HORIZON NUCLEAR POWER

WYLFA NEWYDD

ENERGY WORKING FOR BRITAIN

Wylfa Newydd Project

6.3.4 ES Volume C - Project-wide effects C4 - Air quality effects of traffic

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4 Air quality effects of traffic

4.1 Introduction

4.1.1 This chapter describes the assessment of potential project-wide air quality effects of road traffic.

4.1.2 Please refer to chapter B5 (air quality) (Application Reference Number: 6.2.5) for the technical basis for the assessment including a summary of legislation, policy and guidance; key points arising in consultation that have guided the air quality assessment; and assessment methodologies and criteria.

4.1.3 The potential emission sources that are considered within this chapter include emissions of pollutants from road vehicles (e.g. cars, vans, buses and lorries) travelling on the local road network that are associated with the Wylfa Newydd Project during the construction and operation phases. The air quality assessment of pollutant emissions from other sources, including dusty activities, construction plant and machinery, standby generators and boilers at the various development sites, are considered in the following chapters:

- D5 (excluding emissions from traffic) (Application Reference Number: 6.4.5) for the WNDA Development;
- E5 (Application Reference Number: 6.5.5) for the Off-Site Power Station Facilities;
- F5 (Application Reference Number: 6.6.5) for the Park and Ride;
- G5 (Application Reference Number: 6.7.5) for the A5025 Off-line Highway Improvements; and
- H5 (Application Reference Number: 6.8.5) for the Logistics Centre.

4.1.4 The key pollutants relevant to the assessment of road traffic emissions are oxides of nitrogen (NOx), nitrogen dioxide (NO_2) and particulate matter (PM_{10} and $PM_{2.5}$ – particulate matter with an aerodynamic diameter of 10microns or less and 2.5microns or less, respectively). The assessment also considers nitrogen and acid deposition associated with the emissions of NOx.

4.1.5 The likely significant effects at sensitive human receptors (arising from the predicted changes to NO_2, PM_{10} and $PM_{2.5}$ concentrations) and also sensitive ecological sites (arising from the predicted changes to NOx concentrations or nitrogen and acid deposition rates) are considered within this chapter.

4.1.6 The potential intra-project additive effects of air quality emission sources from road traffic and other sources at key human and ecological receptors are considered within chapter I4 (intra-project cumulative effects) (Application Reference Number: 6.9.4).

4.2 Study area

4.2.1 This section describes the study areas relevant to the assessment of project-wide air quality effects of road traffic emissions.

4.2.2 As described in chapter B5 (Application Reference Number: 6.2.5), the study area is defined following screening criteria within Environmental Protection UK (EPUK) and Institute of Air Quality Management (IAQM) guidance [RD1] based on the predicted changes in the road traffic flows. Roads meeting the screening thresholds are termed 'affected' and are included within the modelling approach. Roads not meeting the screening thresholds but that are located within 200m of a receptor that is within 200m of an affected road link, have also been included within the modelling approach to ensure the full road contribution is considered at each receptor (the roads not meeting the screening thresholds are not defined as affected roads). The study area includes roads on the Isle of Anglesey and also on mainland Wales. The extents of the study area (i.e. the maximum extents of the affected road network) are outlined below and presented in figures C4-1 and C4-2 (Application Reference Number: 6.3.32) for the affected roads on the Isle of Anglesey (the 'Isle of Anglesey study area') and mainland Wales (the 'mainland Wales study area'), respectively. The assessment was undertaken at human and ecological receptors within 200m of the affected road network.

4.2.3 The affected roads modelled on the Isle of Anglesey include:

- the A5025 from Amlwch to the junction with the A55 (Junction 3) in Valley, including the short section of the A5 between the A5025 and the A55;
- A55 between Junction 2 and the Britannia Bridge (west of Junction 8A); and
- A5153 and Parc Cybi between A55 Junction 2 and the Logistics Centre at Parc Cybi (hereafter referred to as the 'Logistics Centre').

4.2.4 The affected roads modelled on mainland Wales include the A55 on mainland Wales from the Britannia Bridge towards the A494 to the west of Chester (Junction 34).

4.2.5 Roads that experience a change in traffic flows below the screening thresholds referred to above do not require further assessment, as the change in concentrations of pollutants at receptors close to these roads would be imperceptible. These roads are, therefore, outside of the study area, and air quality effects at receptors close to these roads would not be significant. Some of these roads have been included within the modelling where they are within 200m of a receptor which is within 200m of the affected roads.

4.3 Baseline environment

4.3.1 This section provides a summary of the baseline conditions for air quality within the study area described in section 4.2.

4.3.2 The methodology and approach followed to define the baseline is provided in detail in appendix B5-1 (Baseline Data Synopsis Report - Air Quality) (Application Reference Number: 6.2.18). This appendix also sets out all of the references to where the source data have been derived. A summary of the key air quality baseline conditions and data sources is provided below.

Air quality baseline conditions

4.3.3 As described above, the affected road network covers the Isle of Anglesey and north Wales. The affected roads are located within the jurisdictions of the Isle of Anglesey County Council (IACC), Gwynedd Council (GC), Conwy County Borough Council (CCBC), Denbighshire County Council (DCC) and Flintshire County Council (FCC). As part of the Local Air Quality Management (LAQM) process, each of these local authorities undertake an annual review of air quality in its area, including measurements of key pollutants such as NO_2, PM_{10} and $PM_{2.5}$, to determine whether the Air Quality Objectives (AQOs) for a number of key air pollutants will be achieved. These are published as LAQM air quality reports.

