the A55 and surrounding road links associated with the Park and Ride site. Apart from the junction, this section of road is predominantly rural.
- Section 1 – Junction 3 of the A55 to Valley Junction A5/A5025 (A5025 Chainage 0m to 800m). The junction between the A5, Holyhead Road and the A5025 is included in this section, along with the first 500m stretch of the A5025. The junction of the A5 and the A5025 is currently a signalised junction on the eastern edge of Valley. Apart from the junction, this section of road is predominantly rural.
- Section 2 – Valley Junction A5/A5025 to north of Llanynghenedl (A5025 Chainage 800m to 3,400m). Section 2 runs along the A5025 from Valley towards Llanynghenedl, passing occasional residential properties both in close proximity of the road and further afield. Section 2 then passes through the village of Llanynghenedl, which is made up of residential properties.
- Section 3 – North of Llanynghenedl to north of Llanfachraeth (A5025 Chainage 3,400m to 5,600m). Section 5 is a 2.2km section of the A5025, which runs close to the village of Llanfachraeth. The area to both the north and south of the village is rural with agricultural land. The village itself has a relatively high proportion of residential properties, along with a school and small commercial properties.
- Section 4 – North of Llanfachraeth to south of Llanfaethlu (A5025 Chainage 5,600m to 8,300m). The area is rural with agricultural land.
- Section 5 – South of Llanfaethlu to north of Llanfaethlu (A5025 Chainage 8,300m to 9,800m). The Llanfaethlu section stretches 2.5km through a predominantly rural area. A small section of the road runs along the southern edge of the village, past a chapel and a public house. To the north and south of this village lies rural land with occasional residential properties. There is also a primary school along this section in Llanfaethlu. Towards the north, the section also includes the Off-Site Power Station Facilities site.
- Section 6 – North of Llanfaethlu to north of Llanrhuddlad (A5025 Chainage 9,800m to 13,100m). Section 6 runs through the village of Llanrhuddlad, which is predominantly made up of residential properties. The surrounding area of the village of Llanrhuddlad is rural.
- Section 7 – North of Llanrhuddlad to north of Cefn Coch (A5025 Chainage 13,100m to 14,400m). This is a 1.3km section, which runs through a rural area surrounded by agricultural land. There are a small number of residential properties.

- Section 8 – North of Cefn Coch to the Power Station Access Road (A5025 Chainage 14,400m to 15,900m). The surrounding land is agricultural with a small number of residential properties.
- Section 9 – The Power Station Access Road Junction would be located on a stretch of the A5025 around 700m south of Tregele.
- Tregele Village – North of the Power Station Access Road Junction to north of Tregele village. The area is predominantly rural with agricultural land and residential properties along the A5025.

Noise

5.2.3 The study and calculation areas for the noise assessment have been defined in accordance with guidance contained in Volume 11 of the Design Manual for Roads and Bridges (DMRB) [RD1]. Firstly, the study area is defined as a 1km boundary around the start and end points of the sections of the A5025 Off-line Highway Improvements, and any improved or bypassed routes as part of the Wylfa Newydd Project. The "calculation area" is then defined as all residential dwellings and other noise-sensitive receptors within 600m of the A5025 Off-line Highway Improvements, as well as those roads (within the 1km boundary) on the existing road network that are predicted to experience noise changes of 1dB in the opening year (following the 'short-term' assessment method in the DMRB) or 3dB in the design year (following the 'long-term' assessment method in the DMRB). The calculation area has been joined up along the A5025 following the road to create a continuous 600m corridor where the area was not continuous.

5.2.4 The DMRB [RD1] also requires consideration beyond the 1km boundary described above, to take into account the likely noise impacts on the wider road network (considered in terms of change in Basic Noise Level (BNL)). This is required for roads where there would be a 1dB increase or decrease in noise in the baseline year and/or a 3dB increase or decrease in the future assessment year in comparison with the baseline year. Where BNL changes beyond the 1km boundary are identified, DMRB advises to define a boundary 50m from the carriageway edge of the affected routes and include this in the study area.

5.2.5 The A5025 Off-line Highway Improvements would take place at discrete locations along the A5025 with additional road and junction alterations at each location of the Associated Development.

5.2.6 It should be noted that the new access for the Off-Site Power Station Facilities, which comprise the Alternative Emergency Control Centre (AECC), the Environmental Survey Laboratory (ESL) and the Mobile Emergency Equipment Garage (MEEG), would be located along section 5 of the A5025, where Off-line Highway Improvements are planned to take place. The Logistics Centre and the Park and Ride facilities, however, are relatively remote from sections of the A5025 Off-line Highway Improvements, other than those associated with their own localised access improvements onto the A55.

5.2.7 Taking into account the above, the resulting calculation area and study area are both shown graphically as respective outlines on the following figures, which consider the different geographical areas of interest to this chapter:

- figure C5-1 (Application Reference Number: 6.3.32) Calculation and study areas for the Logistics Centre and Park and Ride; and
- figure C5-2 (Application Reference Number: 6.3.32) Calculation and study areas for A5025 Off-line Highway Improvements and the Site Campus.

Vibration

5.2.8 The DMRB [RD1] defines the study area for the vibration assessment as within 40m of all roads where noise level predictions were undertaken.

Identified receptors

5.2.9 Figures C5-1 and C5-2 (Application Reference Number: 6.3.32) show the overall spatial extent of the study and calculation areas considered in the assessment in this chapter. The study area encompasses an area where potentially significant noise and vibration effects may occur from project-wide road traffic.

The sensitivity scale set out in chapter B6 (Application Reference Number: 6.2.6) has been applied to enable the categorisation of noise-sensitive receptors relevant to the assessment of road traffic noise and vibration, and is presented in Table C5-1.

Table C5-1 Human receptor sensitivities to noise effects

Sensitivity	Noise-sensitive receptor categories
High	Dwellings, hospitals and schools
Medium	Places of worship, open-air amenities used for recreation, community facilities and offices
Low	Commercial premises
Negligible	Industrial installations

Residential receptors

5.2.10 The following groups of residential receptors that fall within the study area have been defined, and are shown in figures C5-1 and C5-2 (Application Reference Number: 6.3.32):

- residential properties in Holyhead (Logistics Centre);
- residential properties in Kingsland, Holyhead (Logistics Centre);
- residential properties in Penrhos, east of Holyhead (Logistics Centre);
- residential properties in Llanfihangel-yn-Nhywyn (Park and Ride);
- outlying residential properties of Llanfihangel-yn-Nhywyn (Park and Ride);

- residential properties in Valley (section 1);
- outlying residential properties north of Valley (section 1);
- outlying residential properties southeast of Valley (section 1);
- residential properties in Caergeiliog (east of section 1);
- residential properties in Llanynghenedl (section 2);
- residential properties in Llanfachraeth – west (section 3);
- residential properties in Llanfachraeth – east (section 3);
- outlying residential properties north of Llanfachraeth (section 3 and section 4);
- residential properties in Llanfaethlu (section 5);
- outlying residential properties south of Llanfaethlu (section 5);
- outlying residential properties east of Llanfaethlu (section 5);
- outlying residential properties north of Llanfaethlu (section 5);
- residential properties in Llanrhuddlad (section 6);
- outlying residential properties south of Llanrhuddlad (section 6);
- residential properties in Cefn Coch (section 7);
- residential properties in Tregele (section 9);
- outlying residential properties south of Tregele (section 9); and
- outlying residential properties north of Tregele (section 9).

5.2.11 Other identified non-residential receptors are users of:

- Morswyn Primary School, Holyhead;
- Kingsland Primary School, Kingsland;
- Ysgol Gymuned Y Dyffryn Primary School, Valley;
- Llanfachraeth Primary School, Llanfachraeth;
- Llanfaethlu Primary School, Llanfaethlu;
- Llanrhuddlad Primary School, Llanrhuddlad;
- Kingdom Hall Place of Worship, Holyhead;
- Hebron Chapel Place of Worship, Kingsland;
- Hall Place of Worship, Valley;
- Old Church Hall Place of Worship, Valley;
- Hermon Chapel Place of Worship, Valley;
- Ty Capel Place of Worship, Valley;
- Abarim Place of Worship, Llanfachraeth;
- Church Place of Worship, Llanfachraeth;
- Egwys Sant Maethlu Church Place of Worship, Llanfaethlu;
- Village hall Community, Llanfachraeth;

- Village Hall Community, Llanfaethlu;
- Kingsland Primary School outdoor amenity, Kingsland;
- Holyhead Leisure Centre outdoor amenity, Kingsland;
- Holyhead Leisure Centre outdoor amenity no.2, Kingsland;
- Ynys Wen Valley Cemetery outdoor amenity, outlying east of Valley;
- Llanfachraeth play area outdoor amenity, Llanfachraeth - west;
- Dronwy Caravan Park outdoor amenity, outlying north of Llanfachraeth;
- Llanfaethlu play area outdoor amenity, Llanfaethlu;
- offices (e.g. those at the Existing Power Station);
- buildings used for retail activities, Valley;
- buildings used for retail activities, outlying north of Valley;
- buildings used for retail activities, Caergeiliog;
- buildings used for retail activities, Llanfachraeth - west;
- buildings used for retail activities, outlying north of Llanfachraeth;
- buildings used for retail activities, Llanfaethlu;
- buildings used for retail activities, Llanrhuddlad;
- buildings used for retail activities, outlying south of Llanrhuddlad; and
- buildings used for retail activities, Tregele.

5.2.12 In addition to the playing fields and play areas identified, the recreational receptor group includes users of local footpaths and other Public Rights of Way (PRoWs) within the study area (see chapter C3, public access and recreation effects of traffic, Application Reference Number: 6.3.3) for locations).

5.2.13 The assessment of effects on other outdoor recreational amenity receptors (marine leisure activity areas and the Isle of Anglesey Area of Outstanding Natural Beauty) are reported in chapter C3 (Application Reference Number: 6.3.3).

5.3 Baseline environment

5.3.1 This section provides a summary of the baseline conditions for noise and vibration within the study area described in section 5.2.

Noise

5.3.2 The collation of measured baseline data is necessary to provide a record of current ambient noise conditions and observations on local noise sources but it is not practicable to measure baseline noise level at every receptor along the route. The assessment method described in the DMRB requires that the baseline road traffic noise levels at each receptor are calculated using available input assumptions. This method allows an indication of how the baseline conditions may evolve or vary with time, even if the Wylfa Newydd Project was not to go ahead (the 'Do-Minimum' scenario), as well as indicating the overall impact at receptors as a result of the Wylfa Newydd Project going ahead and becoming operational (the 'Do-Something' scenario).

5.3.3 Predicted noise changes are established by considering the expected changes in road traffic variables, including traffic composition (i.e. types and quantities of different vehicles), speeds, road alignments, mitigation and other factors at each sensitive receptor.

Baseline surveys

5.3.4 Baseline noise monitoring results are compiled for the Wylfa Newydd Development Area, the A5025 Off-line Highway Improvements, the Logistics Centre and the Park and Ride (see appendix B6-1, baseline noise monitoring, Application Reference Number: 6.2.20). The results of all of these studies are relevant for this chapter as they spatially cover the study area of interest. A summary of the surveys below is provided in chapter B6 (Application Reference Number: 6.2.6). The baseline noise monitoring locations are shown in figures C5-1 and C5-2 (Application Reference Number: 6.3.32).

- Noise monitoring for the Wylfa Newydd Development Area were undertaken around the boundary, predominantly in autumn of 2014, with further measurements undertaken in the autumn of 2015.
- Noise monitoring for the A5025 Off-line Highway Improvements were undertaken in June and November 2015.
- Noise monitoring was undertaken at four locations in the vicinity of the Park and Ride site. Noise monitoring comprised long-term monitoring between 22 June and 8 July 2016 and an additional short-term measurement undertaken on 16 June 2016.
- Noise monitoring was undertaken at five locations in the vicinity of the Logistics Centre during May 2017 and comprised one long-term monitoring location and four additional short-term locations with measurements undertaken in the vicinity of nearby sensitive properties.

5.3.5 Noise measurements were undertaken either on a short-term or long-term basis. Environmental noise levels are inherently variable, being influenced by a number of man-made and natural factors. The survey periods were selected

to ensure that this variability was fully characterised. Full details of the equipment used and methodology employed during the surveys are presented in appendix B6-1 (Application Reference Number: 6.2.20).

Table C5-2 A5025 baseline noise monitoring summary and locations

Section	Monitoring point reference	Location	Comments
Logistics Centre	PC1	Location of proposed Logistics Centre	Long-term – duration: one week
	PC2	Adjacent to existing residential properties at Maes-Y-Delyn	Short-term
	PC3	Adjacent to existing residential properties at Kingsland Road	Short-term
	PC4	Adjacent to existing residential properties at Penrhyn Geiriol	Short-term
	PC5	Adjacent to Trearddur Bay caravan park	Short-term
Park and Ride	LT1	Sound Level Meter (SLM) positioned within a field east of Cefn Rhosydd and 52m from the London Road carriageway	Long-term – 16 days
	LT2	SLM positioned within a field close to the centre of the proposed Park and Ride and 90m north of the Holyhead Road carriageway	Long-term – 15 days
	LT3	SLM positioned within field on the	Long-term – 16 days

Section	Monitoring point reference	Location	Comments
		southern boundary of the residential home and 375m north of the Holyhead Road carriageway	
	ST1	SLM positioned within a field close to the southern boundary of the Park and Ride and 17m north of the Holyhead Road carriageway	Short-term – one day
Section 1: Valley	R1a	Glynn Villa	Long-term – nine days
	R1b	Cemetery	Short-term
Section 2: Llanynghenedl	R2a	Layby adjacent to Converted Chapel	Short-term
Section 3: Llanfachraeth	R3a	Erw Goch Bach	Long-term – nine days
	R3b	Dolydd	Long-term – nine days
	R3c	Field adjacent to Bryn Farm	Long-term – nine days
	R3d	Field adjacent to Primary School	Long-term – nine days
Section 5: Llanfaethlu and Mobile Emergency Equipment Garage	R4a	Rhos Ty Mawr	Long-term - 16 days
	R4b	Bryn Gwyn	Long-term – two days
	R4c	Layby north of Rhos Ty Mawr	Short-term
Section 6: Llanrhuddlad	R5a	Layby north of westerly turning for Cylch y Garn	Short-term
Section 7: Cefn Coch	R6a	Tyn Felin	Long-term – nine days
	R6b	Rhandir	Long-term – eight days

Section	Monitoring point reference	Location	Comments
Section 9: Power Station Access Road Junction	R7a	Taldwrst	Long-term – eight days

5.3.6 Table C5-3 presents noise levels for both daytime and night-time periods (based on time periods and statistical parameters described in the DMRB, for which both long- and short-term noise changes are considered).

Table C5-3 Summary of long-term measured baseline levels

Monitoring point reference	Measured $L_{A10\ 18\ hr}$ dB	Measured L_{night} dB
R1a	53.4	46.7
R3a	62.8	52.2
R3b	47.6	41.0
R3c	50.1	46.5
R3d	52.8	45.5
R4a	49.3	41.1
R4b	45.3	38.6
R6a	53.8	43.9
R6b	59.0	48.3
R7a	53.5	45.7
LT1	53.0	45.0
LT2	57.0	50.0
LT3	51.0	48.0
PC1	51.0	51.3

Comparison of predicted and measured noise levels

5.3.7 Table C5-4 compares predicted noise levels for the year 2016 against those measured at corresponding receptors and where $L_{A10\ 18\ hr}$ measurements were made. The comparison has been made between levels presented to one decimal place.

Table C5-4 Comparison of predicted and measured noise levels

Noise monitoring location	Measured noise level dB $L_{A10\ 18\ hr}$	Predicted noise level dB $L_{A10\ 18\ hr}$	Variation dB $L_{A10\ 18\ hr}$
R1a	53.4	56.8	3.4

Noise monitoring location	Measured noise level dB $L_{A10\ 18\ hr}$	Predicted noise level dB $L_{A10\ 18\ hr}$	Variation dB $L_{A10\ 18\ hr}$
R3a	62.8	60.6	-2.2
R3b	47.6	47.2	-0.4
R3c	50.1	N/A*	-
R3d	52.8	54.9	2.1
R4a	49.3	51.9	2.6
R4b	45.3	47.2	1.9
R6a	53.8	56.9	3.1
R6b	59.0	60.7	1.7
R7a	53.5	54.2	0.7
* no traffic data available for the local road adjacent to this monitoring location			

5.3.8 The comparison illustrates that there is good correlation between the measured and predicted noise levels, with levels varying by -2.2dB and +3.4dB. This provides an indication of the accuracy of the noise model used in the assessment.

Vibration

5.3.9 It was agreed during consultation with the Isle of Anglesey County Council there were no existing notable vibration sources around the Wylfa Newydd Development Area and that it was not necessary to collect baseline vibration information.

Evolution of baseline

5.3.10 Between the dates of the baseline noise surveys and the operation of road traffic on the completed A5025 Off-line Highway Improvements, baseline noise levels (i.e. those that would occur in the absence of the Wylfa Newydd Project) may have changed, or may be likely to change due to a number of non-project-related factors.

5.3.11 Road traffic is likely to increase over time, in common with most areas of the UK. An increase of 25% in traffic flow in the short term would generally be required before an increase in traffic noise level is likely to be perceptible.

5.3.12 An increase of this level of traffic is considered to be unlikely to occur between the baseline surveys and the completion of the A5025 Off-line Highway Improvements.

5.3.13 Any potential changes in road traffic noise levels that could occur between the dates of the surveys and the baseline year used in the assessments are automatically taken into account by virtue of the requirement to calculate the baseline scenario noise levels.

5.4 Design basis and activities

5.4.1 This section sets out the design basis for this assessment of effects. Where work on the design is currently ongoing or options remain, a worst case has been identified as the basis of this assessment. It sets out where any assumptions have been made to enable the assessment to be carried out at this stage in the evolution of the design. This section also identifies the embedded and good practice mitigation that will be adopted to reduce adverse effects as inherent design features or by implementation of standard industry best working practice.

5.4.2 As described in chapter B1 (introduction to the assessment process) (Application Reference Number: 6.2.1), the application for development consent is based on a parameter approach. This chapter has assessed a worst case scenario from a noise and vibration perspective taking into consideration the flexibility afforded by the parameters.

5.4.3 The Wylfa Newydd Project would increase Annual Average Weekday Traffic flows along the A5025 on the principal roads and bridges in and out of Anglesey and on local roads. These increases are associated with the movement of considerable quantities of materials and construction workers to and from the Wylfa Newydd Development Area, Associated Development sites, off-site accommodation facilities and to and from the Park and Ride and Logistics Centre. Similarly, once the Power Station is commissioned, traffic movements would result from the movement of the workforce to and from their place of work.

5.4.4 The impact of noise and vibration from traffic associated with the Wylfa Newydd Project on local receptors therefore needs to be considered.

General approach to assessment

5.4.5 In general, the assessment of noise levels at noise-sensitive receptors has followed the “Detailed Assessment” methodology outlined in the DMRB [RD1]. Noise levels have been calculated at all residential dwellings within the calculation area (see figures C5-1 and C5-2, Application Reference Number: 6.3.32). Noise levels at dwellings have generally been calculated at first floor level, unless the property is known to only have one floor. For single-storey dwellings, and for other sensitive receptors such as churches, schools, medical facilities and outdoor areas, predictions have been undertaken at 1.5m above ground level.

5.4.6 Consideration has also been given to likely noise effects on the wider road network, outside the calculation area. The BNL changes have been predicted for the affected routes outside the calculation area where there is a 1dB increase or decrease in noise in the baseline year and/or a 3dB increase or decrease in the future assessment year in comparison with the baseline year.