4.3.4 To characterise the environmental baseline and identify the most appropriate background concentrations for use in the air quality assessment, a review of the LAQM air quality reports and data was undertaken. The review also considered other data sources, including the empirically derived background maps published by the Department for Environment, Food and Rural Affairs (Defra) and the devolved administrations.

4.3.5 The analysis and justification behind the selected background concentrations applied within the assessment of road traffic emissions for the Isle of Anglesey study area and mainland Wales study area is detailed within the air quality baseline report in appendix B5-1 (Application Reference Number: 6.2.18), which was issued to and agreed with the IACC and Natural Resources Wales (NRW) during consultation (see chapter B5, Application Reference Number: 6.2.5). This appendix also sets out all of the references from which the source data have been derived. The data available for each pollutant to describe the air quality baseline in the vicinity of the affected road network are discussed in outline below.

Isle of Anglesey study area

4.3.6 The IACC LAQM reports indicate that air quality on the Isle of Anglesey is generally good and background concentrations at locations away from pollution sources such as busy roads are relatively low and well below the relevant AQOs. Through the LAQM process, the IACC has not identified any relevant exposure areas where the AQOs are exceeded, or could potentially be exceeded in the vicinity of the affected road network (i.e. at the A5025, A55, A5 or A5153/Parc Cybi).

Nitrogen dioxide measurements

4.3.7 The IACC undertakes measurements of NO_2 using a network of passive diffusion tubes. To further characterise the environmental baseline, an air quality monitoring survey was initiated by Horizon with the IACC in February 2016. The survey focused on NO_2, and comprised diffusion tube measurements at roadside locations in the vicinity of the affected road network and roadside locations close to the Wylfa Newydd Development Area and the sites of the Off-Site Power Station Facilities and Associated Development, which would experience increases in traffic flows as a result of the Wylfa Newydd Project.

4.3.8 Table C4-1 presents the measured annual mean NO_2 concentrations recorded at roadside locations in the vicinity of the affected road network. Measurements of rural or urban locations away from nearby roads are also included to provide context for the consideration of background concentrations. The monitoring locations are shown on figure C4-1 (Application Reference Number: 6.3.32).

Table C4-1 Summary of Isle of Anglesey study area annual mean NO_2 diffusion tube monitoring data

ID / Name	OS grid coordinate		Site type	Year	Data capture	Annual mean concentration (µg/m^3) [1] (AQO=40)
	E	N				
A55 at Llanfair Pwllgwyngyll (near layby)	252527	372031	Roadside	2016	100%	39.7
RAF Valley (Gymnasium)	231473	376184	Rural (near airfield)	2013/2014	92%	5.1[2]
A5025 Llanfachraeth	231506	382412	Roadside	2011/2012	75%	7.3[3]
A5025 Llanfaethlu	231447	386901	Roadside	2011/2012	100%	6.8[3]
A5025 Tregele	235774	392938	Roadside	2011/2012	100%	6.8[3]
A5025 Cemaes	236932	393102	Roadside	2011/2012	100%	7.2[3]
Supplementary monitoring [4]						
A – A55 at Llanfair Pwllgwyngyll	253263	372367	Roadside	2016	100%	45.2
B – Adjacent to A55 near Junction 5 of the A55, located at an elevated location on an access road to a bridge crossing the A55	237267	376129	Roadside	2016	83%	9.8
C2 – A5 Holyhead Road near Junction 4 of the A55 (adjacent to Park and Ride)[4]	232573	378407	Roadside	2016	92%	11.3
D – A5025 in Valley	229588	379382	Roadside	2016	92%	15.3
E – A5025 in Llanfachraeth	231593	382274	Roadside	2016	92%	9.9
F – A5025 in Llanfaethlu	231555	387112	Roadside	2016	92%	9.5
G – A5025 near Cefn Coch	234152	390193	Roadside	2016	92%	7.0

ID / Name	OS grid coordinate		Site type	Year	Data capture	Annual mean concentration (µg/m^3) [1] (AQO=40)
	E	N				
H – A5025 in Tregele	235575	392545	Roadside	2016	92%	10.2
I – A5025 in Cemaes	236752	393090	Roadside	2016	92%	9.0
J – Maes Cynfor, Cemaes	236891	393381	Rural (in urban area)	2016	92%	6.7
K – A5025 in Amlwch near Stryd Mona junction	244130	392885	Roadside	2016	92%	12.7
L – A5025 in Amlwch near Salem Street junction	244270	392498	Roadside	2016	83%	11.2

Note 1: µg/m^3 (micrograms per cubic metre), the principal unit of measurement for the concentration of an air pollutant in ambient air.

Note 2: Annual mean reported by the IACC based on 12 months of data (six months of data from 2013 combined with six months' data from 2014).

Note 3: Annual mean reported by the IACC based on 12 months of data (nine months of data from 2011 combined with three months of data from 2012).

Note 4: These data are based on an 11-month monitoring period between 9 February 2016 and 04 January 2017 as reported in the North Wales Combined Authority LAQM report [RD2] (a bias adjustment factor of 0.78 was used).