5.4.7 The modelling and assessment work has been undertaken on the basis of an assumed implementation year of the Wylfa Newydd DCO Project of 2019. This is the first year of the construction programme. Although the implementation year is subject to change, the overall programme and phasing would remain as described in chapter A2 (Project overview and introduction

to the developments) (Application Reference Number: 6.1.2). An alternative (later) implementation year would not materially change the conclusions of the assessment as the scenarios that need to be considered are relative to the implementation year and are not fixed in time.

5.4.8 The assumed year of opening of the A5025 Off-line Highway Improvements is 2020, which is the second year of the construction programme of the Wylfa Newydd DCO Project and this year is also taken to be the baseline year for this assessment.

5.4.9 The future assessment year is defined in the DMRB as the year between the baseline year and the 15th year, where then maximum impact from the A5025 Off-line Highway Improvements would occur. For the assessment reported in this chapter two future assessment years have been considered. In maintaining consistency with the requirement of the DMRB, one of the future assessment years is represented by the peak operation year from chapter C2 (traffic and transport) (Application Reference Number: 6.3.2). This is described in chapter C2 (Application Reference Number: 6.3.2) to be in the thirteenth year of operation (or the fifteenth year after the start of construction of the Wylfa Newydd Project), which for the purposes of this assessment is assumed to be, and is referred to in this chapter as, 2033.

5.4.10 The completed highway sections listed in paragraph 5.2. would be used by construction traffic associated with the construction of the WNDA Development. Construction would commence in the first year following award of development consent. It has also been necessary, therefore, to consider a second future assessment year based upon a traffic scenario which assumes the construction traffic at its peak. This is forecast to be in the fifth year of the construction programme, and for the purposes of this assessment, is referred to in this chapter as 2023.

5.4.11 Chapter C2 (Application Reference Number: 6.3.2) presents the results of the traffic modelling undertaken on a single design scenario, which assessed traffic conditions during a Reference Case (without the Wylfa Newydd Project) model run and then conditions during a run with the Wylfa Newydd Project for: 2020 (both with and without the A5025 Off-line Highway Improvements operational); 2023; and 2033. Detailed traffic data in the relevant format have been used in the prediction modelling.

5.4.12 This assessment considers noise level changes at dwellings and other sensitive receptors according to their baseline façade noise levels (i.e. where the reception point is one metre in front of the building façade and is therefore subject to reflections). The following comparisons are made in this assessment for daytime:

- Do-Minimum scenario in baseline year (2020) against Do-Minimum scenario in the future assessment year of peak operation (2033);
- Do-Minimum scenario in the baseline year (2020) against Do-Something scenario in the baseline year (2020) (with the A5025 Off-line Highway Improvements operational);
- Do-Minimum scenario in baseline year (2020) against Do-Something scenario in the future assessment year (2033).

5.4.13 A further comparative scenario has been included in the assessment to consider the specific effects that would occur during the two-year period prior to the opening of the A5025 Off-line Highway Improvements. The additional scenario considers the year of opening of the improvements, with all of the associated traffic composition changes attributable to the Wylfa Newydd Project, but without the A5025 Off-line Highway Improvements:

- Do-Minimum scenario in baseline year (2020) against Do-Something scenario in the baseline year (2020) (without the A5025 Off-line Highway Improvements).

5.4.14 With the A5025 Off-line Highway Improvements operational, the construction traffic for the Wylfa Newydd Project is expected to be at its peak during 2023. As such, the following scenario has also been included:

- Do-Minimum scenario in baseline year (2020) against Do-Something in the future assessment year of peak construction traffic (2023).

5.4.15 Where relevant, night-time assessments have been carried out for the above scenarios in addition to daytime assessments. The above scenarios ensure that the information requirements from the guidance in the DMRB are achieved, and also enable the assessment of effects to be conducted in accordance with the project-specific assessment methodology. Further detail on the scenarios assessed for daytime and night-time and how these relate to the generation of information specific to the DMRB assessment and the project-specific assessment is given in section 5.5.

5.4.16 Do-Minimum and Do-Something are abbreviated as ‘DM’ and ‘DS’, respectively, in some of the tables presented in this chapter for presentational purposes.

Calculation of road traffic noise

5.4.17 Noise level predictions have been undertaken using the CadnaA noise-modelling package due to its widespread use and proven track record. The software implements the methodology contained in the *Calculation of Road Traffic Noise* (CRTN) [RD2]. CRTN is a technical memorandum produced by the Department for Transport Welsh Office providing the definitive method of predicting road traffic noise in the United Kingdom.

5.4.18 The DMRB provides updated guidance on the use of CRTN. This includes guidance on predicting noise from dual carriageways; noise reduction corrections to be applied for low-noise surfacing systems; and the prediction of road traffic noise levels beyond the limitation of CRTN (a distance of 300m) to a distance of 600m from a road traffic source.

5.4.19 Noise level predictions take account of the following variables:

- typical weekday volumes of traffic during the 18-hour period from 06:00 to 24:00 (18-hour Annual Average Weekday Traffic flows) – for the daytime assessment;
- percentage of heavy goods vehicles (vehicles of unladen weight >3.5 tonnes);

- traffic speeds (banded speed based on Interim Advice Note 185/15 [RD3] for daytime);
- road gradient;
- local topography;
- nature of the ground cover between the road and the receptor;
- shielding effects of any intervening structures, including allowances for limited angles of view from the road and any reflection effects from relevant surfaces; and
- road surfacing type.

5.4.20 Further detailed information on the application of CRTN to this assessment is described in chapter B6 (Application Reference Number: 6.2.6), and in appendix B6-2 (noise and vibration modelling and assessment methodology report, Application Reference Number: 6.2.21).

5.4.21 For daytime $L_{A10\ 18\ hr}$ noise levels at dwellings, community facilities and other noise-sensitive properties, façade noise levels have been predicted.

5.4.22 For night-time L_{night} noise levels, the incident noise levels at the façade but without any account for noise-reflections have been predicted. This is often referred to as $L_{night\ outside}$. In this chapter, L_{night} is used interchangeably with $L_{night\ outside}$.

5.4.23 The DMRB provides specific guidance in relation to the noise-level correction that should be applied when using low-noise road surfaces (LNRSs) for new carriageways. The DMRB states that, for the future assessment year, a -3.5dB correction should be applied for an LNRS that is expected to be in place on the existing road.

5.4.24 The DMRB [RD1] also states:

"where new carriageways are to be constructed and a thin surfacing system [low-noise surfacing] used, or where an existing surface is to be replaced with a thin surfacing system, a -3.5dB correction should be assumed for the thin surface system…. ...unless any information is available regarding the specific surface to be installed. This advice applies where the mean traffic speed is >=75kph (47mph). Where the mean speed is <75kph (47mph), a -1dB correction should be applied to a new low-noise surface."

5.4.25 The assumptions made for this assessment are in line with the guidance provided in the DMRB.

5.4.26 An adapted calculation methodology has been applied for the calculation of night-time road traffic noise levels (as described in later in this section).

5.4.27 The traffic data and associated traffic speeds used in this assessment have been supplied by the Wylfa Newydd Project's traffic and transport engineers. The basis of the input data is described in chapter C2 (Application Reference Number: 6.3.2). The traffic data have been converted into suitable formats for each link of the road traffic noise model. Summary information on the input traffic data is presented in appendix C5-1 (Operational road traffic noise input and output, Application Reference Number: 6.3.29).

Assessment of road traffic noise and vibration

5.4.28 The DMRB provides prescriptive guidance on the information that is to be reported for the impact assessment of noise and vibration from new or altered trunk roads. The assessment reported in this chapter provides the information to meet those requirements and those of the Wylfa Newydd Project-specific assessment methodology.

Noise change

5.4.29 Section 3 of the DMRB provides guidance on the magnitude of traffic noise impacts. Magnitudes of impact are considered in both the short term and long term. A change in road traffic noise of 1dB(A) in the short term, for example when a project is opened, is the smallest that is considered perceptible. In the long term, a 3dB(A) change is considered perceptible. The classification of noise impact, provided by the DMRB, has been adapted for direct use with the project-specific significance criteria set out in chapter B1 (Application Reference Number: 6.2.1).

5.4.30 The magnitude of daytime noise change criteria used in this assessment, adapted from the DMRB impact scales, are presented below in Table C5-5 and Table C5-6 for short-term and long-term assessments respectively.

Table C5-5 Magnitude of daytime noise change in the short term

Magnitude of change	Noise change dB $L_{A10,18h}$	Significance
Large	>= 5.0	Major (significant)
Medium	3.0 – 4.9	Major (significant)
Small	1.0 – 2.9	Moderate (significant)
Negligible	0.1 – 0.9	Minor (not significant)
No effect	0	Negligible (not significant)

Table C5-6 Magnitude of daytime noise change in the long term

Magnitude of change	Noise change dB $L_{A10,18h}$	Significance
Large	>= 10.0	Major (significant)
Medium	5.0 – 9.9	Major (significant)
Small	3.0 – 4.9	Moderate (significant)
Negligible	0.1 – 2.9	Minor (not significant)
No effect	0	Negligible (not significant)

5.4.31 The adapted assessment criteria for this project also include consideration of the absolute road traffic noise level when assessing the significance of the effect caused by the magnitude of change. The free-field noise level value of 50dB $L_{Aeq\ 16\ hr}$ is based upon guidance presented in the *Guidelines for Community Noise* [RD4], which identifies that 50dB $L_{Aeq\ 16\ hr}$ represents the

outside daytime noise level below which the majority of the adult population will be protected from becoming moderately annoyed.

5.4.32 According to the *Guidelines for Community Noise* [RD4], an external incident noise level (free-field) of 50dB $L_{Aeq\ 16\ hr}$ would result in a noise level within a property of 35dB $L_{Aeq\ 16\ hr}$ when taking into account a typical reduction from a partially open window. A noise level of 35dB $L_{Aeq\ 16\ hr}$ inside dwellings is used in the *Guidelines for Community Noise* [RD4] as a level which is intended to preserve indoor speech intelligibility as well as avoiding moderate annoyance to occupants during daytime and evening.

5.4.33 Where the overall exposure to road traffic noise is less than 50 dB $L_{Aeq\ 16\ hr}$ the magnitude of change in road traffic noise is assessed to be of negligible significance.

5.4.34 Both adverse and beneficial noise changes are assessed.

5.4.35 A significant adverse daytime noise effect is identified where the noise increase is predicted to be at least a small magnitude of change, and the overall road traffic noise level is predicted to be equal to or above 50 dB $L_{Aeq,16hr}$.

5.4.36 A significant beneficial daytime noise effect is identified where the noise reduction is predicted to be at least a small magnitude of change, but the existing road traffic noise level is already equal to or above 50 dB $L_{Aeq,16hr}$.

Non-residential receptors

5.4.37 The DMRB requires that the noise changes applicable for residential receptors are also reported for non-residential receptors in the assessment summary tables.

5.4.38 The daytime noise criteria used in this assessment for non-residential receptors are based upon thresholds for the onset of potential significant effects from road traffic noise, as presented in Table C5-7 below. It has therefore not been necessary to attribute receptor sensitivity to non-residential receptors.

Table C5-7 Noise level thresholds for the onset of potential significant adverse effects at non-residential receptors.

Receptor type	External free-field road traffic noise level that relates to the onset of a potential significant adverse effect, dB $L_{Aeq\ T}$	Relevant guidance	Description of guideline level
Educational	45	Building bulletin 93 [RD5]	Level below which no special measures likely to be necessary to protect buildings or

Receptor type	External free-field road traffic noise level that relates to the onset of a potential significant adverse effect, dB $L_{Aeq\ T}$	Relevant guidance	Description of guideline level
			playing fields from external noise.
Places of worship	47	BS 8233 [RD6]	Internal acoustic design criterion for new places of worship of 35dB(A).
Commercial	52	BS 8233 [RD6]	Internal acoustic design criterion for offices in new buildings of 40dB(A).
Industrial	52	BS 8233 [RD6]	Internal acoustic design criterion for offices in new buildings of 40dB(A).
Other	>=3dB change	Technical Advice Note 11: Noise [RD7]	A change of 3dB(A) is the minimum perceptible under normal conditions

5.4.39 Only daytime effects (and including the evening) are of relevance to the above non-residential receptor classifications.

5.4.40 A potential significant adverse effect is identified where the road traffic noise is predicted to increase by at least 3dB, and the overall road traffic noise level is predicted to be equal to or above the relevant threshold.

5.4.41 A potential significant beneficial effect is identified where the road traffic noise is predicted to reduce by at least 3dB, but the existing road traffic noise level is already equal to or above the relevant threshold.

5.4.42 For ‘other’ non-residential receptor classifications that do not have directly applicable absolute guideline levels set out in the table above (including PRoWs, community facilities and other outdoor areas), potential significant adverse or beneficial effects have been identified where the road traffic noise is expected to change by at least 3dB.

Noise nuisance

5.4.43 The DMRB requires the presentation of a noise nuisance assessment. It defines the level of noise 'nuisance' by reference to the percentage of people in the affected population that are likely to be 'bothered very much or quite a lot' by traffic noise. Gradual increases in noise are expected to produce a gradual and proportionate increase in the nuisance level (i.e. the percentage of the population that is bothered). However, sudden increases in the noise level are expected to result in an initial large increase in the nuisance level. This new level of nuisance appears to persist for several years at least but, in the longer term, nuisance levels tend back towards those expected for a gradual increase in noise.

5.4.44 Noise nuisance predictions have been based on the highest nuisance levels expected during the first 15 years of operation for the Do-Minimum and Do-Something scenario (2033) and compared to the nuisance levels of the Do-Minimum baseline year (2020). In accordance with the methodology presented in the DMRB, an assessment of noise nuisance for all properties situated within the calculation area has been undertaken and reported.

Ground-borne vibration

5.4.45 The DMRB advises that vibration can cause impacts on buildings and disturbance to occupiers.

5.4.46 The DMRB reports that extensive research has found no evidence that traffic induced vibrations are a source of significant damage to buildings, and that vibration that can be felt indoors and which often cause occupants anxiety are an order of magnitude smaller than would be needed to activate pre-existing strains and cause even cosmetic damage.

5.4.47 The DMRB advises that should the level of vibration at a receptor be predicted to rise to above a level of 0.3mm/s, or an existing level above 0.3mm/s is predicted to increase, then this should be classed as an adverse impact from vibration.

5.4.48 The DMRB states that "*significant ground-borne vibrations may be generated by irregularities in the road surface. Such vibrations are unlikely to be important when considering disturbance from new roads and the assessment will only be necessary in exceptional circumstances*".

A5025 Off-line Highway Improvements

5.4.49 The A5025 Off-line Highway Improvements include the construction of new roads and the intrinsic construction of road surfaces to specifications which would not introduce irregularities.

5.4.50 In addition, the Transport and Road Research Laboratory Report No RR53 [RD8] provides a summary of measurements taken which indicates the relative effects of various construction-related sources. The report indicates that, for a heavy lorry on a poor road surface at 8m a peak particle velocity (PPV) of 0.1mm/s is expected. The same research indicates that 0.3mm/s is reached at a distance of 4m.

5.4.51 The shortest distance between a sensitive receptor and the running surface of the proposed A5025 Off-line Highway Improvements is around 5m. The receptor is located close to where the improvements are planned to connect into the alignment of the existing on-line sections of roads. At these locations, however, there are no situations where the A5025 Off-line Highway Improvements bring the carriageway alignment edge any closer than the current on-line alignment and hence ground-borne vibration would be no higher than currently experienced. Given that the proposed road running surface is expected to be improved when the A5025 Off-line Highway Improvements are constructed, operational ground-borne vibration is not considered to be a significant issue.

A5025 On-line Highway Improvements

5.4.52 Prior to the construction and operation of the A5025 Off-line Highway Improvements, the sections of road along the A5025 On-line Highway Improvements will have been resurfaced with an LNRS. This process includes the re-profiling of vertical road alignment to the required specifications which will preclude the introduction of any irregularities and rectify any existing irregularities.

5.4.53 Increases in PPV are not expected along on-line sections of road for two reasons. Firstly, the heaviest vehicle types in the traffic composition that will operate on the on-line sections with the Wylfa Newydd Project (during the year of opening, peak construction year and peak operation year) would be no different to those operating without the Wylfa Newydd Project. Secondly, the road surfaces will have been improved during the LNRS installation.

Summary

5.4.54 On the basis of the above, ground-borne vibration at any sensitive receptor is not expected to rise to above a level of 0.3mm/s, and an existing level above 0.3mm/s is not expected to increase. As such, no adverse effects on occupiers of buildings are likely from ground-borne vibration.

5.4.55 As no increase in PPV levels are expected on on-line sections of route, and the PPV levels are expected to be below 0.3mm/s at buildings alongside the A5025 Off-line Highway Improvements, no adverse effects on buildings are likely.

5.4.56 In the Scoping Report addendum [RD9] it was proposed to scope out an assessment of vibration for the A5025 Off-line Highway Improvements. In responding to this proposal the Secretary of State (SoS) states: "*The SoS agrees with this approach for the operational phase however for clarity, the SoS considers that vibration should be considered during the construction phase*". Therefore, ground-borne vibration from construction of the A5025 Off-line Highway Improvements is assessed and reported in chapter G6 (Application Reference Number: 6.7.6).

5.4.57 For the purposes of the assessment reported in this chapter which deals only with the project-wide effects of road traffic noise and vibration, ground-borne vibration has been scoped out and is not considered further in this chapter.

Airborne vibration nuisance

5.4.58 Notwithstanding the SoS's agreement to scope out the vibration assessment, the assessment of airborne vibration nuisance has been retained in this chapter for the following reasons:

- presentation of the results from a vibration nuisance assessment is a requirement of DMRB; and
- whilst ground-borne vibration has not been considered further in this chapter as explained above, DMRB states that ground-borne vibration is much less likely to be the cause of disturbance than airborne vibration.

5.4.59 Disturbance due to traffic-induced airborne vibration has been found to be closely correlated with the $L_{A10,18h}$ noise index, and can hence be assessed using noise modelling, rather than vibration models.

5.4.60 The DMRB method for assessing airborne vibration nuisance has been included for the following comparative scenarios:

- Do-Minimum scenario in baseline year against Do-Minimum scenario in the future assessment year (year of peak operation in 2033); and
- Do-Minimum scenario in baseline year against Do-Something scenario in the future assessment year (year of peak operation in 2033).

5.4.61 The above scenarios are only applicable in the long-term assessment of airborne vibration using steady-state annoyance relationships.

5.4.62 DMRB states that the percentage of people bothered very much or quite a lot by vibration is 10% lower at all exposure levels than the corresponding figure for noise nuisance. Below 58dB $L_{A10,18h}$ the percentage of people bothered by traffic induced vibration is assumed to be zero.

Night-time noise assessment

The DMRB assessment methodology

5.4.63 An assessment of night-time noise levels has been undertaken following the assessment method given in the DMRB. The DMRB advises that consideration be given to those receptors that are predicted to experience a noise level change in the long term and which are exposed to an $L_{night\ outside}$ noise level of 55dB or greater in any scenario. This approach has been followed and the required information reported.

5.4.64 Further detail on the scenarios assessed for night-time and how these relate to the generation of information specific to both the DMRB assessment and the project-specific assessment is given in section 5.5.

Project-specific assessment methodology

5.4.65 The DMRB methodology approach has been adapted to take into account the specific considerations associated with the expected night-time movements of Public Service Vehicles (PSVs) and the other changes in traffic composition for the Wylfa Newydd Project.

5.4.66 The development of appropriate assessment criteria for night-time noise is based upon consideration of the potential effects arising from the following:

- magnitude of change in noise levels;
- sleep disturbance from noise; and
- adverse health effects from noise.

5.4.67 Maximum noise levels (using the $L_{Amax, F}$ indicator) have been considered in the assessment of potential sleep disturbance. The lower threshold for the onset of potential sleep disturbance is considered to be a free-field noise level of 60dB $L_{Amax, F}$ at the façade of a property based upon guidance set out in the *Guidelines for Community Noise* [RD4].

5.4.68 An absolute external free-field noise level of 40dB L_{night} is considered a health-based limit value necessary to protect the public, including most of the vulnerable groups such as children, the chronically ill and the elderly, from the adverse health effects of night noise as set out in the *Night Noise Guidelines for Europe* [RD10].

5.4.69 An external free-field noise level of 55dB L_{night} is considered to be a value above which adverse health effects can occur frequently, as described in the *Night Noise Guidelines for Europe* [RD10]. The adopted criteria therefore recognise the need to protect the public from increases in existing road traffic noise at and above this level.

5.4.70 The derivation and justification for the night-time road traffic noise assessment methodology is described in detail in appendix B6-2 (Application Reference Number: 6.2.21).

5.4.71 In summary, the main features of the adapted night-time noise assessment criteria are described below.

- Night-time road traffic noise has been assessed using both the $L_{Aeq\ T}$ and $L_{Amax, F}$ noise indicators.
- Road traffic noise levels at 40dB L_{night} or below are not considered to be significant.
- Night-time magnitudes of noise change are assessed using the free-field $L_{Aeq\ 8\ hr}$ (or L_{night}) indicator.
- For those receptors with existing road traffic noise levels at or above 55dB L_{night}, a significant adverse effect (assessed using the short-term magnitude of change criteria from the DMRB) is identified where a night-time noise change of 1dB or more is predicted.
- For those receptors with existing road traffic noise levels below 55dB L_{night}, a significant adverse effect is identified where a noise change of 3dB or more is predicted.
- Individual road traffic pass-by noise levels below 60dB $L_{Amax, F}$ are unlikely to cause adverse sleep disturbance effects and are therefore not considered to give rise to adverse effects alone.

5.4.72 It should be noted that the above approach is considered to be relevant and proportionate given the specific night-time traffic composition expected to occur once the A5025 Off-line Highway Improvements become operational and the WNDA Development is under construction. The approach is considerably more cautious than the current DMRB requirement to only consider those receptors where the $L_{night\ outside}$ noise level from road traffic in any scenario is greater than 55dB and where a 3dB change occurs in the long term.

5.4.73 The World Health Organization's *Guidelines for Community Noise* [RD4] advise that "*for a good sleep*" the appropriate maximum indoor (or outdoor) noise level criterion should not be exceeded "*more than 10 - 15 times per night*". An assessment of the number of road traffic $L_{Amax,\ F}$ occurrences has been included in this chapter, in the context of both the pre-existing road traffic noise and the expected changes associated with the Wylfa Newydd Project. The potential effects of such occurrences are reported at a commentary level.

5.4.74 Table C5-8 below presents the night-time noise assessment criteria adopted for the project-wide effects.

Table C5-8 Magnitude of change criteria for night-time noise

Magnitude of change	Noise change dB L_{night}		Significance
	Existing traffic noise level, <55dB L_{night}	Existing traffic noise level, >=55dB L_{night}	
Large	>=10.0	>=5.0	Major (significant)
Medium	5.0 – 9.9	3.0 – 4.9	Major (significant)
Small	3.0 – 4.9	1.0 – 2.9	Moderate (significant)
Negligible	0.1 – 2.9	0.1 – 0.9	Minor (not significant)
No effect	0	0	Negligible (not significant)

5.4.75 Both adverse and beneficial noise changes are assessed.

5.4.76 A significant adverse night-time noise effect is identified where the noise increase is predicted to be at least a small magnitude of change, and the overall road traffic noise levels are predicted to be above 40 dB L_{night} and equal to or above 60 dB $L_{Amax,F}$.

5.4.77 A significant beneficial night-time noise effect is identified where the noise reduction is predicted to be at least a small magnitude of change, but the existing road traffic noise levels are already above 40 dB L_{night} and already equal to or above 60 dB $L_{Amax,F}$.

5.4.78 An appraisal of the quantities of night-time $L_{Amax,F}$ events, and the changes in $L_{Amax,\ F}$ absolute levels, associated with the increase in traffic due to the Wylfa Newydd Project and the operation of the A5025 Off-line Highway Improvements has also been undertaken to provide context to, and complement, the assessment of significant adverse effects.

Calculation methodologies for night-time noise

5.4.79 As the night-time traffic composition is expected to have relatively low flows of mixed vehicle types, and because the indicators of interest are L_{night} and $L_{Amax, F}$, it is not appropriate to apply the traffic noise calculation methodology set out in CRTN directly.

5.4.80 Whilst methods exist that enable a conversion of the $L_{A10\ 18\ hr}$ to $L_{Aeq\ T}$ (including L_{night}) within a Transport Research Laboratory report [RD11], the reliable application of the corrections assume more typically occurring traffic flows and composition throughout the day and night. This is unlikely to be the case for the project-wide highways network considered in this assessment once the Wylfa Newydd Project is being constructed and operated. Further, the Transport Research Laboratory method indicates that correlation of the conversion becomes unstable with increasingly low traffic flows, and hourly flows in the surrounding area (as low as a single vehicle movement per hour during the night) fall well below the level at which the CTRN prediction methodology is deemed to be unreliable (50 veh/h).

5.4.81 As such, an adapted night-time road traffic noise calculation methodology has been developed and applied for both $L_{Aeq\ T}$ and $L_{Amax, F}$. The derivation and justification for the night-time road traffic calculation methodologies is described in detail in appendix B6-2 (Application Reference Number: 6.2.21). This adapted calculation methodology for night-time $L_{Aeq\ T}$ has also been used to determine the information required to be presented under the DMRB, rather than the $L_{A10,T}$ to $L_{Aeq,T}$ conversion method advised in DMRB.

Maximum sound pressure level $L_{Amax, F}$

5.4.82 Because the $L_{Amax, F}$ criterion value is based upon a threshold for the onset of a potential adverse sleep disturbance effect (and not a scale of magnitude of change), the approach adopted in this assessment has been to calculate a horizontal 'buffer zone' around the the road segments within the study area (sections 1 to 9 and at Tregele Village, and near to the Associated Development), which shows the approximate distance within which the potential adverse sleep disturbance effects from $L_{Amax, F}$ alone could be expected to occur. This is considered to be represented by a free-field noise level of 60 dB $L_{Amax,F}$ at the façade of a property based upon guidance set out in the WHO guidelines for community noise [RD4].

5.4.83 The 60 dB $L_{Amax,F}$ buffer zone has been calculated using a simplified calculation method. The justification for the adopted methodology is described in detail in chapter B6 (Application Reference Number: 6.2.6) and appendix B6-2 (Application Reference Number: 6.2.21) and summarised below.

- A speed-dependent source term ($L_{Amax, F}$) at a distance 7.5m from the assumed source line of traffic has been derived for each type of vehicle operating at night.
- Reference source levels (at 7.5m) have been calculated for each link that lies within the study area, corrected for speed (either maximum permitted speed for the vehicle type or the speed limit for the section of road, whichever is the lower).

- Where applicable, a correction has been made to account for any LNRSs.
- Where applicable, a cautious 5dB reduction in $L_{Amax, F}$ has been applied to account for roadside noise barriers where these are proposed as embedded mitigation in the design of the A5025 Off-line Highway Improvements.
- The buffer distance around each link (for free-field 60dB $L_{Amax, F}$) has been calculated assuming hemispherical geometrical spreading from a point source using a 20 x log (d/d_{ref}) relationship, where d is distance and d_{ref} is the reference distance.
- The overall buffer zone has been generated from an outline of the individual buffer zones calculated for each type of vehicle around each link.

5.4.84 No further corrections have been applied in the noise model (to account for intervening buildings, other topographical features, propagation over soft ground and air absorption), ensuring that the resulting buffer zone errs on the side of caution and is considered to be conservative.

5.4.85 The buffer zones have been used to assist in the quantification of the total number of residential receptors which could be at risk from potential sleep disturbance for the highest potential $L_{Amax, F}$ expected from any vehicle classification.

Night-time $L_{Aeq\ 8\ hr}$ (or L_{night})

5.4.86 The night-time L_{night} calculation model is described and justified in detail in chapter B6 (Application Reference Number: 6.2.6) and summarised below.

- The source $L_{Amax, F}$ level at 7.5m (referred to above) is converted to a Sound Exposure Level (or L_{AE}) value at a distance of 10m using basic acoustical principles.
- The L_{AE} values have been converted to an equivalent L_{night} value for each road link taking into account the traffic composition and speeds.
- The equivalent $L_{Aeq\ 8\ hr}$ values have been input into the existing CadnaA models as replacement BNLs, and levels calculated at each façade of each receptor on each floor.
- The calculations have been repeated for each relevant night-time Do-Minimum and Do-Something scenario.

Eligibility for noise insulation

5.4.87 Where, despite the application of all reasonably practicable embedded and good practice mitigation measures, there remains a need to provide further protection to occupants from the effects of construction and/or operational noise inside buildings, the provision of additional sound insulation treatments to the affected properties is an achievable and effective additional measure.

5.4.88 Where new or altered highways are planned, there are statutory duties on the responsible authority to offer insulation where certain eligibility criteria are met.

The Noise Insulation Regulations 1975

5.4.89 Under the Noise Insulation Regulations 1975 (as amended), the relevant highways authority has a duty to offer to insulate the habitable rooms (which include dining rooms and studies) and bedrooms of dwellings affected by new or altered roads, if the dwellings satisfy the following criteria:

- the residential premises would be within 300m of the new or altered highway;
- the noise level 15 years after opening would not be less than 68dB $L_{A10\ 18h}$;
- the predicted noise level 15 years after opening is calculated to be at least 1dB above the level before work commences; and
- the improved highway would contribute at least 1dB to the final noise level.

Local Noise Mitigation Strategy (LNMS)

5.4.90 The following sets out the proposed noise criteria for road traffic noise insulation for all residential properties within the defined study area. The criteria have been developed specifically for the A5025 Off-line Highway Improvements and the anticipated changes in traffic composition associated with the Wylfa Newydd Project and are to be published in the LNMS.

5.4.91 The LNMS, as set out in the Wylfa Newydd Code of Construction Practice (CoCP) (Application Reference Number: 8.6), builds upon the statutory requirements and extends the scope of eligibility in the strategy to meet the specific circumstances associated with the Wylfa Newydd Project.

5.4.92 The daytime criteria refer to façade noise levels which are assessed at 1m from the façade of the building and include the noise contribution from reflected noise from the façade.

5.4.93 The night-time criteria refer to free-field noise levels which are assessed at 1m from the façade of the building and exclude the noise contribution from reflected noise from the façade.

5.4.94 For the purposes of the noise insulation criteria outlined below, eligibility as a result of the Wylfa Newydd Project includes consideration of the associated traffic changes (as a result of both construction and operation of the Wylfa Newydd Project) and the inclusion of the A5025 Off-line Highway Improvements. By identifying eligibility at properties alongside unaltered sections of the existing A5025, as well as those affected by new realigned sections introduced under the A5025 Off-line Highway Improvements, the LNMS goes beyond what would be required under the Noise Insulation Regulations alone.

5.4.95 The Relevant Noise Level is the maximum noise level within 15 years caused by the construction or operation of the Wylfa Newydd Project and the Prevailing Noise Level is the noise level just prior to the Wylfa Newydd Project's construction commencing.

5.4.96 The noise insulation criteria are presented in Table C5-9 below.

Table C5-9 Noise insulation criteria for road traffic noise associated with the Wylfa Newydd Project

Time of day	Condition	Eligibility criteria
Daytime (06:00 to 24:00)	For all highways	To follow the Noise Insulation Regulations 1975 (as amended). i. The Relevant Noise Level (after rounding to the nearest whole number) from all road traffic must be at least 68dB $L_{A10\ 18\ hr}$ after the Wylfa Newydd Project commences construction or becomes operational. ii. Noise from the Wylfa Newydd Project must contribute 1dB to the Relevant Noise Level. iii. The Relevant Noise Level must have increased by at least 1dB above the Prevailing Noise Level. iv. Property within 300m of the A5025 Off-line Highway Improvements. v. Façade has window or door of eligible room.
Night-time (23:00 to 07:00)	For all highways	i. The Relevant Noise Level during the Wylfa Newydd Project implementation (after rounding to the nearest whole number) $L_{Amax,\ F}$ is at least 60dB. ii. Prevailing Noise Level L_{night} is at least 55dB or more, and the Relevant Noise Level L_{night} must be at least 1dB higher than the Prevailing Noise Level L_{night}. iii. Property within 300m of the highway. iv. Façade has window or door of eligible room designated for sleeping at night
The design of the noise insulation package should comply with specification of the insulation works as described in Schedule 1 of The Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996.		

Initial estimates of noise insulation eligibility

5.4.97 This chapter is concerned with identifying and assessing the likely significant noise and vibration effects associated with the operation of the A5025 Off-line Highway Improvements and road traffic changes associated with the Wylfa Newydd Project. Under the assessment framework applied for the Wylfa Newydd Project, the provision of noise insulation is not considered to be a method of reducing or remedying such significant effects at individual properties.

5.4.98 Nevertheless, initial estimates of the quantities of residential receptors potentially eligible for noise insulation under the LNMS have been identified

for information in this chapter based upon the following simplified screening criteria:

- daytime;
  - façade noise level from all road traffic is predicted to be at least 68dB $L_{A10\ 18\ hr}$ after the opening of the A5025 Off-line Highway Improvements; and
  - the road traffic noise level increases by at least 1dB.
- night-time;
  - the maximum noise level from road traffic is expected to be 60dB $L_{Amax,\ F}$ or more; and
  - existing L_{night} =>55dB and change in L_{night} is at least 1dB.

Road surfaces

5.4.99 The existing and unaltered roads on sections 1, 3, 5 and around the Logistics Centre would have Hot Rolled Asphalt in 2020, as these sections would eventually be bypassed.

5.4.100 The existing and unaltered roads on sections 2, 4, 6, 8 and around the Park and Ride would be treated with LNRS as part of the earlier A5025 On-line Highway Improvements, assumed to be in place by 2020. This has the effect of introducing lower baseline noise levels at receptors adjacent to these sections of road for the 2020 baseline year than would be case if these roads had not been treated with LNRS.

5.4.101 The new bypass at Valley (section 1) would be surfaced with Hot Rolled Asphalt in 2020.

5.4.102 The new bypasses at Llanfaethlu (section 5), Llanfachraeth (section 3), Cefn Coch (section 7) and the road in section 9 around the Power Station Access Road would be treated with LNRS in 2020.

5.4.103 LNRS corrections in the assessment have only been applied where the traffic speed is greater than 75kph (47mph), in line with the guidance contained within the DMRB.

5.4.104 Figure C5-3 (Application Reference Number: 6.3.32) shows schematically the LNRS assumptions used in the modelling across the local road network within the study area used in the Do-Minimum and Do-Something scenarios that have been assessed.

Opening year of the A5025 Off-line Highway Improvements

Basis of assessment and assumptions

5.4.105 The assessment of road traffic noise during the opening year of the A5025 Off-line Highway Improvements in 2020 is required by the DMRB guidance. It requires the use of the short-term assessment method.

5.4.106 Two separate 2020 opening year scenarios have been assessed, one without and one with the bypasses in operation. The first scenario provides an

indication of the likely effects that would be experienced during the period when the construction of the Wylfa Newydd Project has commenced but before the A5025 Off-line Highway Improvements are completed and operational. These two scenarios have been included and compared side by side to provide a quantifiable assessment of the noise benefits of the bypasses in the short-term. Both have been assessed separately against a baseline 2020 scenario (representing conditions that would prevail in the absence of the Wylfa Newydd Project).

5.4.107 Full details related to the derivation of the existing and proposed traffic data used in this assessment and a list of committed developments included in the data are presented in chapters C2 (traffic and transport) (Application Reference Number: 6.3.2) and I2 (scope) (Application Reference Number: 6.9.2).

5.4.108 Appendix C5-1 (Application Reference Number: 6.3.29) presents a summary of the road traffic flow data applied for each link along with the assumed traffic speeds for the scenarios considered.

5.4.109 All bus traffic (PSVs) is assumed to be of a standard diesel variant.

5.4.110 The preliminary design of the noise barrier arrangement along the A5025 Off-line Highway Improvements and used in the assessment, assumes that the noise barriers are positioned as close as practicable to the edge of the carriageway verge, and are acoustically reflective.

Embedded mitigation

5.4.111 The A5025 Off-line Highway Improvements would lead to noise reductions at residential receptors close to the existing A5025 alignment and provide benefits to the wider road network, as per the Phasing Strategy (Application Reference Number: 8.29).

5.4.112 Noise barriers would be constructed along the eastern and western side of section 3. The heights, positions, orientations and acoustic properties (e.g. reflective or absorptive) of the noise barriers would be subject to review and finalisation during the detailed design stages of the A5025 Off-line Highway Improvements, as per the Design and Access Statement, volume 3 (Associated Development and Off-Site Power Station Facilities) (Application Reference Number: 8.2.3).

5.4.113 Barrier optimisation has centred on predictions for the peak construction year and, specifically, the bypass at Llanfachraeth (section 3) where greater adverse effects have been identified. The benefit afforded by noise barriers of different lengths along both sides of the bypass have been examined, based upon the result of adding incremental portions of barrier along sections determined by the topographical characteristics of the landscape design of the bypass. In particular, these have been determined by extending over bridges, into underpasses, areas of cutting and sections of embankment. Front-line receptors have formed the basis of the optimisation, for the east and west barrier options examined separately, with calculations to identify whether the barrier segments provide a beneficial reduction in noise of 1dB or more. The preliminary barrier height assumed in this assessment has been restricted to

2m above ground based upon the need to strike a balance between noise mitigation requirements, limiting visual intrusion, and ensuring engineering practicability.

5.4.114 The preliminary design of the noise barrier arrangement used in the modelling and assessment reported in this chapter assumes that the height of the barrier remains continuous along its entire length on both sides of the carriageway. The heights, positions, orientations and acoustic properties (e.g. reflective or absorptive) of the noise barriers would be subject to review and finalisation during the detailed design stages of the A5025 Off-line Highway Improvements.

5.4.115 At this time, however, it is reasonably foreseeable that the detailed arrangements of the noise barriers as they traverse on and off the viaduct structure crossing the Afon Alaw, would need to be restricted to a height of 1m above carriageway due to the specific engineering practicability and visual constraints that apply along this structure. To ensure that this chapter reports a worst case, a localised sensitivity study has been undertaken to assess how the road traffic noise effects adjacent to the viaduct as reported in this chapter might change as a result of a reduced noise barrier height of 1m on the viaduct section, compared to those associated with continuous 2m high noise barriers. The scope of, and results from, this sensitivity study are presented in detail in section 5 of appendix C5-1 (Application Reference Number: 6.3.29).

5.4.116 Future design optimisation activities are also envisaged at other locations where the 2m high noise barriers have been assumed in the noise modelling.

5.4.117 Once finalised, any variation in height, orientation and acoustic property that is to be accommodated into the design would have been subject to further localised noise assessments as appropriate to ensure that the conclusions of the project-wide assessments are no worse than those reported in this chapter and that they meet the specific requirements of any design-related noise commitments and relevant planning conditions.

5.4.118 LNRS would be used on the new bypasses at Llanfaethlu (section 5), Llanfachraeth (section 3), Cefn Coch (section 7) and the Power Station Access Road Junction (section 9), as per the Design and Access Statement, volume 3 (Associated Developments and Off-Site Power Station Facilities) (Application Reference Number: 8.2.3).

Good practice mitigation

5.4.119 Construction traffic using the road links identified within the study area would be controlled in accordance with the management strategies set out in the Wylfa Newydd CoCP (Application Reference Number: 8.6).

5.4.120 Other non-construction related traffic using the completed highways improvements would be controlled in accordance with the management strategies set out in the A5025 Off-line Highway Improvements sub-CoCP (Application Reference Number: 8.12).

Peak construction

5.4.121 A peak in construction traffic flows associated with the relevant component parts of the Wylfa Newydd Project coinciding with a peak in traffic associated with the operation of Associated Developments is predicted in 2023.