4.3.9 The highest recorded concentrations are the two measurements adjacent to the A55. The A55 layby monitoring location is within 1m of the kerb of the A55. The latest annual mean concentration of 39.7µg/m^3 recorded in 2016 is just within the annual mean AQO of 40µg/m^3. An annual mean concentration of 45.2µg/m^3 was also recorded at diffusion tube monitoring location A, located adjacent to the A55, approximately 750m to the northeast of the layby monitoring location. The nearest residential property to the A55 in this area is over 20m from the kerbside. As air pollution concentrations decrease rapidly further away from a road source through dispersion, the IACC estimated that the concentration at 20m from the kerbside would be much lower, at approximately 19µg/m^3 [RD3] based on the A55 layby monitoring location concentration in 2014 of 38.7µg/m^3.

4.3.10 Concentrations of NO_2 at the other monitoring locations further from the A55 (i.e. locations B and C2) are lower and well within the annual mean AQO of 40µg/m^3. The data suggest that elevated concentrations of NO_2 exist in close proximity to the A55, but the concentrations decrease rapidly to concentrations more representative of rural locations within a relatively short distance from the A55.

4.3.11 All measured annual mean concentrations were well within the empirically derived value of 60µg/m^3 that is a representative threshold for consideration of the potential risk of exceedance of the one-hour mean AQO of 200µg/m^3 as a 99.8th percentile [RD4]. Therefore, the one-hour mean AQO is considered to be met at these locations [RD4].

4.3.12 The concentrations measured adjacent to the A5025 in 2016 ranged from 7.0µg/m^3 to 15.3µg/m^3 and are well within the annual mean AQO of 40µg/m^3. The 2016 measurements adjacent to the A5025 are slightly higher than measurements previously recorded in 2011/2012 at similar locations adjacent to the A5025.

4.3.13 The measurements at Royal Air Force Valley Gymnasium and location J, Maes Cynfor, Cemaes of 5.1µg/m^3 and 6.7µg/m^3 are likely to be representative of the typical rural background concentration across much of the Isle of Anglesey study area (i.e. reflecting the range of concentrations in the absence of the modelled roads sources such as the A5025 or A55). Some locations in urban areas within the study area may have slightly higher background concentrations.

PM_{10} and $PM_{2.5}$ measurements

4.3.14 The IACC measured PM_{10} and $PM_{2.5}$ concentrations at three locations in 2016 close to specific sources of particulate emissions, such as quarries and a composting site (Llynfaes, Brynteg and Penhesgyn). These sites are considered to be unrepresentative of particulate concentrations within the Isle of Anglesey study area. The measured PM_{10} and $PM_{2.5}$ concentrations ranged from 8.1µg/m^3 to 18.8µg/m^3 and from 4.0µg/m^3 to 6.1µg/m^3, respectively, and are included for context only. The measured concentrations were well below AQOs.

4.3.15 The IACC has also carried out monitoring at Llangefni in between 2011 and 2015. This is an urban background monitoring location and not likely to be

directly representative of the existing conditions at the majority of locations close to the affected roads on the Isle of Anglesey. The measured concentrations of PM_{10} ranged from 12.9µg/m^3 to 16.8µg/m^3 and the measured concentration of $PM_{2.5}$ in 2015 was 8.7µg/m^3 (based on five months of measurements).

4.3.16 Measurements of PM_{10} and $PM_{2.5}$ were recorded by the IACC in 2013/14 and 2016 at, or close to, the Wylfa Newydd Development Area (approximately between 500m and 1.5km from the A5025). The recorded annual mean concentrations were 14.4µg/m^3 and 14.9µg/m^3 for PM_{10} and 7.8µg/m^3 and 7.4µg/m^3 for $PM_{2.5}$, for the two locations respectively (see table C4-2). The monitoring locations are representative of rural areas on Anglesey, but also contain a greater contribution from sea salt particles due to their position close to the northern coast. There were no 24-hour periods where the average PM_{10} concentration was higher than 50µg/m^3 (35 exceedances of 50µg/m^3 measured as a 24-hour mean are allowed by the AQO).

4.3.17 Despite the variations in locations across the Isle of Anglesey and range of location types, the measured concentrations are all relatively low and are well within the PM_{10} and $PM_{2.5}$ annual mean AQOs of 40µg/m^3 and 25µg/m^3, respectively. The monitoring locations are shown on figure C4-2 (Application Reference Number: 6.3.32).

Table C4-2 Measured PM_{10} and $PM_{2.5}$ concentrations in proximity to the Isle of Anglesey study area

Monitoring location	Monitoring location type	Year of measurement	Average concentration (µg/m^3)	
			PM_{10}	$PM_{2.5}$
Wylfa Newydd Development Area	Near Existing Power Station Visitor Centre	2013/2014	14.4[1]	7.8[1]
Felin Cafnan	Near Wylfa Newydd Development Area	2016	14.9	7.4

Note 1: Monitoring period from March 2013 to January 2014

Defra background mapping

4.3.18 Defra and the devolved administrations produce empirically derived background maps of pollutant concentrations. The 2013 background map concentrations for NOx, NO_2, PM_{10} and $PM_{2.5}$ for the 1km by 1km grid squares representing the receptors within the Isle of Anglesey study area are shown in table C4-3 (further details of these data are provided in appendix B5-1, Application Reference Number: 6.2.18). The use of 2013 data assumes no future year improvement in background pollutant concentrations from the baseline (calibrated) year of 2013. This is a conservative approach because it is likely that background concentrations for the future assessment years (see paragraph 4.4.5) would be lower than the 2013 concentrations due to the generally decreasing trends and expected improvements in air quality in future

years. Information on the trends in background concentrations are presented in appendix B5-1 (Application Reference Number: 6.2.18).