Basis of assessment and assumptions

5.4.122 The assessment of road traffic noise during the construction phase in 2023 captures the peak Wylfa Newydd Project construction effects based on maximum total worker and construction vehicle movements for all elements of the Wylfa Newydd Project.

5.4.123 The 2023 peak construction scenario was assessed against a baseline 2020 scenario (representing conditions that would prevail in the absence of the Wylfa Newydd Project).

5.4.124 Full details related to the derivation of the existing and proposed traffic data used in this assessment and a list of committed developments included in the data are presented in chapters C2 (Application Reference Number: 6.3.2) and I2 (Application Reference Number: 6.9.2).

5.4.125 Appendix C5-1 (Application Reference Number: 6.3.29) presents a summary of the road traffic flow data applied for each link along with the assumed traffic speeds for the scenarios considered.

5.4.126 All bus traffic (or PSVs) is assumed to be of a standard diesel variant.

5.4.127 All noise barriers proposed in the A5025 Off-line Highway Improvements are assumed to be positioned as close as practicable to the edge of the carriageway verge, and are assumed to be acoustically reflective.

Embedded mitigation

5.4.128 There are a number of measures included in the design that would reduce the noise and vibration effects from road traffic during the construction phases of the Wylfa Newydd Project. These measures have been taken into account in the assessments. The inherent mitigation is summarised below.

I. Construction and use of the Marine Off-Loading Facility to deliver the bulk of materials to the Wylfa Newydd Development Area, as using marine vessels significantly reduces the number of heavy goods vehicle movements on the road network. This would lead to reduced noise effects at residential receptors close or adjacent to the A5025.

II. Construction and use of the Park and Ride would significantly reduce the number of car movements on the A5025. This would lead to reduced noise effects at residential receptor locations close, or adjacent to, the A5025.

III. Construction of the Logistics Centre would enable consolidation of loads to reduce traffic along the A5025 and allow traffic management to reduce peak-time deliveries to the Power Station.

5.4.129 The A5025 Off-line Highway Improvements would lead to noise reductions at residential receptors close to the existing A5025 alignment and provide

benefits to the wider road network, as per the Phasing Strategy (Application Reference Number: 8.29).

5.4.130 Noise barriers would be constructed along the eastern and western side of section 3. The heights, positions, orientations and acoustic properties (e.g. reflective or absorptive) of the noise barriers would be subject to review and finalisation during the detailed design stages of the A5025 Off-line Highway Improvements, as per the Design and Access Statement, volume 3 (Application Reference Number: 8.2.3).

5.4.131 As described above, LNRS would be used on the new bypasses at Llanfaethlu (section 5), Llanfachraeth (section 3), Cefn Coch (section 7) and section 9 the Power Station Access Road Junction, as per the Design and Access Statement, volume 3 (Application Reference Number: 8.2.3).

Good practice mitigation

5.4.132 Construction traffic using the completed highways improvements would be controlled in accordance with the management strategies set out in the Wylfa Newydd CoCP (Application Reference Number: 8.6) which is secured through a DCO requirement.

5.4.133 Other non-construction related traffic using the completed highways improvements would be controlled in accordance with the management strategies set out in the Wylfa Newydd CoOP (Application Reference Number: 8.13).

Peak operation

5.4.134 Traffic flows associated with operation of the Wylfa Newydd Project are predicted to peak in 2033 (including construction of the radioactive waste facilities and two Scheduled Outages).

Basis of assessment and assumptions

5.4.135 The assessment of road traffic noise during the operational phase in 2033 captures the maximum traffic generation likely to occur during any point of operation.

5.4.136 The 2033 peak operation scenario was assessed against a baseline 2020 scenario (representing conditions that would prevail in the absence of the Wylfa Newydd Project).

5.4.137 Full details related to the derivation of the existing and proposed traffic data used in this assessment and a list of committed developments included in the data are presented in chapters C2 (Application Reference Number: 6.3.2) and I2 (Application Reference Number: 6.9.2).

5.4.138 Appendix C5-1 (Application Reference Number: 6.3.29) presents a summary of the road traffic flow data applied for each link along with the assumed traffic speeds for the scenarios considered.

5.4.139 All bus traffic (or PSVs) is assumed to be of a standard diesel variant.

5.4.140 All noise barriers proposed in the A5025 Off-line Highway Improvements are assumed to be positioned as close as practicable to the edge of the carriageway verge, and are assumed to be acoustically reflective.

Embedded mitigation

5.4.141 The A5025 Off-line Highway Improvements would lead to noise reductions at residential receptors close to the existing A5025 alignment and provide benefits to the wider road network, as per the Phasing Strategy (Application Reference Number: 8.29).

5.4.142 Noise barriers would be constructed along the eastern and western side of section 3. The heights, positions, orientations and acoustic properties (e.g. reflective or absorptive) of the noise barriers would be subject to review and finalisation during the detailed design stages of the A5025 Off-line Highway Improvements, as per the Design and Access Statement, volume 3 (Application Reference Number: 8.2.3).

5.4.143 As described above, LNRS would be used on the new bypasses at Llanfaethlu (section 5), Llanfachraeth (section 3), Cefn Coch (section 7) and section 9 the Power Station Access Road Junction, as per the Design and Access Statement, volume 3 (Application Reference Number: 8.2.3).

Good practice mitigation

5.4.144 Operational traffic using the completed highways improvements would be controlled in accordance with the management strategies set out in the Wylfa Newydd CoOP (Application Reference Number: 8.13).

5.4.145 The Wylfa Newydd CoOP (Application Reference Number: 8.13) is considered to contain good practice mitigation measures and their effect on traffic flows has been included in the traffic data described in chapter B3 (Traffic and transport) (Application Reference Number: 6.2.3) and as used in the noise assessment.

5.5 Assessment of effects

5.5.1 This section presents the findings of the noise and vibration effects of traffic.

5.5.2 The assessment of effects in this section of the chapter is presented according the years of interest described earlier, namely:

- opening year of the A5025 Off-line Highway Improvements (2020);
- peak construction year (2023); and
- peak operation (2033)

5.5.3 Both DMRB information and assessments in accordance with the project-specific criteria adopted for the highway improvements are presented in this section.

5.5.4 The assessment of effects for the purposes of the Environmental Impact Assessment is based on the likely significant effects arising from the adoption of the project-specific assessment criteria.

5.5.5 Predicted noise change contours for $L_{A10\ 18\ hr}$ have been generated in graphical form for all of the relevant scenarios. These are introduced in the following sections according to the year of interest.

5.5.6 Calculated $L_{Amax,\ F}$ buffer zones have been generated in graphical form for the relevant night-time scenarios. For the Do-Something scenarios, the calculated magnitudes of noise change at each receptor that fall within the $L_{Amax,\ F}$ buffer zones have been shown on the graphical outputs.

5.5.7 A summary of the comparative scenarios considered for the generation of DMRB information and for the basis of the Wylfa Newydd Project-specific assessments is presented below in Table C5-10. The table is presented in terms of the year of interest (i.e. opening year, peak construction year and peak operation year), and indicates whether the scenario is required for reporting by the DMRB. The table also indicates whether the DMRB information or Wylfa Newydd Project-specific assessment has used the short-term or long-term effect scales. It should be noted that the Wylfa Newydd Project-specific assessment criteria for night-time use a mixture of noise change scales according to whether the existing baseline road traffic noise level is above 55dB L_{night} or not (see Table C5-8).

Table C5-10 Summary of the comparative scenarios used for DMRB information and Wylfa Newydd Project-specific assessments. Note: DM – Do-Minimum scenario, DS – Do-Something scenario

Year of interest	Comparative scenario	Required under DMRB?	Basis of DMRB Information			Wylfa Newydd Project-specific assessment	
			Daytime	Night-time	Nuisance	Daytime	Night-time
Opening year (2020)	DM 2020 vs DS 2020 (without A5025 Off-line Highway Improvements operational)	No*	Short-term*	N/A	Worst nuisance across all scenarios relevant for the DMRB	Project-specific (short-term)	Project-specific
	DM 2020 vs DS 2020 (with A5025 Off-line Highway Improvements operational)	Yes	Short-term	N/A		Project-specific (short-term)	Project-specific
Peak construction (2023)	DM 2020 vs DS 2023	No*	Short-term*	N/A		Project-specific (short-term)	Project-specific

Year of interest	Comparative scenario	Required under DMRB?	Basis of DMRB Information			Wylfa Newydd Project-specific assessment	
			Daytime	Night-time	Nuisance	Daytime	Night-time
Peak operation (2033)	DM 2020 vs DM 2033	Yes	Long-term	Long-term		Project-specific (long-term)	Project-specific
	DM 2020 vs DS 2033	Yes	Long-term	Long-term		Project-specific (long-term)	Project-specific
* whilst not a requirement of the DMRB, the relevant tables have been presented in this chapter for information							

Opening year of the A5025 Off-line Highway Improvements

The DMRB assessment summary tables

5.5.8 To comply with the requirements for assessing noise from new or altered road schemes as described in the DMRB, it is necessary to present information in a prescribed format. The information presented in this subsection meets those minimum reporting requirements, but is not used in the assessment of significant effects.

Noise change comparisons

5.5.9 Table C5-11 and Table C5-12 provide the noise level change comparisons in accordance with the reporting requirements for a Detailed Assessment within the DMRB for the year of opening.

5.5.10 Table C5-11 presents the comparisons arising during the year of opening but with the A5025 Off-line Highway Improvements not yet operational. Table C5-12 presents the comparisons arising during the year of opening with the A5025 Off-line Highway Improvements operational.

5.5.11 The tables include both residential and non-residential receptors. The table does not include an assessment of night-time noise at residential dwellings because the DMRB advises that night-time road traffic noise should not be assessed using the short-term impact scales.

Table C5-11 Short-term traffic noise comparison, Do-Minimum (2020) against Do-Something (2020) – without A5025 Off-line Highway Improvements operational

Do-Minimum 2020 vs. Do-Something 2020			
Change in noise level		Daytime	
		Number of dwellings	Number of other sensitive receptors
Increase in noise level, $L_{A10\ 18\ hr}$	0.1 – 0.9	1,660	178
	1.0 – 2.9	521	72
	3 – 4.9	0	0
	5+	0	0
No change	0	18	1
Decrease in noise level, $L_{A10\ 18\ hr}$	0.1 – 0.9	0	0
	1.0 – 2.9	0	0
	3 – 4.9	0	0
	5+	0	0

5.5.12 Table C5-11 above shows that 521 dwellings are predicted to experience perceptible daytime noise increases (1.0dB $L_{A10\ 18\ hr}$ or more) in the short term without the introduction of the A5025 Off-line Highway Improvements. No dwellings are predicted to experience perceptible decreases in daytime noise levels without the A5025 Off-line Highway Improvements.

5.5.13 In terms of other sensitive receptors, 72 are predicted to experience daytime noise increases of 1.0dB $L_{A10\ 18\ hr}$ or more, and none are expected to experience daytime noise reductions of 1.0dB $L_{A10\ 18\ hr}$ or more.

5.5.14 Overall, when considering the amount of sensitive receptors that would experience a perceptible increase in noise level (593) and the finding that no receptors would experience a perceptible decrease, the overall impact of not including the A5025 Off-line Highway Improvements can be considered to be adverse in the short term.

Table C5-12 Short-term traffic noise comparison, Do-Minimum (2020) against Do-Something (2020) – with A5025 Off-line Highway Improvements operational

Do-Minimum 2020 vs. Do-Something 2020			
Change in noise level		Daytime	
		Number of dwellings	Number of other sensitive receptors
Increase in noise level, $L_{A10\ 18\ hr}$	0.1 – 0.9	1,680	182
	1.0 – 2.9	216	32
	3 – 4.9	10	0
	5+	19	1

Do-Minimum 2020 vs. Do-Something 2020			
Change in noise level		Daytime	
		Number of dwellings	Number of other sensitive receptors
No change	0	66	14
Decrease in noise level, $L_{A10\ 18\ hr}$	0.1 – 0.9	61	6
	1.0 – 2.9	61	9
	3 – 4.9	63	6
	5+	23	1

5.5.15 Table C5-12 above shows that 245 dwellings are predicted to experience perceptible daytime noise increases (1.0dB $L_{A10\ 18\ hr}$ or more) in the short term following the introduction of the A5025 Off-line Highway Improvements. Conversely, 147 dwellings are predicted to experience perceptible decreases in daytime noise levels with the A5025 Off-line Highway Improvements operation.

5.5.16 In terms of other sensitive receptors, 33 are predicted to experience daytime noise increases of 1.0dB $L_{A10\ 18\ hr}$ or more, whilst 16 are expected to experience daytime noise reductions of 1.0dB $L_{A10\ 18\ hr}$ or more.

5.5.17 Overall, when comparing the amount of sensitive receptors that would experience a potential perceptible decrease in noise level (163) against those that would experience a perceptible increase in noise level (278), the overall impact of the A5025 Off-line Highway Improvements can be considered to be adverse in the short term, but with a greatly reduced balance of adverse impacts compared to the scenario without the A5025 Off-line Highway Improvements.

Noise nuisance

5.5.18 The DMRB noise nuisance table (Table C5-33) for the scheme is presented under the Peak Operation section as it requires consideration of the worst case for all scenarios assessed.

Vibration nuisance

5.5.19 The assessment of ground-borne vibration has been scoped out of this assessment.

5.5.20 The DMRB airborne vibration nuisance table (Table C5-34) for the scheme is presented under the Peak Operation section as it requires consideration of the worst case for all scenarios assessed.

Wylfa Newydd Project-specific assessment of significance

Residential receptors

5.5.21 Table C5-13 and C5-14 below present the numbers of residential receptors according to the magnitude of change criteria adopted for this assessment, along with effect significance based upon the high sensitivity attributed to residential receptors. Table C5-13 presents the effects arising during the year of opening but with the A5025 Off-line Highway Improvements not yet operational. Table C5-14 presents the effects arising during the year of opening with the A5025 Off-line Highway Improvements operational.

Table C5-13 Summary of noise effects at residential receptors during year of opening in 2020 – without A5025 Off-line Highway Improvements operational

Do-Minimum 2020 vs. Do-Something 2020				
Magnitude of change		Significance	Number of dwellings	
			Daytime	Night-time
Adverse effect	Large	Major (significant)	0	1
	Medium	Major (significant)	0	49
	Small	Moderate (significant)	273	198
	Negligible	Minor (not significant)	1,908	1,859
No change	Neutral	Negligible	18	92
Beneficial effect	Negligible	Minor (not significant)	0	0
	Small	Moderate (significant)	0	0
	Medium	Major (significant)	0	0
	Large	Major (significant)	0	0

Table C5-14 Summary of noise effects at residential receptors during year of opening in 2020 – with A5025 Off-line Highway Improvements operational

Do-Minimum 2020 vs. Do-Something 2020				
Magnitude of change		Significance	Number of dwellings	
			Daytime	Night-time
Adverse effect	Large	Major (significant)	1	7
	Medium	Major (significant)	0	68
	Small	Moderate (significant)	119	84
	Negligible	Minor (not significant)	1,805	1,803
No change	Neutral	Negligible	66	105
Beneficial effect	Negligible	Minor (not significant)	180	76
	Small	Moderate (significant)	5	50
	Medium	Major (significant)	12	6
	Large	Major (significant)	11	0

5.5.22 The tables show that the number of daytime significant adverse effects reduce from 273 (all moderate) residential receptors to 120 (119 moderate and one major) once the A5025 Off-line Highway Improvements become functional, using the short-term assessment methodology. Furthermore, compared to no significant beneficial effects without the A5025 Off-line Highway Improvements, significant beneficial effects at 28 (five moderate, 23 major) receptors are predicted, leading to an overall balance of 92 daytime significant adverse effects from the A5025 Off-line Highway Improvements in the opening year.

5.5.23 For night-time, the tables show that the number of night-time significant adverse effects reduce from 248 (198 moderate, 50 major) residential receptors to 159 (84 moderate and 75 major) once the A5025 Off-line Highway Improvements become functional, using the Wylfa Newydd Project-specific assessment methodology. Furthermore, significant beneficial effects at 56 (50 moderate and six major) receptors are predicted, leading to an overall balance of 103 night-time significant adverse effects for the A5025 Off-line Highway Improvements in the opening year.

5.5.24 The total numbers of residential receptors within the calculated 60dB $L_{Amax, F}$ buffer zones for these scenarios are presented in Table C5-15 below.

5.5.25 It should be understood that, as part of this qualitative appraisal, the 60dB $L_{Amax, F}$ buffer zones are defined by the heaviest vehicle type and/or vehicle speed using a road segment, with this being irrespective of the number of vehicles using the road and thus a single vehicle movement defining the $L_{Amax, F}$ buffer.

5.5.26 Changes in the 60dB $L_{Amax, F}$ buffer zones would occur with the introduction of new vehicles on to a road (for instance in the case of the new A5025 Off-line

Highway Improvements that are new sources of road traffic noise), alterations in the traffic composition (where heavier vehicles are introduced as part of the development or reduced due to the redirection of traffic flow) and/or changes in vehicle speed.

5.5.27 Finally, this qualitative appraisal allows for an indication of the number of residential receptors that are estimated to be exposed to night-time noise events of at least 60 dB $L_{Amax, F}$ within the derived buffer zone. The traffic associated with the Wylfa Newydd Project is only present on roads serving the development and, therefore, the 60dB $L_{Amax, F}$ buffer zones occur solely around these roads and not across the extent of the road network.

5.5.28 The appraisal considers the traffic composition broken down according to the vehicle classifications described in Volume 7 of the DMRB [RD12]. For commercial vehicles this requires the separate consideration of buses and coaches (PSVs) and other goods vehicles (OGVs). For the latter there is a further sub-categorisation of OGV1 and OGV2. The smaller rigid commercial vehicles with up to three axles are referred to as OGV1, whilst the heavier articulated commercial and rigid commercial vehicles with more than three axles are referred to as OGV2.

Table C5-15 Summary of residential properties within night-time $L_{Amax, F}$ buffer zone during year of opening in 2020 – without and with the A5025 Off-line Highway Improvements

Total number of residential receptors within calculated $L_{Amax, F}$ buffer zone			
A5025 Off-line Highway Improvements' status	Do-Minimum 2020	Do-Something 2020	
	All traffic	All traffic (including Wylfa Newydd Project traffic)	Project traffic only
Without	975	1,049	617
With	975	1,067	567

5.5.29 This shows that the changes in traffic flow composition (in combination with the A5025 Off-line Highway Improvements, where they are included) give rise to increases in the numbers of residential dwellings within the $L_{Amax, F}$ buffer zones (by 74 without the A5025 Off-line Highway Improvements, and by 92 with them).

5.5.30 The table also shows that, when considering the traffic associated with the Wylfa Newydd Project in isolation from other traffic using the network, the numbers of properties affected by the $L_{Amax, F}$ levels from the Wylfa Newydd Project traffic drops by 50 receptors once the A5025 Off-line Highway Improvements become operational. It is also noted that fewer residential receptors are within the $L_{Amax, F}$ buffer zone when comparing traffic only from the Wylfa Newydd Project against all traffic within the study area. This is because the Wylfa Newydd Project traffic operates along only part of the overall network within the study area. In addition, the Wylfa Newydd Project traffic does not include vehicle types at night which are calculated to give rise to the highest $L_{Amax, F}$ levels (namely OGV1 and OGV2 classifications), whereas these do exist within other local traffic.

5.5.31 Calculated roadside reference $L_{Amax, F}$ noise levels for a sample of road links within the study area are presented in appendix C5-1 (Application Reference Number: 6.3.29). The relevant traffic composition details and other operating assumptions for the sample links are also presented in appendix C5-1 (Application Reference Number: 6.3.29). The information has enabled a qualitative appraisal of the potential changes in quantities of night-time noise events and corresponding $L_{Amax, F}$ noise levels relative to those experienced in the baseline year without the Wylfa Newydd Project.

5.5.32 Irrespective of the final alignment of the road, the highest likely roadside reference $L_{Amax, F}$ maximum noise level arising from any vehicle expected to operate during the night-time period (23:00 to 07:00) in the Do-Something scenario is expected to be no worse than that expected to occur in the Do-Minimum scenario. This is because the highest levels are associated with OGV1 and OGV2 movements, which are expected to operate both before and after the A5025 Off-line Highway Improvements become operational. The provision of the embedded mitigation, in the form of the roadside noise barriers at Llanfachraeth and the LNRS along sections of some of the new bypasses, is expected to result in reductions to the highest roadside reference $L_{Amax, F}$ of between 0.9dB and 3.5dB along certain links (including OGV1 and OGV2 classifications) when compared to the Do-Minimum in 2020, even when traffic speed changes are taken into account. This observation is made by inspection of the information provided in table A1-9 in appendix C5-1 (Application Reference Number: 6.3.29).

5.5.33 Table C5-16 below presents an overview of the highest numbers of vehicle pass-bys during the night-time at any location along the A5025 where the Off-line Highway Improvements are planned for the scenarios considered in this section of the chapter.

Table C5-16 Overview of night-time traffic composition for Do-Minimum and Do-Something scenarios in 2020: Note: DM – Do-Minimum scenario, DS – Do-Something scenario

A5025 Off-line Highway Improvements' status	Road	Highest number of night-time vehicle pass-bys [All, (Heavy*)]			
		DM 2020		DS 2020	
		Night period	Any hour	Night period	Any hour
Without	A5025	225 (6)	136 (4)	377 (26)	232 (10)
	A55	1,571 (755)	446 (255)	1,737 (771)	555 (255)
With	A5025	As above			
	A55				
* Heavy includes OGV1, OGV2 and PSV					

5.5.34 The number of vehicle pass-bys during the night-time period (23:00 to 07:00) would increase across the study area. Table A1-8 of appendix C5-1

(Application Reference Number: 6.3.29) presents traffic data which show that in the Do-Something scenario, a maximum of 23 PSV pass-bys would be introduced during the night as a result of the Wylfa Newydd Project. Additional information provided by the traffic engineers indicates that up to 10 PSV pass-bys in any one hour would be introduced during the night as a result of the Wylfa Newydd Project. Whilst the highest $L_{Amax, F}$ levels are calculated to be caused by OGV1 and OGV2 classification vehicles, the introduction of PSV and other movements nevertheless potentially increases the risk of sleep disturbance compared to the Do-Minimum scenario. Along the A55, the proportional increases in pass-bys are less prominent when compared to the traffic composition in the Do-Minimum scenario. These findings complement and add weight to the assessment of night-time significant effects identified and presented in Table C5-13 and C5-14 above.

5.5.35 In summary, Table C5-13 and C5-14 show that the operation of the A5025 Off-line Highway Improvements in the year of opening reduces the likely significant adverse effects by 153 in the daytime and by 89 in the night-time compared to the scenarios without the A5025 Off-line Highway Improvements. The operation of the A5025 Off-line Highway Improvements also introduces significant beneficial effects at 28 receptors in the daytime and 56 receptors in the night-time in the opening year compared to the scenarios without the A5025 Off-line Highway Improvements.

5.5.36 Further information on the geographical distribution of the magnitudes of change within designated residential receptor groupings within the study area is presented in table A4-1 and table A4-2 in appendix C5-1 (Application Reference Number: 6.3.29) for the respective scenarios of without and with the A5025 Off-line Highway Improvements.

Non-residential receptors

5.5.37 Table C5-17 and Table C5-18 below present the total numbers of potential significant effects (adverse and beneficial) at non-residential receptors according to the classifications shown.

Table C5-17 Potential daytime significant effects at non-residential receptors (year of opening – without A5025 Off-line Highway Improvements operational)

Do-Minimum 2020 vs. Do-Something 2020 (opening year of A5025 Off-line Highway Improvements, without improvements operational)		
Non-residential receptor type	External free-field noise level that relates to an onset of a potential adverse significant effect, dB $L_{Aeq\ T}$	Number of non-residential receptors*
Educational	45	0 (0)
Places of worship	47	0 (0)
Commercial	52	0 (0)
Industrial	52	0 (0)
Other	-	0 (0)
* potentially significant adverse effects shown, with potentially significant beneficial effects shown in parentheses		

5.5.38 The table shows that there are no daytime significant adverse effects at non-residential receptors, and no daytime significant beneficial effects during the year of opening without the operation of the completed A5025 Off-line Highway Improvements.

Table C5-18 Potential daytime significant effects at non-residential receptors (year of opening – with A5025 Off-line Highway Improvements operational)

Do-Minimum 2020 vs. Do-Something 2020 (opening year of A5025 Off-line Highway Improvements, with improvements operational)		
Non-residential receptor type	**External free-field noise level that relates to an onset of a potential adverse significant effect, dB $L_{Aeq\ T}$**	**Number of non-residential receptors***
Educational	45	0 (0)
Places of worship	47	0 (0)
Commercial	52	0 (0)
Industrial	52	0 (0)
Other	-	1 (2)
* potentially significant adverse effects shown, with potentially significant beneficial effects shown in parentheses		

5.5.39 The table shows that there would be a daytime potential significant adverse effect at a single non-residential receptor with the operation of the completed A5025 Off-line Highway Improvements during the year of opening:

- one PRoW 27/020/1, Llanfachraeth

5.5.40 The effects on users of this PRoW would be localised to the crossing points on the A5025, and therefore short-lived. The effects are therefore not considered to constitute a significant adverse effect.

5.5.41 The table also shows that there are two daytime potential significant beneficial effects at non-residential receptors with the A5025 Off-line Highway Improvements completed and operational during the year of opening. These would occur at:

- play area, Llanfachraeth; and
- one PRoW (38/030B/1), Cefn Coch.

5.5.42 The effects on users of the PRoW would be localised to the crossing point on the A5025, and are therefore short-lived and not considered to constitute a significant beneficial effect.

BNL changes

5.5.43 Consideration has been given to likely noise effects at residential receptors along the wider road network within the study area but outside the calculation area as guided by DMRB.

5.5.44 Table C5-19 provides predicted BNLs for an affected route (comprising minor roads lying between A5025 Llanfaethlu and B5112 Llannerch-y-medd) outside the calculation area with the values in brackets presenting the numerical differences between the Do-Minimum in the baseline year of 2020 and the Do-Something scenarios in 2020.

Table C5-19 BNLs for an affected route outside the calculation area – year of opening. Note: DM – Do-Minimum scenario, DS – Do-Something scenario

Road link	Basic Noise Level (BNL) dB			
	Relevant noise indicator	DM 2020	DS 2020 (without operation of A5025 Off-line Highway Improvements)	DS 2020 (with operation of A5025 Off-line Highway Improvements)
Minor roads between A5025 Llanfaethlu and B5112 Llannerch-y-medd	$L_{A10\ 18\ hr}$ (daytime)	58.2	60.9 (+2.7)	60.9 (+2.7)
	L_{night} (night-time)	50.6	56.4 (+5.8)	56.4 (+5.8)

5.5.45 The above figures would suggest that during the year of opening, increases are expected in the BNLs along an 8km section of minor roads between A5025

Llanfaethlu and B5112 Llannerch-y-medd of 2.7dB and 5.8dB during the daytime and night-time respectively.

5.5.46 However, the traffic engineers have confirmed that the additional traffic causing such BNL increases would not operate over the entire length of the road link but would turn off a short distance along the road where the eventual access would be located for the nearby construction site at Llanfaethlu. The precise position of the access is not yet confirmed, but it is unlikely that the BNL change would affect any receptors alongside the relevant carriageway.

5.5.47 Potential significant adverse road traffic noise effects associated with the BNL changes for this road link have therefore not been considered further.

5.5.48 It should be noted that the daytime BNLs calculated in the above table are based upon very low traffic flows (<500 vehicles per 18-hour day and <40 vehicles per eight-hour night period), which fall outside the range of validity of the CRTN (and hence the daytime BNL) calculation methodology. The results of this BNL comparison should be regarded as an indicative assessment.

Further rationalisation of model outputs

5.5.49 Initial assessment results were reviewed following the calculation of road traffic noise contours and the inspection of the assessed effects. As a consequence, the BNLs along two further road links were further scrutinised as follows.

B4545 from Valley to Four Mile Bridge

5.5.50 Initial assessments identified numerous significant adverse effects due to night-time noise along this road for the year of opening and peak construction scenarios. However, the traffic engineers have confirmed that the additional traffic originally designated to this road link (which is associated with traffic changes due to construction traffic) would not operate over the entire length of the road link but would turn off at a point only a short distance along the road where the eventual access would be located for the nearby construction site at Valley. The precise position of the access is not yet confirmed, but it is unlikely that the predicted noise changes will affect any receptors alongside the relevant carriageway along this link.

5.5.51 Potential significant adverse road traffic noise effects associated with the modelled traffic assumed to operate along this road link have therefore been excluded from the residential receptor counts presented for the relevant years of interest.

Minor road from junction with A55 (near to the Park and Ride) running north to Bodedern

5.5.52 Initial assessments identified significant adverse effects due to night-time noise arising alongside this route within the calculation area during the peak construction years. BNL assessments, which are used in DMRB to define whether affected routes beyond the calculation area should be considered further, had not identified this as an affected route, however, due to the DMRB method requiring a +1dB change in the day-time BNL (in the short term).

5.5.53 The traffic engineers have confirmed that the additional traffic designated to this road link would operate along its entire length, part of which lies outside the calculation area. The BNL comparisons for the adjoining link along this road within Bodedern (which lies to the north of a junction with another minor road), are all below +1dB (for both day and night) due to the higher traffic flows apparent in the baseline year and therefore do not require further consideration.

5.5.54 Potential significant adverse road traffic noise effects associated with the modelled traffic assumed to operate along this road link beyond the calculation area have therefore been excluded from the residential receptor counts presented for this year of interest.

Initial noise insulation eligibility estimations

5.5.55 An assessment has been carried out using the predicted noise levels obtained from the noise modelling exercise to provide an initial estimate of the potential numbers of residential receptors which may be eligible for noise insulation under the LNMS proposals.

5.5.56 Table C5-21 below presents a summary of the numbers of dwellings potentially eligible under the daytime and night-time criteria adopted for this chapter, for the comparative scenario without the highway improvements. The table also presents the overall combined number of eligible dwellings for the comparative scenario (based upon combining the day and night-time together and hence eliminating any double counting of eligibility).

Table C5-20 Estimated number of residential dwellings eligible for noise insulation – year of opening without improvements

Comparative scenario	Estimated number of eligible residential dwellings		
	Daytime	Night-time	Combined
Do-Minimum 2020 vs Do-Something 2020 (without A5025 Off-line Highway Improvements)	94	161	174

5.5.57 Table C5-21 below presents a summary of the numbers of dwellings potentially eligible under the daytime and night-time criteria adopted for this chapter for the comparative scenario stated with the improvements. The table also presents the overall combined number (day and night) of eligible dwellings for the comparative scenario.

Table C5-21 Estimated number of residential dwellings eligible for noise insulation – year of opening with improvements

Comparative scenario	Estimated number of eligible residential dwellings		
	Daytime	Night-time	Combined
Do-Minimum 2020 vs Do-Something 2020 (with A5025 Off-line Highway Improvements operational)	27	83	87

Vibration effects

5.5.58 The assessment of ground-borne vibration has been scoped out of this assessment.

5.5.59 Airborne vibration has been assessed in accordance with DMRB. The airborne vibration nuisance table for the scheme is presented under the Peak Operation section as it requires consideration of the worst case for all scenarios assessed.

Noise contours and other figures

5.5.60 Table C5-22 below identifies the predicted daytime noise change contour figures, and the night-time noise change figures for the scenarios assessed under this section (opening year of the A5025 Off-line Highway Improvements).

Table C5-22 Schedule of noise output figures – opening year (2020)

Comparative scenario	Geographical area	Day / night	Noise change scale*	Figure no. (Application Reference Number: 6.3.32)
Do-Minimum 2020 vs Do-Something 2020 (without A5025 Off-line Highway Improvements completed and operational)	Logistics Centre and Park and Ride	Day	Short-term	C5-4
		Night	Mixed	C5-5
	A5025 Off-line Highway Improvements and the Site Campus	Day	Short-term	C5-6
		Night	Mixed	C5-7
Do-Minimum 2020 vs Do-Something	Logistics Centre and Park and Ride	Day	Short-term	C5-8
		Night	Mixed	C5-9

Comparative scenario	Geographical area	Day / night	Noise change scale*	Figure no. (Application Reference Number: 6.3.32)
2020 (with A5025 Off-line Highway Improvements completed and operational)	A5025 Off-line Highway Improvements and the Site Campus	Day	Short-term	C5-10
		Night	Mixed	C5-11
* Wylfa Newydd Project-specific criteria consider both the short-term and long-term noise change scales for night-time depending upon the existing road traffic noise levels				

Peak construction

The DMRB assessment summary tables

5.5.61 To comply with the requirements for assessing noise from new or altered road schemes as described in the DMRB, it is necessary to present information in a prescribed format. There is no requirement to present information for the peak construction year under the DMRB. Notwithstanding this, the equivalent information is presented in this subsection for information only and is not used in the assessment of significant effects.

Noise change comparisons

5.5.62 Table C5-23 provides the noise level change comparisons in accordance with the reporting requirements for a Detailed Assessment within the DMRB for the year of peak construction.

5.5.63 Table C5-23 includes both residential and non-residential receptors. The table does not include an assessment of night-time noise at residential dwellings because the DMRB advises that night-time road traffic noise should not be assessed using the short-term impact scales.

Table C5-23 Short-term traffic noise comparison, Do-Minimum (2020) against Do-Something (2023) – year of peak construction

Do-Minimum 2020 vs. Do-Something 2023			
Change in noise level		Daytime	
		Number of dwellings	Number of other sensitive receptors
Increase in noise level, $L_{A10\ 18\ hr}$	0.1 – 0.9	1,695	172
	1.0 – 2.9	299	49
	3 – 4.9	13	1
	5+	22	1
No change	0	9	5

Do-Minimum 2020 vs. Do-Something 2023			
Change in noise level		Daytime	
		Number of dwellings	Number of other sensitive receptors
Decrease in noise level, $L_{A10\ 18\ hr}$	0.1 – 0.9	30	9
	1.0 – 2.9	55	8
	3 – 4.9	62	5
	5+	14	1

5.5.64 Table C5-23 above shows that 334 dwellings are predicted to experience perceptible daytime noise increases (1.0dB $L_{A10\ 18\ hr}$ or more) in the short term following the introduction of the A5025 Off-line Highway Improvements during the year of peak construction. Conversely, 131 dwellings are predicted to experience perceptible decreases in daytime noise levels with the A5025 Off-line Highway Improvements in operation during the year of peak construction.

5.5.65 In terms of other sensitive receptors, 51 are predicted to experience daytime noise increases of 1.0dB $L_{A10\ 18\ hr}$ or more, whilst 14 are expected to experience daytime noise reductions of 1.0dB $L_{A10\ 18\ hr}$ or more.

5.5.66 Overall, when comparing the amount of sensitive receptors that would experience a potential perceptible decrease in noise level (145) against those that would experience a perceptible increase in noise level (385), the overall impact of the A5025 Off-line Highway Improvements during the year of peak construction can be considered to be adverse in the short term.

Noise nuisance

5.5.67 The DMRB noise nuisance table (Table C5-33) for the scheme is presented under the Peak Operation section as it requires consideration of the worst case for all scenarios assessed.

Vibration nuisance

5.5.68 The assessment of ground-borne vibration has been scoped out of this assessment.

5.5.69 The DMRB vibration nuisance table (Table C5-34) for the scheme is presented under the Peak Operation section as it requires consideration of the worst case for all scenarios assessed.

Wylfa Newydd Project-specific assessment of significance

Residential receptors

5.5.70 Table C5-24 below presents the numbers of residential receptors according to the magnitude of change criteria adopted for this assessment, along with effect significance based upon the high sensitivity attributed to residential receptors. The table presents the effects arising during the year of peak construction traffic (2023) compared to those in a baseline year, which is the year of opening of the A5025 Off-line Highway Improvements (2020). No

material changes in baseline noise levels would be expected due to changes in non-development road traffic between 2020 and 2023.

Table C5-24 Summary of noise effects at residential receptors during year of peak construction in 2023

Do-Minimum 2020 vs. Do-Something 2023 (year of peak construction traffic)				
Magnitude of change		Significance	Number of dwellings	
			Daytime	Night-time
Adverse effect	Large	Major (significant)	3	8
	Medium	Major (significant)	4	70
	Small	Moderate (significant)	145	101
	Negligible	Minor (not significant)	1,877	1,899
No change	Neutral	Negligible	9	3
Beneficial effect	Negligible	Minor (not significant)	135	74
	Small	Moderate (significant)	5	38
	Medium	Major (significant)	14	6
	Large	Major (significant)	7	0

5.5.71 The table shows that the number of daytime significant adverse effects in the year of peak construction would be 152 (145 moderate and seven major) at residential receptors (compared with 120 (119 moderate and one major) during the year of opening as presented in table C5-14) using the short-term assessment methodology. Furthermore, significant beneficial effects at 26 (five moderate, 21 major) receptors are predicted (compared with 28 (five moderate and 23 major) during the year of opening as presented in table C5-14). This leads to an overall balance of 126 daytime significant adverse effects in the peak construction year.

5.5.72 For night-time, the table shows that the number of significant adverse effects in the year of peak construction would be 179 (101 moderate, 78 major) residential receptors (compared to 159 (84 moderate and 75 major) during the year of opening as presented in table C5-14) using the Wylfa Newydd Project-specific assessment methodology. Furthermore, significant beneficial effects at 44 (38 moderate and six major) receptors are predicted (compared with 56 (50 moderate and six major) during the year of opening as presented in table C5-14). This leads to an overall balance of 135 night-time significant adverse effects in the year of peak construction.

5.5.73 The total numbers of residential receptors within the calculated 60dB $L_{Amax, F}$ buffer zones for these scenarios are presented in Table C5-25 below.

Table C5-25 Summary of residential properties within night-time $L_{Amax, F}$ buffer zone during year of peak construction in 2023

Total number of residential receptors within calculated $L_{Amax, F}$ buffer zone		
Do-Minimum 2020	Do-Something 2023	
All traffic	All traffic (inc. Wylfa Newydd Project traffic)	Wylfa Newydd Project traffic only
970	1062	561

5.5.74 This shows that the changes in traffic composition and the location of the A5025 Off-line Highway Improvements give rise to an increase in the number of residential dwellings within the $L_{Amax, F}$ buffer zones of 92 during the peak construction year.

5.5.75 The table also shows that, when considering the traffic associated with the Wylfa Newydd Project in isolation from other traffic using the network, fewer residential receptors fall within the $L_{Amax, F}$ buffer zone. This is because the Wylfa Newydd Project traffic operates along only part of the overall network within the study area, and does not include vehicle types which are calculated to give rise to the highest $L_{Amax, F}$ levels (namely OGV1 and OGV2).

5.5.76 Calculated roadside reference $L_{Amax, F}$ noise levels for a sample of road links within the study area are presented in appendix C5-1 (Application Reference Number: 6.3.29). The relevant traffic composition details and other operating assumptions for the sample links are also presented in appendix C5-1 (Application Reference Number: 6.3.29). The information has enabled a qualitative appraisal of the potential changes in quantities of night-time noise events and corresponding $L_{Amax, F}$ noise levels relative to those experienced in the baseline year without the Wylfa Newydd Project.