Table C4-3 Summary of 2013 background map concentrations for the Isle of Anglesey study area

Pollutant	Annual mean concentration range ($\mu g/m^3$)
NOx	5.6 to 11.2
NO_2	4.3 to 8.5
PM_{10}	9.9 to 12.2
$PM_{2.5}$	6.8 to 8.1

4.3.19 The 2013 projected background concentrations compare reasonably well to measured rural NO_2 background concentrations. The background map concentrations are lower than roadside NO_2 measurements, as would be expected, and are considered to be most representative of locations more than 100m to 200m from road traffic sources (i.e. in the absence of the road traffic emissions source). This also applies to NOx, where the background map values would be representative of the existing NOx concentrations at rural locations more than 100m to 200m from road traffic sources. It is likely that, with the addition of the specific contribution from busy roads such as the A55, NOx concentrations at the closest parts of ecological receptors would be higher than the background map concentrations above and potentially above the critical level of $30\mu g/m^3$ (for details of the critical levels see chapter B5, Application Reference Number: 6.2.5).

4.3.20 The background map PM_{10} concentrations are lower than the measured PM_{10} concentrations recorded at the Wylfa Newydd Development Area. The reasons for this are not known but could be due to the difference in the background map modelling and actual measured contributions from different sources, for example, the contribution from sea salt particles.

4.3.21 For $PM_{2.5}$, the background map concentrations are similar to the measured concentrations.

Evolution of the air quality baseline

4.3.22 The evolution of baseline air quality is summarised in chapter B5 (Application Reference Number: 6.2.5) and described in more detail in appendix B5-1 (Application Reference Number: 6.2.18) of this Environmental Statement. This concluded that using existing data to represent the background concentrations of pollutants for the future year assessments was a suitably conservative approach.

Summary

4.3.23 Air quality within the vicinity of the Isle of Anglesey study area (namely in proximity to the A5025, A55 and A5) is generally good, and measured concentrations of pollutants are well below the relevant AQOs. IACC measurements have identified elevated concentrations of NO_2 at roadside locations close to the A55. However, there is no risk of the future baseline

annual mean concentration of NO_2 being above the AQO value due to the distance to relevant exposure locations. Short-term (i.e. one-hour mean) concentrations are also likely to be within the AQO. For the modelling assessment, the background map concentrations were used to represent the NO_2 concentrations to which the modelled contribution of the road traffic sources were added.

4.3.24 Based on the relatively high annual mean NO_2 concentrations in close proximity to the A55, the annual mean NOx concentrations are also likely to be above the relevant annual mean AQO at areas within the ecological sites which are relatively close to the A55 (e.g. within approximately 20m). Similar to NO_2, the background map concentrations were used to represent the background NOx concentrations to which the modelled contribution of the road traffic sources were added.

4.3.25 The PM_{10} measurements at the Wylfa Newydd Development Area are likely to contain a greater contribution from sea salt particles, which could explain the higher concentrations in comparison to the background maps. In the absence of alternative monitoring sites for reference, the highest of the 2013/2014 and 2016 measured data was used to represent the background PM_{10} concentration for the Isle of Anglesey study area, to which the modelled contributions of the road traffic sources were added (a value of 14.9µg/m^3). For the study area which is close to the Wylfa Newydd Development Area (i.e. within 2km of the Wylfa Newydd Development Area boundary), the highest of the 2013/2014 and 2016 measured $PM_{2.5}$ data was used to represent the background $PM_{2.5}$ concentration (a value of 7.8µg/m^3).

4.3.26 The background map $PM_{2.5}$ data were used for the wider study area to which the modelled contributions of the road traffic sources were added. This was based on the measured concentrations being similar to the background map concentrations, and the spatial coverage provided by the maps.

4.3.27 Predicted baseline air pollutant concentrations at representative receptor locations in the future assessment years are reported within section 4.5. These represent the concentrations of pollutants determined from the modelled baseline road contribution (the contribution to pollutant concentrations from the road sources without the additional Wylfa Newydd Project road traffic) added to the background concentration as described above. As the background maps contain a contribution from road sources, the contributions from the major road sources which are being modelled have been removed from the background concentration in order to prevent ‘double counting’ of emissions (see appendix C4-1, project-wide modelling of road traffic emissions, Application Reference Number: 6.3.27).

Mainland Wales study area

4.3.28 The local authorities on mainland Wales within which the affected road network (i.e. the A55) passes through (GC, CCBC, DCC and FCC) also monitor and report on local air quality as part of the LAQM process. This includes measurements of NO_2 and PM_{10} in close proximity to the A55. These local authorities have not declared Air Quality Management Areas, and no detailed assessments of air quality are currently planned.

4.3.29 The air quality baseline report (appendix B5-1, Application Reference Number: 6.2.18) presents a more detailed review of all monitoring and air quality data considered and is not repeated here. Figure C4-2 (Application Reference Number: 6.3.32) shows the locations of the NO_2 diffusion tube monitoring sites and the PM_{10} monitoring location within or close to the mainland Wales study area.

4.3.30 The assessment approach for the mainland Wales study area differs from the detailed dispersion modelling approach applied for the Isle of Anglesey study area. A screening assessment was undertaken (see appendix C4-2 Assessment of Road Traffic Emissions - Mainland Wales, Application Reference Number: 6.3.28) to determine if the magnitude of the predicted increases in pollutant concentrations could potentially lead to significant effects, taking the likely baseline concentrations at the receptor locations into account. The application of the available data discussed below to inform the future year baseline air pollutant concentrations is described within the mainland Wales study area assessment report (see appendix C4-2, Application Reference Number: 6.3.28).

Nitrogen dioxide measurements

4.3.31 Table C4-4 presents the measured 2016 annual mean NO_2 concentrations at monitoring locations within or close to the mainland Wales study area.

Table C4-4 Measured 2016 annual mean NO_2 concentrations on mainland Wales close to the A55

Council	Monitoring location	OS grid coordinate		Site type	Data capture	Annual mean NO_2 ($\mu g/m^3$)
		E	N			
GC	GCC/038, A55 Bangor	254982[1]	369725[1]	Roadside	75%	28.6
	GCC/039, A55 Bangor (co-located)				75%	28.4
CCBC	CBC-017[2]	284526	379417	Roadside	100%	19.0
	CBC-018[3]	295049	378144	Roadside	100%	20.9
	CBC-021[4]	268572	375472	Roadside	100%	17.7
	CBC-022[5]	282362	378757	Roadside	100%	20.7
	CBC-033[6]	286677	378645	Roadside	100%	13.8

Council	Monitoring location	OS grid coordinate		Site type	Data capture	Annual mean NO_2 ($\mu g/m^3$)
		E	N			
DCC	DBR5, A55 St Asaph	302938	374638	Suburban	100%	15.5
	DBR8, A55 St Asaph	303270	374640	Suburban	100%	15.5
	DBR9, A55 St Asaph	303197	374830	Suburban	100%	21.1
	DBR10, A55 St Asaph	303263	374867	Suburban	100%	16.1
FCC	Site 46, A55 Northop	325136	368397	Urban background	92%	12.7
	Site 49, A55 Broughton	333531	363028	Kerbside	83%	16.9

Note 1: From March 2011 until July 2012 the two tubes were located at E 256871, N 369493 approximately 4m from the A55 (at a layby). From September 2012 onwards the two tubes were located at E 254982, N 369725 (on a bridge above the A55 at Penrhos Road, to the east of Junction 9 of the A55).

Note 2: Previously CCBC5, Kingsway, Colwyn Bay.

Note 3: Previously CCBC6, A55 Pensarn.

Note 4: Previously CCBC11, A55 Llanfairfechan.

Note 5: Previously CCBC12, Bryn Marl, Mochdre.

Note 6: Previously CCBC13, Beach Ave Old Colwyn

4.3.32 All NO_2 diffusion tube measurements are well within the annual mean AQO of 40µg/m^3. It should be noted that GCC/038 and GCC/039 monitoring locations are on a bridge above the A55 at Penrhos Road, to the east of Junction 9 of the A55. Therefore, the measured concentrations are not directly relevant to concentrations, which would be experienced at roadside locations horizontally set back from the A55. In 2011, these tubes were at another location approximately 2m from the edge of the A55. The measured annual mean concentrations were 38.3µg/m^3 and 38.5µg/m^3. This indicates that, in very close proximity to the A55, concentrations of NO_2 are relatively high in comparison to the AQO and other measured concentrations considered in this assessment. These concentrations are of a similar scale, if slightly lower than the IACC measurement recorded close to the A55 at the A55 Llanfair Pwllgwyngyll layby in 2011 (44.6µg/m^3) (see appendix B5-1, Application Reference Number: 6.2.18).

4.3.33 The next closest monitoring location is CBC-018, which is approximately 9m from the edge of the A55 at Pensarn. The measured concentration at this location (20.9µg/m^3) indicates that concentrations are lower further from the edge of the A55. Concentrations have fluctuated at this site between 2011

and 2016. A measurement of 22.6µg/m^3 was recorded in 2015 and is higher than the measurement for 2016. The consideration of the likely predicted environmental concentration (PEC) and appropriate background to use is discussed in section 4.5 (assessment of effects).

4.3.34 This measurement represents the likely concentrations at receptors in close proximity to the A55 on mainland Wales (the nearest of which is 9m from the A55). Receptors set further back from the A55 would experience lower NO_2 concentrations.

4.3.35 As noted above, the NO_2 concentrations adjacent to the A55 in 2011 were lower than those measured on the Isle of Anglesey, despite traffic flows on the mainland being higher, based on traffic flow data provided by the Department for Transport [RD5]. This would suggest that other factors are influencing the dispersion of pollutants at the A55 Llanfair Pwllgwyngyll monitoring site, such as the alignment of the road with more frequently occurring wind directions.

4.3.36 The Defra background map NO_2 concentrations for 2013 range between 6.4µg/m^3 and 18.9µg/m^3 across the study area. The 2013 concentration for the grid square associated with monitoring site FCC_46 was 13.2µg/m^3.

PM_{10} measurements

4.3.37 PM_{10} monitoring has been undertaken by CCBC in close proximity to the A55, near the location of the NO_2 diffusion tube site CBC_018 A55, Pensarn. The 2015 annual mean concentration is presented in table C4-5. The site was decommissioned in September 2015; therefore, the annualised concentration for 2015 (16.6µg/m^3) has been used in this assessment and is considered to be indicative of concentrations at properties of similar distance from the A55.

Table C4-5 Measured 2015 annual mean PM_{10} concentrations on mainland Wales close to the A55

Monitoring location	OS grid coordinate		Site type	Data capture	Annual mean PM_{10} (µg/m^3)
	E	N			
CCBC PM10/3, A55 Pensarn	295033	378174	Roadside	63%	16.6[1]

Note 1: Annual mean concentration annualised by CCBC as data capture for most recent publically available data was less than 75% (data for January to August 2015).