5.5.77 Irrespective of the final alignment of the road, the highest likely roadside reference $L_{Amax, F}$ maximum noise level arising from any vehicle expected to operate during the night-time period (23:00 to 07:00) in the Do-Something scenario is expected to be no worse than that expected to occur in the Do-Minimum scenario. This is because the highest levels are associated with OGV1 and OGV2 movements, which are expected to operate during both the Do-Minimum and Do-Something scenarios. The provision of the embedded mitigation, in the form of the roadside noise barriers at Llanfachraeth and the LNRS along sections of some of the new bypasses, is expected to result in reductions to the highest roadside reference $L_{Amax, F}$ of between 0.9dB and 3.5dB along certain links (including OGV1 and OGV2 classifications) when compared to the Do-Minimum in 2020, even when traffic speed changes are taken into account. This observation is made by inspection of the information provided in table A1-9 in appendix C5-1 (Application Reference Number: 6.3.29).

5.5.78 Table C5-26 below presents an overview of the highest numbers of vehicle pass-bys during the night-time at any location along the A5025 where the A5025 Off-line Highway Improvements are planned for the scenarios considered in this section of the chapter.

Table C5-26 Overview of night-time traffic composition for Do-Minimum and Do-Something scenarios in 2023 (peak construction year)

Road	Highest no. of night-time vehicle pass-bys [All (Heavy)*]			
	Do-Minimum 2020		Do-Something 2023	
	Night period	Any hour	Night period	Any hour
A5025	225 (6)	136 (4)	404 (32)	235 (13)
A55	1,571 (755)	446 (255)	1,808 (792)	577 (260)
* Heavy includes OGV1, OGV2 and PSV				

5.5.79 The number of vehicle pass-bys during the night-time period (23:00 to 07:00) would increase on road sections within the study area. Table A1-8 of appendix C5-1 (Application Reference Number: 6.3.29) presents traffic data which shows that in the Do-Something scenario, a maximum of 28 PSV pass-bys would be introduced during the night as a result of the Wylfa Newydd Project. Additional information provided by the traffic engineers indicates that up to 13 PSV pass-bys in any one hour would be introduced during the night as a result of the Wylfa Newydd Project during the night. Whilst the highest $L_{Amax, F}$ levels are calculated to be caused by OGV1 and OGV2 classification vehicles, the introduction of PSV and other movements nevertheless potentially increases the risk of sleep disturbance compared to the Do-Minimum scenario. Along the A55, the proportional increases in pass-bys are less prominent when compared to the traffic composition in the Do-Minimum scenario. These findings complement and add weight to the assessment of night-time significant effects identified and presented in Table C5-24 above.

5.5.80 In summary, inspection and comparison of the respective results presented in Table C5-14 and Table C5-24 show that the operation of the A5025 Off-line Highway Improvements in the year of peak construction increases the likely significant adverse effects by 32 (26 moderate and six major) in the daytime and by 20 (17 moderate and three major) in the night-time, when compared to the year of opening with the A5025 Off-line Highway Improvements operational. This is due to the increase in Wylfa Newydd Project construction traffic predicted to occur between 2020 and 2023.

5.5.81 Further information on the geographical distribution of the magnitudes of change within designated residential receptor groupings within the study area is presented in table A4-3 in appendix C5-1 (Application Reference Number: 6.3.29) for the peak construction year.

Non-residential receptors

5.5.82 Table C5-27 below presents the total numbers of potential significant effects (adverse and beneficial) at non-residential receptors according to the classifications shown.

Table C5-27 Potential daytime significant effects at non-residential receptors (year of peak construction)

Do-Minimum 2020 vs. Do-Something 2023 (year of peak construction traffic)		
Non-residential receptor type	**External free-field noise level that relates to an onset of a potential adverse significant effect, dB $L_{Aeq\ T}$**	**Number of non-residential receptors***
Educational	45	0 (0)
Places of worship	47	0 (0)
Commercial	52	0 (0)
Industrial	52	0 (0)
Other	-	2 (2)
* potentially significant adverse effects shown, with potentially significant beneficial effects shown in parentheses		

5.5.83 The table shows that there would be two daytime potential significant adverse effects at non-residential receptors during the peak year of construction. These would occur at:

- two PRoWs: (27/018/1 and 27/020/1), both in Llanfachraeth.

5.5.84 The effects on users of these PRoWs would be localised to the crossing points on the A5025, and therefore short-lived. The effects are therefore not considered to constitute significant adverse effects.

5.5.85 The table also shows that there would be two daytime significant beneficial effects at non-residential receptors during the peak year of construction. These would occur at:

- play area, Llanfachraeth; and
- PRoW 38/030B/1, Cefn Coch.

5.5.86 The effects on users of the PRoW would be localised to the crossing point on the A5025, and therefore short-lived. These are therefore not considered to constitute a significant beneficial effect.

Basic Noise Level (BNL) changes

5.5.87 Consideration has been given to likely noise effects at residential receptors along the wider road network within the study area but outside the calculation area as guided by DMRB.

5.5.88 Table C5-28 provides predicted BNLs for a route identified as being affected in the year of opening. The values in brackets present the numerical differences between the Do-Minimum scenario in the baseline year of 2020 and the Do-Something scenario for peak construction traffic in 2023.

Table C5-28 BNL for an affected route outside the calculation area – year of peak construction

Road link	Basic Noise Level dB		
	Relevant noise indicator	Do-Minimum 2020	Do-Something 2023 (peak construction)
Minor roads between A5025 Llanfaethlu and B5112 Llannerch-y-medd	$L_{A10\ 18\ hr}$ (daytime)	58.2	58.3 (+0.1)
	L_{night} (night-time)	50.6	50.6 (+0.0)

5.5.89 The BNL comparisons show that increases of only 0.1dB are expected during the peak construction year along this section of road compared to the Do-Minimum scenario in the baseline year of 2020. Such increases would be considered to be negligible and because the traffic is not expected to operate over any material length of this link (as explained in the section describing the BNLs for the year of opening) it has not been necessary to further consider this link as an affected route in any case.

5.5.90 As with the scenarios considered for the year of opening, the daytime BNLs calculated in the above table are based upon very low traffic flows, which fall outside the range of validity of the CRTN calculation methodology.

Further rationalisation of model outputs

5.5.91 The same observations were made for the year of peak construction that were made for the year of opening regarding traffic on the following road links:

- B4545 from Valley to Four Mile Bridge; and
- Minor road from junction with A55 (near to the Park and Ride) running north to Bodedern.

5.5.92 The potential significant adverse road traffic noise effects associated with the modelled traffic assumed to operate along the B4545 have therefore been excluded from the residential receptor counts presented for this year of interest.

5.5.93 The potential significant adverse road traffic noise effects associated with the modelled traffic assumed to operate along the minor road from the A55 to Bodedern beyond the calculation area have therefore also been excluded from the residential receptor counts presented for this year of interest.

Initial noise insulation eligibility estimations

5.5.94 An assessment has been carried out using the predicted noise levels obtained from the noise modelling exercise to provide an initial estimate of the potential numbers of residential receptors which may be eligible for noise insulation under the LNMS proposals:

5.5.95 Table C5-29 below presents a summary of the numbers of dwellings potentially eligible under the daytime and night-time criteria adopted for this chapter for the comparative scenario stated. The table also presents the

overall combined number (day and night) of eligible dwellings for the comparative scenario.

Table C5-29 Estimated number of residential dwellings eligible for noise insulation – year of peak construction

Comparative scenario	Estimated number of eligible residential dwellings		
	Daytime	Night-time	Combined
Do-Minimum 2020 vs Do-Something 2023 (year of peak construction traffic)	30	89	94

Vibration effects

5.5.96 The assessment of ground-borne vibration has been scoped out of this assessment.

5.5.97 Airborne vibration has been assessed in accordance with DMRB. The airborne vibration nuisance table for the scheme is presented under the Peak Operation section as it requires consideration of the worst case for all scenarios assessed.

Noise contours and other figures

5.5.98 Table C5-30 on the next page identifies the predicted daytime noise change contour figures, and the night-time noise change figures for the scenarios assessed under this section (peak construction year).

Table C5-30 Schedule of noise output figures – year of peak construction (2023)

Comparative scenario	Geographical area	Day / night	Noise change scale*	Figure no. (Application Reference Number: 6.3.32)
Do-Minimum 2020 vs Do-Something 2023 (for peak construction traffic)	Logistics Centre and Park and Ride	Day	Short-term	C5-12
		Night	Mixed	C5-13
	A5025 Off-line Highway Improvements and the Site Campus	Day	Short-term	C5-14
		Night	Mixed	C5-15

* Wylfa Newydd Project-specific criteria consider both the short-term and long-term noise change scales for night-time depending upon the existing road traffic noise levels

Peak operation

The DMRB assessment summary tables

5.5.99 To comply with the requirements for assessing noise from new or altered road schemes as described in the DMRB, it is necessary to present information in a prescribed format. The information presented in this subsection meets those minimum reporting requirements, but is not used in the assessment of significant effects.

Noise change comparisons

5.5.100 Table C5-31 and Table C5-32 provide the noise level change comparisons in accordance with the reporting requirements for a Detailed Assessment within the DMRB for the year of peak operation in 2033. Table C5-31 provides an assessment of how noise would change between the years of 2020 and 2033 without the Wylfa Newydd Project by comparing the Do-Minimum scenarios for those years. Table C5-32 provides an assessment comparing the Do-Something (with the Wylfa Newydd Project) in 2033 with the Do-Minimum scenario in 2020. The information presented uses the long-term noise change scales as advised by the DMRB.

5.5.101 The tables include both residential and non-residential receptors. The tables include an assessment of night-time noise at residential dwellings where the L_{night} in the peak operational scenarios is at least 55dB.

Table C5-31 Long-term traffic noise comparison, Do-Minimum (2020) against Do-Minimum (2033)

Do-Minimum 2020 vs. Do-Minimum 2033 (year of peak operational traffic)				
Change in noise level		Daytime ($L_{A10\ 18\ hr}$)		Night-time (L_{night})
		Number of dwellings	Number of other sensitive receptors	Number of dwellings
Increase in noise level, dB	0.1 – 2.9	2,193	248	735
	3.0 – 4.9	6	1	0
	5 – 9.9	0	0	0
	10+	0	0	0
No change	0	0	1	3
Decrease in noise level, dB	0.1 – 2.9	0	1	5
	3.0 – 4.9	0	0	0
	5 – 9.9	0	0	0
	10+	0	0	0

5.5.102 The figures in Table C5-31 above show that, whilst there would be noise increases between 2020 and 2033 without the A5025 Off-line Highway

Improvements, only six dwellings in total would experience perceptible increases (3.0dB $L_{A10\ 18\ hr}$ or more) in the long term, and during daytime only. No dwellings are expected to experience a daytime noise reduction.

5.5.103 In terms of other sensitive receptors, only one is predicted to experience daytime noise increases of 3.0dB $L_{A10\ 18\ hr}$ or more. In addition, one non-residential receptor is expected to experience a daytime noise reduction, but the noise change would be less than 3.0dB $L_{A10\ 18\ hr}$ in the long term.

Table C5-32 Long-term traffic noise comparison, Do-Minimum (2020) against Do-Something (2033)

Do-Minimum 2020 vs. Do-Something 2033 (year of peak operational traffic)				
Change in noise level		Daytime ($L_{A10\ 18\ hr}$)		Night-time (L_{night})
		Number of dwellings	Number of other sensitive receptors	Number of dwellings
Increase in noise level, dB	0.1 – 2.9	1,979	227	595
	3.0 – 4.9	15	1	79
	5 – 9.9	19	1	3
	10+	2	0	0
No change	0	5	1	0
Decrease in noise level, dB	0.1 – 2.9	102	15	2
	3.0 – 4.9	68	5	0
	5 – 9.9	9	1	4
	10+	0	0	0

5.5.104 Table C5-32 above shows that 36 dwellings are predicted to experience perceptible daytime noise increases (3.0dB $L_{A10\ 18\ hr}$ or more) in the long term for the peak operational year of the A5025 Off-line Highway Improvements. Conversely, 77 dwellings are predicted to experience perceptible decreases in daytime noise levels with the A5025 Off-line Highway Improvements in operation during the peak year.

5.5.105 For night-time, the table shows that 82 properties are predicted to experience perceptible night-time noise increases (3.0dB L_{night} or more) in the long term for the peak operational year. Conversely, four dwellings are predicted to experience perceptible decreases in night-time noise levels with the A5025 Off-line Highway Improvements in operation during the peak year.

5.5.106 In terms of other sensitive receptors, two are predicted to experience daytime noise increases of 3.0dB $L_{A10\ 18\ hr}$ or more, whilst six are expected to experience daytime noise reductions of 3.0dB $L_{A10\ 18\ hr}$ or more.

5.5.107 Assuming that all receptors predicted to experience perceptible changes in daytime noise levels are also included in the totals for night-time noise changes and vice versa, then when comparing those predicted to experience perceptible decreases in noise levels (77) against those that would experience

a perceptible increase in noise levels (82), the overall impact of the operation of the Power Station and the A5025 Off-line Highway Improvements can be considered to be around neutral in the long term.

Noise nuisance

5.5.108 Calculations of the change in noise nuisance have been undertaken for all residential dwellings within the calculation area for the assessment of permanent traffic noise impacts, as required by DMRB.

5.5.109 Table C5-33 provides the results of the noise nuisance assessment.

Table C5-33 Traffic noise nuisance

Change in nuisance level		Do-Minimum	Do-Something
		Number of dwellings	Number of dwellings
Increase in nuisance level	< 10%	2,176	510
	10 < 20%	0	1,196
	20 < 30%	0	245
	30 < 40 %	0	22
	> 40 %	0	7
No change	0%	23	51
Decrease in nuisance level	< 10%	0	166
	10 < 20%	0	2
	20 < 30%	0	0
	30 < 40 %	0	0
	> 40 %	0	0

5.5.110 The table shows that, with the A5025 Off-line Highway Improvements in place and operational and the increase in traffic due to the Wylfa Newydd Project, 1,980 dwellings would experience an increase in noise nuisance compared to 2,176 dwellings in the Do-Minimum situation. It is shown that a large proportion of the dwellings are predicted to experience increases in nuisance levels greater than 10% due to the Wylfa Newydd Project.

5.5.111 However, it should be noted that a small increase in noise level in the short term results in a relatively large increase in nuisance, e.g. a 0.9dB increase in noise level is equivalent to 20% increase in the noise nuisance level in the short term. Whereas, when considering nuisance in the Do-Minimum scenario, the long-term nuisance curves are used, which result in much lower increases.

Vibration nuisance

5.5.112 The assessment of ground-borne vibration has been scoped out of this assessment.

5.5.113 Calculations of the change in airborne vibration nuisance have been undertaken for all residential dwellings within 40m of roads which have predicted noise levels greater than 58dB $L_{A1018hr}$ as required by DMRB. The

DMRB vibration nuisance relationship is only validated up to a distance of 40m.

5.5.114 Table C5-34 provides the results of the airborne vibration nuisance assessment.

Table C5-34 Airborne vibration nuisance

Change in nuisance level		Do-Minimum	Do-Something
		Number of dwellings	Number of dwellings
Increase in nuisance level	< 10%	486	377
	10 < 20%	0	0
	20 < 30%	0	0
	30 < 40 %	0	0
	> 40 %	0	0
No change	0%	3	17
Decrease in nuisance level	< 10%	0	93
	10 < 20%	0	2
	20 < 30%	0	0
	30 < 40 %	0	0
	> 40 %	0	0

5.5.115 The table above indicates that 377 dwellings are expected to experience increases in airborne vibration nuisance with the Wylfa Newydd Project, compared to 486 if the Wylfa Newydd Project were not to proceed.

5.5.116 The results also show that 95 dwellings would experience decreases in nuisance as a result of the Wylfa Newydd Project compared to none if the Wylfa Newydd Project were not to proceed.

5.5.117 The reduction in the number of dwellings experiencing airborne vibration nuisance increases, and the introduction of nuisance decreases at dwellings is due primarily to the inclusion of the introduction of the A5025 Off-line Highway Improvements on new alignments which mean that dwellings become more than 40m away.

Wylfa Newydd Project-specific assessment of significance

Residential receptors

5.5.118 Table C5-35 and Table C5-36 below present the numbers of residential receptors according to the magnitude of change criteria adopted for this assessment, along with effect significance based upon the high sensitivity attributed to residential receptors. Table C5-35 presents the effects arising during the peak operational year but without the A5025 Off-line Highway Improvements compared to the year of opening also without the A5025 Off-line Highway Improvements. Table C5-36 presents the effects arising during the peak operational year with the A5025 Off-line Highway Improvements

operational compared to the year of opening without the A5025 Off-line Highway Improvements.

Table C5-35 Summary of noise effects at residential receptors during peak year of operation in 2033 – without A5025 Off-line Highway Improvements

Do-Minimum 2020 vs. Do-Minimum 2033 (year of peak operational traffic)				
Magnitude of change		Significance	Number of dwellings	
			Daytime	Night-time
Adverse effect	Large	Major (significant)	0	0
	Medium	Major (significant)	0	0
	Small	Moderate (significant)	2	0
	Negligible	Minor (not significant)	2,197	2,166
No change	Neutral	Negligible	0	10
Beneficial effect	Negligible	Minor (not significant)	0	23
	Small	Moderate (significant)	0	0
	Medium	Major (significant)	0	0
	Large	Major (significant)	0	0

5.5.119 The figures in Table C5-35 above show that there would be two residential receptors where a significant adverse effect (moderate) would be expected between 2020 and 2033 without the A5025 Off-line Highway Improvements. Negligible beneficial effects of minor significance are predicted to occur at 23 residential receptors during night-time in the long term.

Table C5-36 Summary of noise effects at residential receptors during peak year of operation in 2033 - with A5025 Off-line Highway Improvements operational

Do-Minimum 2020 vs. Do-Something 2033 (year of peak operational traffic)				
Magnitude of change		Significance	Number of dwellings	
			Daytime	Night-time
Adverse effect	Large	Major (significant)	2	6
	Medium	Major (significant)	0	77
	Small	Moderate (significant)	2	99
	Negligible	Minor (not significant)	2,011	1,893
No change	Neutral	Negligible	5	2
Beneficial effect	Negligible	Minor (not significant)	158	93
	Small	Moderate (significant)	15	25

Do-Minimum 2020 vs. Do-Something 2033 (year of peak operational traffic)				
Magnitude of change		Significance	Number of dwellings	
			Daytime	Night-time
	Medium	Major (significant)	6	0
	Large	Major (significant)	0	4

5.5.120 The table shows that the number of daytime significant adverse effects in the year of peak operation would be four (two moderate and two major) at residential receptors using the long-term assessment methodology. Furthermore, significant beneficial effects at 21 (15 moderate and six major) receptors are predicted, leading to an overall balance of 17 daytime significant beneficial effects for the Wylfa Newydd Project in the peak operation year.

5.5.121 For night-time, the table shows that the number of significant adverse effects in the year of peak operation would occur at 182 (99 moderate, 83 major) residential receptors using the Wylfa Newydd Project-specific assessment methodology. Furthermore, significant beneficial effects at 29 (25 moderate and four major) receptors are predicted, leading to an overall balance of 153 night-time significant adverse effects for the scheme in the year of peak operation.

5.5.122 The total numbers of residential receptors within the calculated 60dB $L_{Amax, F}$ buffer zones for these scenarios are presented in Table C5-37 below.

Table C5-37 Summary of residential properties within night-time $L_{Amax, F}$ buffer zone during year of peak operation in 2033

Total number of residential receptors within calculated $L_{Amax, F}$ buffer zone		
Do-Minimum 2020	Do-Something 2033	
All traffic	All traffic (inc. Wylfa Newydd Project traffic)	Wylfa Newydd Project traffic only
975	1,049	617

5.5.123 This shows that the changes in traffic composition and the location of the A5025 Off-line Highway Improvements would give rise to an increase in the number of residential dwellings within the $L_{Amax, F}$ buffer zones of 74. The table also shows that, when considering the traffic associated with the Wylfa Newydd Project in isolation from other traffic using the network, fewer residential receptors fall within the $L_{Amax, F}$ buffer zone. This is because the Wylfa Newydd Project traffic operates along only part of the overall network within the study area, and does not include vehicle types which are calculated to give rise to the highest $L_{Amax, F}$ levels (namely OGV1 and OGV2).