4.3.38 The measured PM_{10} concentration is well below the AQO of 40µg/m^3 and is representative of receptors in the vicinity of the A55.

4.3.39 There is no monitoring of $PM_{2.5}$ across the mainland Wales study area.

Defra background mapping

4.3.40 Table C4-6 presents the 2013 background map concentration ranges within the mainland Wales study area for the key pollutants discussed within this chapter. The use of 2013 data is a justified and conservative approach (as

explained in the air quality baseline report appendix B5-1, Application Reference Number: 6.2.18).

Table C4-6 Summary of 2013 background map concentrations for the mainland Wales study area

Pollutant	Annual mean concentration range ($\mu g/m^3$)
NOx	8.4 to 26.8
NO_2	6.4 to 18.9
PM_{10}	10.5 to 15.1
$PM_{2.5}$	7.3 to 10.5

4.3.41 The 2013 background mapped pollutant concentrations vary considerably across the study area (largely due to the presence of urban areas) and are indicative of background concentrations within the study area.

4.3.42 As expected, the background map PM_{10} concentrations are lower than the measured PM_{10} concentration recorded close to the A55.

Evolution of the air quality baseline

4.3.43 As discussed in paragraph 4.3.22, using existing data to represent the background concentrations of pollutants for the future year assessments was a suitably conservative approach.

Summary

4.3.44 Air quality in the vicinity of the mainland Wales study area (namely in proximity to the A55) is generally good and concentrations of pollutants are below the relevant AQOs at the nearest relevant long-term exposure locations (i.e. 9m or further from the A55).

4.3.45 Short-term (i.e. one-hour mean) NO_2 concentrations are also likely to be within the AQO at the long-term receptor locations assessed, given the annual mean NO_2 concentration is below $60\mu g/m^3$, which is an accepted benchmark (as stated in chapter B5, Application Reference Number: 6.2.5) to indicate the potential for exceedance.

4.3.46 It is understood that measurements undertaken at a layby location very close to the kerbside of the A55 (east bound carriageway) to the southeast of the Britannia Bridge indicate that annual mean concentrations could exceed $60\mu g/m^3$ [RD6]. On this basis, there is the possibility that the one-hour mean AQO value of $200\mu g/m^3$ could be exceeded more than the permitted 18 times in the year at this short-term exposure location. A further consultation meeting with GC is planned to review the full monitoring dataset once 12 months of data have been recorded and to agree further monitoring and assessment work.

4.3.47 The measured 2016 NO_2 concentrations and 2015 PM_{10} concentrations across the study area have been applied in the assessment as indicative concentrations representative of the concentration at receptors to determine the potential for significant effects.

4.3.48 Similar to the Isle of Anglesey study area, the relatively high NO_2 concentrations in close proximity to the A55 indicate that the annual mean NOx concentrations are likely to be above the relevant annual mean AQO at sections of ecological receptors which are relatively close to the A55 (e.g. within approximately 10m to 20m).

Human receptors

4.3.49 This section considers the sensitive human receptors in accordance with guidance outlined within the EPUK/IAQM guidance [RD1] and LAQM TG16 [RD4]. The methodology behind the selection of relevant receptors is outlined in chapter B5 (Application Reference Number: 6.2.5) and is not repeated in this chapter.

Isle of Anglesey study area

4.3.50 All relevant human receptors were modelled within 200m of the affected road network on the Isle of Anglesey. For this assessment, a subset of key human receptors, which are considered to represent the 'worst case' (i.e. with the potential to experience the largest changes in concentrations) were identified for analysis and discussion within this chapter and are described in detail within this chapter. These key receptors are representative of the highest concentrations and/or greatest effects of NO_2, PM_{10} and $PM_{2.5}$ that would be experienced at any other receptor near the same affected roads. For example, receptor R17 is a residential property that represents other residential properties and the new primary school site at Llanfaethlu.

4.3.51 The predicted concentrations at all modelled receptors are presented in appendix C4-1 (Application Reference Number: 6.3.27). All modelled human receptors are also shown in figures C4-3 to C4-6 (Application Reference Number: 6.3.32).

4.3.52 Table C4-7 presents the key receptors identified across the spatial extent identified within the Isle of Anglesey study area (as discussed in paragraph 4.3.50). These are also shown in figures C4-3 to C4-6 (Application Reference Number: 6.3.32). It is noted that the key receptors listed in table D5-1 (chapter D5, air quality, Application Reference Number: 6.4.5) are not the same location as the key receptors with the same reference listed in table C4-7, except for R4 to R8 which were used for the assessment of additive effects (see appendix I4-2, Project-wide and WNDA Development intra-project air quality assessment, Application Reference Number: 6.9.10).