5.5.124 Calculated roadside reference $L_{Amax, F}$ noise levels for a sample of road links within the study area are presented in appendix C5-1 (Application Reference Number: 6.3.29). The relevant traffic composition details and other operating assumptions for the sample links are also presented in appendix C5-1 (Application Reference Number: 6.3.29). The information has enabled a

qualitative appraisal of the potential changes in quantities of night-time noise events and corresponding $L_{Amax, F}$ noise levels relative to those experienced in the baseline year without the Wylfa Newydd Project.

5.5.125 Irrespective of the final alignment of the road, the highest likely roadside reference $L_{Amax, F}$ maximum noise level arising from any vehicle expected to operate during the night-time period (23:00 to 07:00) in the Do-Something scenario is expected to be no worse than that expected to occur in the Do-Minimum scenario. This is because the highest levels are associated with OGV1 and OGV2 movements, which are expected to operate during both the Do-Minimum and Do-Something scenarios. The provision of the embedded mitigation, in the form of the roadside noise barriers at Llanfachraeth and the LNRS along sections of some of the new bypasses, is expected to result in reductions to the highest roadside reference $L_{Amax, F}$ of between 0.9dB and 3.5dB along certain links (including OGV1 and OGV2 classifications) when compared to the Do-Minimum in 2020, even when traffic speed changes are taken into account. This observation is made by inspection of the information provided in table A1-9 in appendix C5-1 (Application Reference Number: 6.3.29).

5.5.126 Table C5-38 below presents an overview of the highest numbers of vehicle pass-bys during the night-time at any location along the A5025 where the A5025 Off-line Highway Improvements are planned for the scenarios considered in this section of the chapter.

Table C5-38 Overview of night-time traffic composition for Do-Minimum and Do-Something scenarios for 2020 and year of peak operation in 2033.

Road	Highest no. of night-time vehicle pass-bys [All] (Heavy)*			
	Do-Minimum 2020		Do-Something 2033	
	Night period	Any hour	Night period	Any hour
A5025	225 (6)	136 (4)	359 (6)	297 (3)
A55	1,571 (755)	446 (255)	1,758 (835)	513 (283)
* Heavy includes OGV1, OGV2 and PSV				

5.5.127 The number of vehicle pass-bys during the night-time period (23:00 to 07:00) would increase across the sections of the A5025 Off-line Highway Improvements. However, this increase is associated only with lighter vehicles and cars. There are no material changes to the numbers of OGV1, OGV2 and PSV in 2033 during peak operation of the A5025 Off-line Highway Improvements. The highest $L_{Amax, F}$ levels are calculated to be caused by OGV1 and OGV2 classification vehicles. The increases introduced to the quantities of the lighter vehicles and cars nevertheless potentially increases the risk of sleep disturbance compared to the Do-Minimum scenario. Along the A55, the proportional increases in pass-bys are less prominent when compared to the traffic composition in the Do-Minimum scenario. These findings complement and add weight to the assessment of night-time significant effects identified and presented in Table C5-36 above.

5.5.128 In summary, inspection of the respective results presented in Table C5-35 and Table C5-36 show that the operation of the Wylfa Newydd Project in the year of peak operation increases the likely significant adverse effects by two (two major) in the daytime and by 182 (99 moderate and 83 major) in the night-time when compared to the year of peak operation but without the Wylfa Newydd Project included (Do-Minimum).

5.5.129 The assessment shows that there are 178 more significant adverse night-time effects than significant adverse daytime effects, and eight more significant beneficial effects during the night-time than during the daytime.

5.5.130 Further information on the geographical distribution of the magnitudes of change within designated residential receptor groupings within the study area is presented in table A4-4 and table A4-5 in appendix C5-1 (Application Reference Number: 6.3.29) for the respective scenarios which consider Do-Minimum in 2033 and Do-Something in 2033.

Non-residential receptors

5.5.131 Table C5-39 and Table C5-40 below present the total numbers of potential significant effects (adverse and beneficial) at non-residential receptors in the year of peak of operation without and with the A5025 Off-line Highway Improvements respectively.

Table C5-39 Potential daytime significant effects at non-residential receptors (year of peak operation)

Do-Minimum 2020 vs. Do-Minimum 2033 (year of peak operational traffic)		
Non-residential receptor type	**External free-field noise level that relates to an onset of a potential adverse significant effect, dB $L_{Aeq\ T}$**	**Number of non-residential receptors***
Educational	45	0 (0)
Places of worship	47	0 (0)
Commercial	52	0 (0)
Industrial	52	1 (0)
Other	-	0 (0)
* potentially significant adverse effects shown, with potentially significant beneficial effects shown in parentheses		

5.5.132 The table shows that there would be one daytime significant adverse with no beneficial effects at any non-residential receptor during the year of peak operation without the Wylfa Newydd Project.

5.5.133 There would be no daytime significant beneficial effects at non-residential receptors during the year of peak operation without the Wylfa Newydd Project.

Table C5-40 Potential daytime significant effects at non-residential receptors (year of peak operation)

Do-Minimum 2020 vs. Do-Something 2033 (year of peak operational traffic)		
Non-residential receptor type	**External free-field noise level that relates to an onset of a potential adverse significant effect, dB $L_{Aeq\ T}$**	**Number of non-residential receptors***
Educational	45	0 (0)
Places of worship	47	0 (0)
Commercial	52	0 (0)
Industrial	52	1 (0)
Other	-	1 (2)

* potentially significant adverse effects shown, with potentially significant beneficial effects shown in parentheses

5.5.134 The table shows that there would be two potential daytime significant adverse effects at non-residential receptors during the year of peak operation of the A5025 Off-line Highway Improvements. These would occur at:

- PRoW 27/020/1, in Llanfachraeth; and
- electricity sub-station, Holyhead.

5.5.135 It should be noted that the potential significant effect at the electricity substation would also occur were the A5025 Off-line Highway Improvements were to not go ahead. This industrial receptor is not considered to be noise sensitive in any case and is therefore not considered to constitute a significant effect.

5.5.136 The effects on users of these PRoWs would be localised to the crossing points on the A5025, and therefore short-lived. The effects are therefore not considered to constitute significant adverse effects.

5.5.137 The table also shows that there would be two potential daytime significant beneficial effects at non-residential receptors during the peak year of operation of the A5025 Off-line Highway Improvements. These would occur at:

- play area, Llanfachraeth; and
- PRoW (38/030B/1), Cefn Coch.

5.5.138 The effects on users of this PRoW would be localised to the crossing point on the A5025, and therefore short-lived. The effects are therefore not considered to constitute a significant beneficial effect.

BNL changes

5.5.139 Consideration has been given to likely noise effects at residential receptors along the wider road network within the study area but outside the calculation area as guided by DMRB.

5.5.140 Table C5-41 provides predicted BNLs for a route identified as being affected in the year of opening. The values in brackets present the numerical differences between the Do-Minimum scenario in the baseline year of 2020, Do-Minimum scenario in the peak year of operation of the Power Station (2033) and the Do-Something scenario with A5025 Off-line Highway Improvements in 2033.

Table C5-41 BNL for affected routes outside the calculation area – year of peak operation

Road link	BNL (dB)			
	Relevant noise indicator	Do-Minimum 2020	Do-Minimum 2033 (without A5025 Off-line Highway Improvements)	Do-Something 2033 (with A5025 Off-line Highway Improvements in peak year of operation)
Minor roads between A5025 Llanfaethlu and B5112 Llannerch-y-medd	$L_{A10\ 18\ hr}$ (daytime)	58.2	58.5 (+0.3)	58.6 (+0.4)
	L_{night} (night-time)	50.6	51.4 (+0.8)	51.4 (+0.8)

5.5.141 The BNL comparisons show that increases of only 0.8dB in the long term are expected during the peak operation year along this section of road compared to the Do-Minimum scenario in the baseline year of 2020. Such increases would be considered to be negligible and because the traffic is not expected to operate over any material length of this link (as explained in the section describing the BNLs for the year of opening) it has not been necessary to further consider this link as an affected route in any case.

5.5.142 As with the scenarios considered for the year of opening and year of peak construction, the daytime BNLs calculated in the above table are based upon very low traffic flows, which fall outside the range of validity of the CRTN calculation methodology.

Further rationalisation of model outputs

5.5.143 Unlike the year of opening and the peak construction year, no significant adverse effects were identified in the year of peak operation alongside either the B4545 from Valley to Four Mile Bridge, or the minor road from Junction 4 with A55 (near to the Park and Ride) running north to Bodedern. It has not been necessary therefore to modify the residential receptor counts accordingly.

Initial noise insulation eligibility estimations

5.5.144 An assessment has been carried out using the predicted noise levels obtained from the noise modelling exercise to provide an initial estimate of the potential numbers of residential receptors which may be eligible for noise insulation under the LNMS proposals.

5.5.145 Table C5-42 below presents a summary of the numbers of dwellings potentially eligible under the daytime and night-time criteria adopted for this chapter for the comparative scenario stated. The table also presents the overall combined number (day and night) of eligible dwellings for the comparative scenario.

Table C5-42 Estimated number of residential dwellings eligible for noise insulation – year of peak operation

Comparative scenario	Estimated number of eligible residential dwellings		
	Daytime	Night-time	Combined
Do-Minimum 2020 vs Do-Something 2033 (year of peak operation)	26	64	70

Vibration effects

5.5.146 The assessment of ground-borne vibration has been scoped out of this assessment.

5.5.147 Airborne vibration has been assessed in accordance with DMRB. The airborne vibration nuisance for the scheme is presented above Table C5-34. No further quantitative assessment has been undertaken.

5.5.148 The appraisal undertaken to assess the potential changes in the number of vehicle $L_{Amax,F}$ occurrences during the night-time period, is also relevant for the potential changes in the number of vehicle pass-bys that could generate airborne vibration inside residential dwellings close to road links within the study area.

5.5.149 As both road traffic maximum noise levels and airborne vibration are reduced by increasing the sound insulation performance of the windows (and external doors) of rooms, any insulation treatments applied to windows for the purposes of controlling the increased risk of sleep disturbance from maximum noise levels would also control airborne vibration.

Noise contours and other figures

5.5.150 Table C5-43 below identifies the predicted daytime noise change contour figures, and the night-time noise change figures for the scenarios assessed under this section (peak operation year).

Table C5-43 Schedule of noise output figures – year of peak operation (2033)

Comparative scenario	Geographical area	Day/night	Noise change scale*	Figure no. (Application Reference Number: 6.3.32)
Do-Minimum 2020 vs Do-Minimum 2033 (without A5025 Off-line Highway Improvements)	Logistics Centre and Park and Ride	Day	Long-term	C5-16
		Night	Mixed	C5-17
	A5025 Off-line Highway Improvements and the Site Campus	Day	Long-term	C5-18
		Night	Mixed	C5-19
Do-Minimum 2020 vs Do-Something 2033 (with A5025 Off-line Highway Improvements)	Logistics Centre and Park and Ride	Day	Long-term	C5-20
		Night	Mixed	C5-21
	A5025 Off-line Highway Improvements and the Site Campus	Day	Long-term	C5-22
		Night	Mixed	C5-23

* Wylfa Newydd Project-specific criteria consider both the short-term and long-term noise change scales for night-time depending upon the existing road traffic noise levels

Overall summary of significant effects

5.5.151 Table C5-44 below presents an overall summary of the likely Wylfa Newydd Project-wide significant adverse and beneficial effects, and the overall balance of effects for both daytime and night-time assessments.

Table C5-44 Summary of significant effects at residential receptors. Note: DM – Do-Minimum scenario, DS – Do-Something scenario

Assessment year	Comparative scenario	Day / night	No. of significant effects			No. of additional properties >=60dB $L_{Amax, F}$
			Noise change			
			Adverse	Beneficial	Balance	
Year of opening	DM 2020 vs DS 2020 (without A5025 Off-line Highway Improvements operational)	Day	273	0	273 (adverse)	-
		Night	248	0	248 (adverse)	74
	DM 2020 vs DS 2020 (with A5025 Off-line Highway Improvements operational)	Day	120	28	92 (adverse)	-
		Night	159	56	103 (adverse)	92
Year of peak construction	DM 2020 vs DS 2023	Day	152	26	126 (adverse)	-
		Night	179	44	135 (adverse)	92
Year of peak operation	DM 2020 vs DM 2033	Day	2	0	2 (adverse)	-
		Night	0	0	0 (neutral)	-
	DM 2020 vs DS 2033	Day	4	21	17 (beneficial)	-
		Night	182	29	153 (adverse)	95

* excludes residential receptors south of Valley deemed to be unaffected by the changes in traffic on minor roads as currently depicted in the traffic model outputs

** a localised sensitivity study indicates that a reduced height to the Afon Alaw viaduct noise barrier to 1m, would introduce up to four additional significant adverse effects, and reduce the significant beneficial effects by up to two

5.5.152 The above summary shows that the highest number of significant adverse effects occurs as a result of the Wylfa Newydd Project in the year of opening but without the A5025 Off-line Highway Improvements being constructed. For this scenario a balance of 273 additional residential receptors during the daytime and 248 additional residential receptors during the night-time would be expected to experience significant adverse noise effects.

5.5.153 The overall balance figures reduce by 181 (adverse) during the day, and 145 (adverse) during the night with the A5025 Off-line Highway Improvements constructed and operational. This results in daytime and night-time significant effect balances of 92 (adverse) and 103 (adverse) respectively.

5.5.154 The introduction of the A5025 Off-line Highway Improvements would not only reduce the total number of adverse daytime and night-time effects, but also

introduce significant beneficial effects at 28 and 56 receptors in the daytime and night-time periods respectively.

5.5.155 The balance of significant adverse effects associated with the A5025 Off-line Highway Improvements operational in the peak construction year, is 126 (adverse) during the day and 135 (adverse) during the night. The total number of significant adverse effects at night-time is 179. The highest number of significant night-time adverse effects assessed in any period is higher at 248 during the year of opening without the A5025 Off-line Highway Improvements operational.

5.5.156 Once the construction of the Wylfa Newydd Project has been completed, and when assessed in the long term, the balance in the number of significant adverse effects reduces by 144 during the day-time, but increases by 18 during night-time when compared to the balances of significant effects during the year of peak construction. The final balance of Wylfa Newydd Project-wide significant effects during the year of peak operation is 17 (beneficial) during the daytime and 153 (adverse) during the night.

5.5.157 The geographical distribution of the magnitudes of change within designated residential receptor groupings within the study area is presented in tables A4-1 to A4-5 in appendix C5-1 (Application Reference Number: 6.3.29).

5.5.158 During the year of opening, the peak year of construction and the peak year of operation, there are observed changes to the traffic composition during night-time periods. During the year of opening and the peak construction year there are additional PSV movements across the night-time period and within certain hours of the night, along with increases in the lighter vehicle movements. During the peak year of operation, similar observations are made with the number of lighter vehicles higher than in the baseline year.

5.5.159 The PSV movements would not be present in the year of peak operation. Whilst neither the PSVs nor the lighter vehicles would be responsible for the highest likely maximum noise levels during the night, the increases in the number of these vehicles nevertheless are considered to increase the risk of potential sleep disturbance. These observations complement the assessment of night-time significant effects.

5.6 Additional mitigation

5.6.1 In accordance with chapter B1 (Application Reference Number: 6.2.1), embedded and good practice mitigation measures relevant to noise and vibration were taken into account when determining the ‘pre-mitigation’ significance of effects. These are detailed in the design basis and activities section of this chapter.

5.6.2 Proposed additional mitigation measures would be implemented to address the potential significant effects identified in the assessment of effects section. These additional mitigation measures are summarised in Table C5-45, Table C5-47 and Table C5-48.

5.6.3 In the majority of the comparative scenarios considered in the ‘pre-mitigation’ assessment, the night-time period gives rise to the greatest number of significant adverse effects at residential receptors. The exception to this is the

year of opening without the A5025 Off-line Highway Improvements operational where there are 25 more effects in the day-time compared to the night-time.

5.6.4 During night-time periods, the primary adverse effects of concern include the risk of increased sleep disturbance to building occupants, which can be determined by evaluating the absolute indoor noise levels and the number of noise events experienced indoors during the night.

5.6.5 Whilst the assessment of both daytime and night-time significant effects is based upon considering outdoor noise levels, the criteria for night-time effects have been specifically set to protect occupants inside dwellings whilst resting or sleeping. Preserving or improving indoor noise levels in bedrooms would therefore provide protection against the risk of increased sleep disturbance and other health based effects for those already experiencing relatively high night-time noise levels.

5.6.6 To provide those residents of buildings with the additional means to reduce indoor noise levels to mitigate the risk of increased sleep disturbance, additional mitigation in the form of noise insulation treatment (along with associated ventilation) to windows and/or external doors to habitable rooms is proposed to be offered to occupants of all eligible residential dwellings.

5.6.7 Horizon is committed to a voluntary LNMS which will offer secondary glazing to residential properties that experience significant noise effects associated with the Wylfa Newydd Project, including changes in traffic, within defined areas near the Power Station site and A5025 improvements, as per the Wylfa Newydd CoCP (Application Reference Number: 8.6).

5.6.8 The offering of noise insulation to occupants of properties with L_{night} noise levels at or above 55dB at night-time, and which are subject to an increase of noise of at least 1dB, is intended to reflect the necessary increased precaution required for this group of residential receptors.

5.6.9 The provision of noise insulation is expected to provide at least 15dB further reduction to maximum indoor road traffic noise levels compared to those experienced when windows are left partially open. Such a measure is therefore considered to provide the means to residents for offsetting and improving any existing and future sleep disturbance effects associated with changes in traffic composition during the night-time period and during certain hours of the night as a result of the Wylfa Newydd Project.

5.6.10 The installed noise insulation treatments would also provide the means for offsetting and improving any existing and future road traffic airborne vibration from vehicle pass-bys at properties close to road links within the study area.

5.6.11 Whilst the benefits of offering noise insulation are explained above, such measures do not remedy or reduce the relevant significant adverse effects reported in this chapter. This is because the identification of significant effects is based upon consideration of the changes in outdoor noise climate which would not be affected by additional noise insulation treatments made to windows. Gardens and other outside spaces would not be protected from the noise effects.

5.6.12 Furthermore, the provision of noise insulation is made as an 'offer' and there is no certainty that all affected residential receptors would choose to accept the offer. Additionally, it is not technically feasible to install noise insulation in all properties particularly those where the existing windows may not be the weakest path for sound transmission into the property.

5.6.13 Finally, the property would not benefit from the noise insulation if the occupants chose to keep their windows opened, although the provision of acoustically treated ventilation is intended to reduce the need to open windows.

5.6.14 The following subsections set out the estimated number of residential receptors currently expected to become eligible for noise insulation, based upon the findings presented in this chapter. It should be noted that both day and night-time eligibility for noise insulation is listed below separately. Final quantities of eligible properties based upon both day and night-time noise considerations will be confirmed during the detailed design stages of the A5025 Off-line Highway Improvements.

Opening year of the A5025 Off-line Highway Improvements

5.6.15 The following additional mitigation measures are proposed for residential dwellings currently assessed as likely to experience significant day and night-time adverse noise effects during the year of opening of the A5025 Off-line Highway Improvements.

Table C5-45 Proposed additional mitigation measures – opening year of the A5025 Off-line Highway Improvements – without improvements

Proposed additional mitigation measures	Objective	Achievement criteria and reporting requirements
Noise insulation to residential dwellings due to day and night-time noise. This is currently estimated to be 174 residential dwellings for this comparative scenario.	To provide the means for offsetting and improving any potential increases in indoor noise levels during the day-time and night-time periods as a result of the Wylfa Newydd Project, at receptors where existing road traffic noise levels are already considered to be high.	Discretionary powers to offer insulation are provided for under The Noise Insulation Regulations 1975. Confirmed eligibility criteria and timescales for offers will be set out in the LNMS as set out in the Wylfa Newydd CoCP (Application Reference Number: 8.6) which is secured through the development consent.

5.6.16 Where the above measures are targeted at protecting occupants of dwellings from changes in night-time traffic noise, there would also be commensurate protection from daytime noise and vice versa.

Table C5-46 Proposed additional mitigation measures – opening year of the A5025 Off-line Highway Improvements – with improvements

Proposed additional mitigation measures	Objective	Achievement criteria and reporting requirements
Noise insulation to residential dwellings due to day and night-time noise. This is currently estimated to be 87 residential dwellings for this comparative scenario.	To provide the means for offsetting and improving any potential increases in indoor noise levels during the day-time and night-time periods as a result of the Wylfa Newydd Project, at receptors where existing road traffic noise levels are already considered to be high.	Discretionary powers to offer insulation are provided for under *The* Noise Insulation Regulations 1975. Confirmed eligibility criteria and timescales for offers will be set out in the LNMS as set out in the Wylfa Newydd CoCP (Application Reference Number: 8.6) which is secured through the development consent.

5.6.17 Where the above measures are targeted at protecting occupants of dwellings from changes in night-time traffic noise, there would also be a commensurate protection from daytime noise and vice versa.

Peak construction

5.6.18 The following additional mitigation measures are proposed for residential dwellings currently assessed as likely to experience significant night-time adverse noise effects during the year of peak construction.

Table C5-47 Proposed additional mitigation measures – peak construction

Proposed additional mitigation measures	Objective	Achievement criteria and reporting requirements
Noise insulation to residential dwellings due to day and night-time noise. This is currently estimated to be 94 residential dwellings for this comparative scenario.	To provide the means for offsetting and improving any potential increases in indoor noise levels during the day-time and night-time periods as a result of the Wylfa Newydd Project, at receptors where existing road traffic noise levels are already considered to be high.	Discretionary powers to offer insulation are provided for under The Noise Insulation Regulations 1975. Confirmed eligibility criteria and timescales for offers will be set out in the LNMS as set out in the Wylfa Newydd CoCP (Application Reference Number: 8.6) which is secured through the development consent.

5.6.19 Where the above measures are targeted at protecting occupants of dwellings from changes in night-time traffic noise, there would also be commensurate protection from daytime noise and vice versa.

Peak operation

5.6.20 The following additional mitigation measures are proposed for residential dwellings currently assessed as likely to experience significant night-time adverse noise effects during the year of peak operation.

Table C5-48 Proposed additional mitigation measures – peak operation

Proposed additional mitigation measures	Objective	Achievement criteria and reporting requirements
Noise insulation to residential dwellings due to day and night-time noise. This is currently estimated to be 70 residential dwellings for this comparative scenario.	To provide the means for offsetting and improving any potential increases in indoor noise levels during the day-time and night-time periods as a result of the Wylfa Newydd Project, at receptors where existing road traffic noise levels are already considered to be high.	Discretionary powers to offer insulation are provided for under The Noise Insulation Regulations 1975. Eligibility criteria and timescales for offers will be set out in the LNMS as set out in the Wylfa Newydd CoCP (Application Reference Number: 8.6) which is secured through the development consent.

5.6.21 Where the above measures are targeted at protecting occupants of dwellings from changes in night-time traffic noise, there would also be commensurate protection from daytime noise and vice versa.

Overall provision of noise insulation

5.6.22 The estimated quantities of noise insulation presented in Table C5-45, Table C5-46, Table C5-47 and Table C5-48 are mutually exclusive for each year of interest separately. The spatial distribution of the residential receptors that are eligible for noise insulation varies between the scenarios considered due to the complex differences in traffic flows and speeds, and the alignments of the existing and proposed roads considered. In a large number of cases, the same dwellings become eligible across more than one scenario, but in some cases the eligibility is only evident for a specific scenario and in specific locations. It is necessary to understand the overall required quantity and locations of eligible residential receptors by avoiding any doubling counting across scenarios.

5.6.23 The total number of residential receptors that are estimated to be eligible for noise insulation across all scenarios are 179 for night-time and 106 for day-time. The overall number of residential receptors eligible for noise insulation when combining day-time and night-time together is 193.

5.6.24 Figures C5-24 and C5-25 (Application Reference Number: 6.3.32) show the locations of the 193 residential receptors estimated to be eligible for noise insulation.

5.7 Residual effects

5.7.1 This section describes the residual effects for noise and vibration effects of traffic having taken into account the embedded, good practice and additional mitigation described above. Table C5-49 provides a summary of significant residual effects identified either prior to or post application of additional mitigation for the opening year, peak construction and peak operation phases. For each year of interest, a summary of the residual significant effects at residential receptors are presented in Table C5-49 by geographical area. This summary is based on the worst significant effect assessed at a particular receptor taking into account both the daytime and night-time effects.

5.7.2 The geographical areas and the individual receptor groupings used to present the assessment findings shown in Table C5-49, are presented in figures C5-26 and C5-27 (Application Reference Number: 6.3.32). Tables A4-1 to A4-5 in appendix C5-1 (Application Reference Number: 6.3.29) provide a further detailed breakdown of the magnitude of change, effect significance and quantity of receptors affected within the particular receptor grouping for each year of the five respective scenarios assessed.

5.7.3 Both adverse and beneficial significant effects are shown in table for each geographical area in turn.

5.7.4 Additionally, all effects of minor significance or greater identified in the assessment of effects section are summarised in appendix I3-1 (Master residual effects table) (Application Reference Number: 6.9.8), which also provides the effects by the geographical location of the named receptor grouping.

5.7.5 It should be noted that a localised sensitivity study indicates that the probable need to apply a reduced height to the Afon Alaw viaduct noise barrier of 1m, would introduce up to four additional significant adverse effects, and reduce the significant beneficial effects by up to two in section 3 only. This sensitivity study is described further in section 5 of appendix C5-1 (Application Reference Number: 6.3.29).

5.7.6 The additional mitigation, in the form of noise insulation treatments to buildings where the existing day-time and night-time road traffic noise levels are already high (at least 68dB $L_{A10,18h}$ or at least 55dB L_{night}), would provide the means to avoid occupants being subject to further increased indoor noise levels and noise-induced health risks (including sleep disturbance).

5.7.7 The assessment of significant effects in this chapter is based upon criteria which consider external or outdoor noise levels only. The provision of noise insulation would not alter the assessment of significant effects as it would only influence noise inside properties.

Table C5-49 Summary of residual effects

Receptor (or group of receptors)	Sensitivity of receptor(s)	Description of potential effect	Nature of effect	Potential magnitude of change	Potential significance of effect	Additional mitigation	Post-mitigation magnitude of change	Significance of residual effect
Opening year of the A5025 Off-line Highway Improvements – without improvements (number of properties)								
Residential properties along section 1	High	Increases in road traffic noise	Short-term Adverse	Small (22)	Moderate (22)	Offers of noise insulation to occupants of eligible properties, to provide the means for reducing day-time and night-time noise. Measure would control indoor noise levels only, and	Small (22)	Moderate (22)
Residential properties along section 2	High	Increases in road traffic noise	Short-term Adverse	Small (27)	Moderate (27)		Small (27)	Moderate (27)
Residential properties along section 3	High	Increases in road traffic noise	Short-term Adverse	Medium (1) Small (126)	Major (1) Moderate (126)		Medium (1) Small (126)	Major (1) Moderate (126)
Residential properties along section 4	High	Increases in road traffic noise	Short-term Adverse	Medium (8) Small (7)	Major (8) Moderate (7)		Medium (8) Small (7)	Major (8) Moderate (7)
Residential properties along section 5	High	Increases in road traffic noise	Short-term Adverse	Large (1) Medium (15) Small (43)	Major (16) Moderate (43)		Large (1) Medium (15) Small (43)	Major (16) Moderate (43)
Residential properties along section 6	High	Increases in road traffic noise	Short-term Adverse	Medium (14) Small (26)	Major (14) Moderate (26)		Medium (14) Small (26)	Major (14) Moderate (26)

Receptor (or group of receptors)	Sensitivity of receptor(s)	Description of potential effect	Nature of effect	Potential magnitude of change	Potential significance of effect	Additional mitigation	Post-mitigation magnitude of change	Significance of residual effect
Residential properties along section 7	High	Increases in road traffic noise	Short-term Adverse	Medium (8) Small (6)	Major (8) Moderate (6)	hence would not reduce the significant effects assessed.	Medium (8) Small (6)	Major (8) Moderate (6)
Residential properties along section 8	High	Increases in road traffic noise	Short-term Adverse	Medium (3) Small (6)	Major (3) Moderate (6)		Medium (3) Small (6)	Major (3) Moderate (6)
Residential properties in the vicinity of Tregele village	High	Increases in road traffic noise	Short-term Adverse	Small (11)	Moderate (11)		Small (11)	Moderate (11)
Opening year of the A5025 Off-line Highway Improvements (with improvements)								
Residential properties along section 1	High	Increases in road traffic noise	Short-term Adverse	Small (16)	Moderate (16)	Offers of noise insulation to occupants of eligible properties, to provide means reducing day-time	Small (16)	Moderate (16)
		Decreases in road traffic noise	Short-term Beneficial	Small (2)	Moderate (2)		Small (2)	Moderate (2)
Residential properties along section 2	High	Increases in road traffic noise	Short-term Adverse	Small (25)	Moderate (25)		Small (25)	Moderate (25)

Receptor (or group of receptors)	Sensitivity of receptor(s)	Description of potential effect	Nature of effect	Potential magnitude of change	Potential significance of effect	Additional mitigation	Post-mitigation magnitude of change	Significance of residual effect
Residential properties along section 3	High	Increases in road traffic noise	Short-term Adverse	Large (6) Medium (20) Small (4)	Major (26) Moderate (4)	and night-time noise. Measure would control indoor noise levels only, and hence would not reduce the significant effects assessed.	Large (6) Medium (20) Small (4)	Major (26) Moderate (4)
		Decreases in road traffic noise	Short-term Beneficial	Medium (6) Small (12)	Major (6) Moderate (12)		Medium (6) Small (12)	Major (6) Moderate (12)
Residential properties along section 4	High	Increases in road traffic noise	Short-term Adverse	Medium (10) Small (5)	Major (10) Moderate (5)		Medium (10) Small (5)	Major (10) Moderate (5)
Residential properties along section 5	High	Increases in road traffic noise	Short-term Adverse	Large (1) Medium (16) Small (11)	Major (17) Moderate (11)		Large (1) Medium (16) Small (11)	Major (17) Moderate (11)
Residential properties along section 6	High	Increases in road traffic noise	Short-term Adverse	Medium (16) Small (24)	Major (16) Moderate (24)		Medium (16) Small (24)	Major (16) Moderate (24)
Residential properties along section 7	High	Increases in road traffic noise	Short-term Adverse	Medium (3) Small (2)	Major (3) Moderate (2)		Medium (3) Small (2)	Major (3) Moderate (2)
Residential properties along section 8	High	Increases in road traffic noise	Short-term Adverse	Medium (3) Small (6)	Major (3) Moderate (6)		Medium (3) Small (6)	Major (3) Moderate (6)

Receptor (or group of receptors)	Sensitivity of receptor(s)	Description of potential effect	Nature of effect	Potential magnitude of change	Potential significance of effect	Additional mitigation	Post-mitigation magnitude of change	Significance of residual effect
Residential properties in the vicinity of Tregele village	High	Increases in road traffic noise	Short-term Adverse	Small (16)	Moderate (16)		Small (16)	Moderate (16)
Peak construction								
Residential properties along section 1	High	Increases in road traffic noise	Short-term Adverse	Small (19)	Moderate (19)	Offers of noise insulation to occupants of eligible properties, to provide means reducing day-time and night-time noise. Measure would control indoor noise	Small (19)	Moderate (19)
		Decreases in road traffic noise	Short-term Beneficial	Small (1)	Moderate (1)		Small (1)	Moderate (1)
Residential properties along section 2	High	Increases in road traffic noise	Short-term Adverse	Medium (5) Small (22)	Major (5) Moderate (22)		Medium (5) Small (22)	Major (5) Moderate (22)
Residential properties along section 3	High	Increases in road traffic noise	Short-term Adverse	Large (7) Medium (20) Small (6)	Major (27) Moderate (6)		Large (7) Medium (20) Small (6)	Major (27) Moderate (6)
		Decreases in road traffic noise	Short-term Beneficial	Medium (6) Small (11)	Major (6) Moderate (11)		Medium (6) Small (11)	Major (6) Moderate (11)

Receptor (or group of receptors)	Sensitivity of receptor(s)	Description of potential effect	Nature of effect	Potential magnitude of change	Potential significance of effect	Additional mitigation	Post-mitigation magnitude of change	Significance of residual effect
Residential properties along section 4	High	Increases in road traffic noise	Short-term Adverse	Medium (11) Small (4)	Major (11) Moderate (4)	levels only, and hence would not reduce the significant effects assessed.	Medium (11) Small (4)	Major (11) Moderate (4)
Residential properties along section 5	High	Increases in road traffic noise	Short-term Adverse	Large (1) Medium (13) Small (10)	Major (14) Moderate (10)		Large (1) Medium (13) Small (10)	Major (14) Moderate (10)
Residential properties along section 6	High	Increases in road traffic noise	Short-term Adverse	Medium (16) Small (24)	Major (16) Moderate (24)		Medium (16) Small (24)	Major (16) Moderate (24)
Residential properties along section 7	High	Increases in road traffic noise	Short-term Adverse	Medium (3) Small (4)	Major (3) Moderate (4)		Medium (3) Small (4)	Major (3) Moderate (4)
Residential properties along section 8	High	Increases in road traffic noise	Short-term Adverse	Medium (2) Small (7)	Major (2) Moderate (7)		Medium (2) Small (7)	Major (2) Moderate (7)
Residential properties in the vicinity of Logistics Centre	High	Increases in road traffic noise	Short-term Adverse	Small (2)	Moderate (2)		Small (2)	Moderate (2)
Residential properties in the vicinity of Park and Ride	High	Increases in road traffic noise	Short-term Adverse	Small (4)	Moderate (4)		Small (4)	Moderate (4)

Receptor (or group of receptors)	Sensitivity of receptor(s)	Description of potential effect	Nature of effect	Potential magnitude of change	Potential significance of effect	Additional mitigation	Post-mitigation magnitude of change	Significance of residual effect
Residential properties in the vicinity of Tregele village	High	Increases in road traffic noise	Short-term Adverse	Small (33)	Moderate (33)		Small (33)	Moderate (33)
Peak operation								
Residential properties along section 1	High	Increases in road traffic noise	Long-term Adverse	Small (5)	Moderate (5)	Offers of noise insulation to occupants of eligible properties, to provide means reducing day-time and night-time noise. Measure would control indoor noise	Small (5)	Moderate (5)
		Decreases in road traffic noise	Long-term Beneficial	Small (1)	Moderate (1)		Small (1)	Moderate (1)
Residential properties along section 2	High	Increases in road traffic noise	Long-term Adverse	Medium (3) Small (7)	Major (3) Moderate (7)		Medium (3) Small (7)	Major (3) Moderate (7)
Residential properties along section 3	High	Increases in road traffic noise	Long-term Adverse	Large (6) Medium (20) Small (7)	Major (26) Moderate (7)		Large (6) Medium (20) Small (7)	Major (26) Moderate (7)
		Decreases in road traffic noise	Long-term Beneficial	Medium (4) Small (12)	Major (4) Moderate (12)		Medium (4) Small (12)	Major (4) Moderate (12)

Receptor (or group of receptors)	Sensitivity of receptor(s)	Description of potential effect	Nature of effect	Potential magnitude of change	Potential significance of effect	Additional mitigation	Post-mitigation magnitude of change	Significance of residual effect
Residential properties along section 4	High	Increases in road traffic noise	Long-term Adverse	Medium (11) Small (4)	Major (11) Moderate (4)	levels only, and hence would not reduce the significant effects assessed.	Medium (11) Small (4)	Major (11) Moderate (4)
Residential properties along section 5	High	Increases in road traffic noise	Long-term Adverse	Medium (13) Small (5)	Major (13) Moderate (5)		Medium (13) Small (5)	Major (13) Moderate (5)
Residential properties along section 6	High	Increases in road traffic noise	Long-term Adverse	Medium (16) Small (27)	Major (16) Moderate (27)		Medium (16) Small (27)	Major (16) Moderate (27)
Residential properties along section 7	High	Increases in road traffic noise	Long-term Adverse	Medium (3) Small (2)	Major (3) Moderate (2)		Medium (3) Small (2)	Major (3) Moderate (2)
Residential properties along section 8	High	Increases in road traffic noise	Long-term Adverse	Medium (3) Small (4)	Major (3) Moderate (4)		Medium (3) Small (4)	Major (3) Moderate (4)
Residential properties in the vicinity of Logistics Centre	High	Increases in road traffic noise	Long-term Adverse	Small (2)	Moderate (2)		Small (2)	Moderate (2)
Residential properties in the vicinity of Tregele village	High	Increases in road traffic noise	Long-term Adverse	Medium (8) Small (38)	Major (8) Moderate (38)		Medium (8) Small (38)	Major (8) Moderate (38)

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5.8 References

Table C5-50 Schedule of references

ID	Reference
RD1	Highways Agency. 2011. *Design Manual for Roads and Bridges Vol 11 Environmental Assessment Section 3 Part 7 Noise and Vibration* (HD213/11 – Revision 1) [Online] Available from: http://www.standardsforhighways.co.uk/ha/standards/DMRB/vol11/section3/hd21311.pdf
RD2	Department for Transport and the Welsh Office. 1988. *Calculation of Road Traffic Noise* [Online] Available from: http://www.programmeofficers.co.uk/Cuadrilla/CoreDocuments/CD31/CD31.24.pdf
RD3	Highways Agency. 2015. *Interim Advice Note 185/15: Updated traffic, air quality and noise advice*. London: The Stationery Office.
RD4	World Health Organization. (WHO) *Guidelines for Community Noise 1999.* [Online] Available from: http://whqlibdoc.who.int/hq/1999/a68672.pdf
RD5	Department for Education and Education Funding Agency. 2015. *Acoustic design of schools: performance standards. Building bulletin 93* [Online] Available from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/400784/BB93_February_2015.pdf
RD6	British Standards Institution. 2014. *BS 8233:2014 Guidance on sound insulation and noise reduction for buildings*. London: British Standards Institution.
RD7	Welsh Government. 1997. *Technical Advice Note (TAN) 11: Noise (1997)* [Online] Available from: http://gov.wales/topics/planning/policy/tans/tan11/?lang=en
RD8	Transport and Road Research Laboratory. 1986. *Ground vibration caused by civil engineering works.* No. RR53 Department of Transport.
RD9	Horizon Nuclear Power. 2017. Wylfa Newydd Project: Addendum to the Environmental Impact Assessment Scoping Report. [Online] Available from: https://infrastructure.planninginspectorate.gov.uk/projects/wales/wylfa-newydd-nuclear-power-station/?ipcsection=docs
RD10	World Health Organization Europe. 2009. *Night Noise Guidelines for Europe*. Copenhagen: World Health Organization Regional Office for Europe.
RD11	Transport Research Laboratory. 2002. *Converting the UK traffic noise index $L_{A10,18h}$ to EU noise indices for noise mapping*.

ID	Reference
RD12	Highways Agency. 2006. *Design Manual for Roads and Bridges Vol 7 Pavement Design and Maintenance Section 2 Part 1 Traffic Assessment* (HD24/06) [Online] Available from: http://www.standardsforhighways.co.uk/ha/standards/dmrb/vol7/section2/hd2406.pdf