Table C4-7 Key human receptors in the Isle of Anglesey study area

Receptor label	Model ID	Description
R1	Hum_939	Residential property north of the A5025, east of Cemaes.
R2	Hum_365	Residential property north of the A5025 at Cemaes.
R3	Hum_419	Residential property south of the A5025 at Cemaes.
R4	Hum_770	Residential property north of the A5025 at Cemaes.
R5	Hum_161	Residential property north of the A5025, to the west of Cemaes.
R6	Hum_427	Residential property east of the A5025 at Tregele, adjacent to the Wylfa Newydd Development Area boundary.
R7	Hum_1276	Residential property west of the A5025 at Tregele, adjacent to the Wylfa Newydd Development Area boundary.
R8	Hum_513	Residential property west of the A5025, south of Tregele, adjacent to the Wylfa Newydd Development Area construction site entrance.
R9	Hum_950	Residential property west of the A5025, north of Cefn Coch.
R10	Hum_941	Residential property east of the proposed alignment of the A5025 at Cefn Coch.
R11	Hum_505	Residential property west of the proposed alignment of the A5025 at Cefn Coch.
R12	Hum_1800	Residential property east of the proposed alignment of the A5025, south of Cefn Coch.
R13	Hum_1849	Residential property east of the A5025 at Llanrhuddlad.
R14	Hum_1854	Residential property east of the A5025, to the south of Llanrhuddlad.
R15	Hum_1857	Residential property west of the A5025, to the north of Llanfaethlu.

Receptor label	Model ID	Description
R16	Hum_1872	Residential property to the east of the proposed alignment of the A5025 at Llanfaethlu.
R17	Hum_1919	Residential property west of the proposed alignment of the A5025 at Llanfaethlu.
R18	Hum_1954	Residential property east of the proposed alignment of the A5025 at Llanfaethlu.
R19	Hum_1956	Residential property adjacent to the A5025 in Llanfaethlu, east of the proposed alignment.
R20	Hum_1964	Residential property east of the A5025, to the south of Llanfaethlu.
R21	Hum_1973	Residential property adjacent to the A5025 in Llanfachraeth, west of the existing alignment.
R22	Hum_1984	Residential property adjacent to the A5025 in Llanfachraeth, west of the existing alignment.
R23	Hum_2014	Residential property near A5025 in Llanfachraeth, west of the proposed alignment.
R24	Hum_2143	Residential property east of the A5025 at Llanynghenedl.
R25	Hum_2177	Residential property east of A5025, south of Llanynghenedl.
R26	Hum_2301	Dwelling and Public House north of A55, Junction 2.
R27	Hum_2387	Residential property north of the A55 and east of A5025 at Valley.
R28	Hum_2419	Residential property south of A55 at Caergeiliog.
R29	Hum_2425	Residential property south of A55 at Caergeiliog.
R30	HumST_694	Cartio Môn go-kart track north of A55 at Dalar Hir (short-term exposure location only).
R31	Hum_2444	Gwyddfor residential care home north of A55 at Dalar Hir.

Receptor label	Model ID	Description
R32	Hum_2502	Residential property south of A55 at Llangristiolus.
R33	Hum_2507	Residential property north of A55, to the northeast of Llangristiolus.
R34	Hum_2556	Residential property north of A55 at Pentre Berw.
R35	Hum_2573	Residential property north of A55 at Star.
R36	HumST_723	Layby on A55 at Llanfair Pwllgwyngyll (short-term exposure location only).
R37	Hum_2815	Residential property north of A55 at Llanfair Pwllgwyngyll.
R38	Hum_2886	Residential property south of A55 at Llanfair Pwllgwyngyll.
R39	Hum_2939	Residential property south of A55 at Llanfair Pwllgwyngyll.

Mainland Wales study area

4.3.53 Table C4-8 presents the 'worst case' receptor locations across the mainland Wales study area, which are discussed within the results section. Dispersion modelling has not been undertaken for mainland Wales, so there is no model ID required for receptors presented in table C4-8.

Table C4-8 Key human receptors in the mainland Wales study area

Receptor label	Description
R40	Residential property north of the A55 to the northwest of Junction 9 near Treborth, west of the A487.
R41	Layby (A55, east bound) southeast of Britannia Bridge. Short-term exposure location for the assessment of peak one-hour mean NO_2 concentrations.
R42	Residential property north of the A55 between Junctions 9 and 10, east of the A487.
R43	Residential property south of the A55 Junctions 10 and 11.
R44	Residential property south of the A55 between Junctions 11 and 12, east of the A5.

Receptor label	Description
R45	Residential property south of the A55 between Junctions 12 and 13.
R46	Residential property north of the A55 between Junctions 13 and 14.
R47	Residential property south of the A55 between Junctions 14 and 15, north of Llanfairfechan.
R48	Residential property south of A55 between Junctions 15 and 15A, east of Llanfairfechan.
R49	Residential property south of A55 between Junctions 16 and 16A, northwest of Dwygyfylchi.
R50	Residential property north of A55 between Junctions 17 and 18, north of Conwy.
R51	Residential property south of A55 between Junctions 19 and 20, east of Conwy.
R52	Residential property south of A55 between Junctions 20 and 21, north of Colwyn Bay.
R53	Residential property south of A55 between Junctions 21 and 22, north of Colwyn Bay.
R54	Residential property south of A55 between Junctions 22 and 23, northeast of Old Colwyn.
R55	Residential property south of A55 between Junctions 23 and 23A, east of Llanddulas.
R56	Residential property east of A55 between Junctions 23A and 24, northeast of Abergele.
R57	Residential property south of A55 between Junctions 26 and 27, west of St Asaph.
R58	Residential property north of A55 between Junctions 30 and 31, east of St Asaph.
R59	Residential property east of A55 between Junctions 33 and 33A, east of Northop.

Ecological receptors

4.3.54 Sensitive ecological receptors, including European Designated Sites (i.e. Special Areas of Conservation (SACs), Special Protection Areas and Ramsar sites) and other national or local designations (i.e. Sites of Special Scientific

Interest (SSSIs), Wildlife Sites and Ancient Woodlands), were considered within 200m of the affected road network.

Isle of Anglesey study area

4.3.55 The ecological receptors modelled within the Isle of Anglesey study area are presented in table C4-9 and the location of the receptors illustrated on figure C4-1 (Application Reference Number: 6.3.32). Those ecological receptors that are not sensitive to air pollution were screened out of the assessment. The full list of receptors and descriptions of why certain receptors are not sensitive to air pollution are provided in appendix B5-2 (Existing Nitrogen and Acid Deposition and Critical Loads at Ecological Receptors for the Wylfa Newydd Project) (Application Reference Number: 6.2.19).

Table C4-9 Ecological receptors in the Isle of Anglesey study area

Designated site/designations	Approximate distance and direction from affected road
Isle of Anglesey study area – A5025	
Beddmanarch-Cymyran SSSI	Approximately 60m to the west of the A5025 where the A5025 crosses the Afon Alaw on the southern edge of Llanfachraeth.
Afon Wygyr Wildlife Site	Approximately 10m south of the A5025 south of the village of Cemaes.
Ancient Woodland (26051)	Approximately 10m east of the A5025 at Cefn Coch.
Ancient Woodland (26076)	Approximately 140m southeast of the A5025 at Cemaes.
Isle of Anglesey study area – A55	
Beddmanarch-Cymyran SSSI	Adjacent to the north and south of the A55 where the A55 crosses Afon Crigyll (between Junction 2 and Junction 3).
Malltraeth Marsh/Cors Ddyga SSSI	45m to the south of the A55, to the east of Junction 6 at its nearest point.
Cae Barcdy Wildlife Site	200m south of the A55, southwest of Junction 3 of the A55.
Gwely Cyrs Caergeiliog Wildlife Site	Adjacent to Junction 3 of the A55.
Cors Tafarn-y-Grib Wildlife Site	150m north of the A55, west of Gwalchmai.

Designated site/designations	Approximate distance and direction from affected road
Cors Hendre Fawr Wildlife Site	Adjacent to the eastbound carriageway, east of Gwalchmai, to the west of Junction 6.
Cors Tregarnedd Fawr Wildlife Site	Adjacent to the east and westbound carriageway, to the east of Junction 6.
Coed Braint Siglen Dyfnia Wildlife Site	180m north of the A55 Llanfair Pwllgwyngyll bypass.
Ancient Woodland (25882)	Adjacent to the east and westbound carriageway to the west of Junction 7.
Ancient Woodland (25882)	Adjacent to the westbound carriageway between Junction 6 and Junction 7.
Ancient Woodland (26066)	Adjacent to the westbound carriageway, east of Junction 2.
Ancient Woodland (43665)	Adjacent to the eastbound carriageway, east of Junction 2.
Ancient Woodland (26037)	Adjacent to the eastbound carriageway, east of Junction 2.
Ancient Woodland (26067)	Adjacent to the eastbound carriageway, east of Junction 2.
Ancient Woodland (25084)	Adjacent to the westbound carriageway, west of Junction 8.
Ancient Woodland (25083)	Adjacent to the westbound carriageway, east of Junction 8a.
Ancient Woodland (25087)	Adjacent to the eastbound carriageway, west of Junction 8.
Ancient Woodland (43393)	Adjacent to the eastbound carriageway, west of Junction 8.
Ancient Woodland (24252)	Adjacent to the eastbound carriageway, west of Junction 8.
Llyn Dinam SAC/Llynnau Y Fali SSSI	1.2km to the southwest of the Park and Ride (Junction 4).
Llyn Traffwll SSSI	830m to the south of the Park and Ride (Junction 4).
Cors Plas Wildlife Site	1.2km to the southeast of the Park and Ride (Junction 4).

Designated site/designations	Approximate distance and direction from affected road
Rhostir a Pwll Caergeiliog Wildlife Site	1.6km to the west of the Park and Ride (Junction 4).

Mainland Wales study area

4.3.56 Ecological receptors modelled within the mainland Wales study area are presented in table C4-10 and the location of the receptors illustrated on figure C4-2 (Application Reference Number: 6.3.32). The full list of receptors and description of why certain receptors are not sensitive to air pollution is provided in appendix B5-2 (Application Reference Number: 6.2.19).

Table C4-10 Ecological sensitive receptors on mainland Wales

Designated site/designations	Approximate distance and direction from affected road
Coedydd Afon Menai SSSI	Adjacent to eastern side of the A55 Britannia Bridge and extending northeast from the A55. At this location, the A55 is elevated approximately 30m to 40m above the ground level within the Coedydd Afon Menai SSSI. A conservative approach has been adopted in determining the distance for use in the assessment. As a worst-case, it was assumed that a distance of 15m would represent the straight-line distance from the A55 on the Britannia Bridge to the nearest part of the tree canopy within the Coedydd Afon Menai SSSI.
Coedydd Aber SAC/SSSI	45m to the south of the A55, east of Junction 13 at Abergwyngregyn.
Sychnant Pass SSSI	119m to the south of the A55 at Junction 16a, west of Conwy.
Llanddulas Limestone and Gwrych Castle Wood SSSI	180m to the south of the A55 east of Junction 23, east of Llanddulas.
Traeth Pensarn SSSI	92m to the north of the A55 at Junction 23a, north of Abergele.
Halkyn Mountain/Mynydd Helygain SAC & Halkyn Common and Holywell Grasslands SSSI	10m to the east and westbound carriageway of the A55 at its closest point, east of Junction 31.

4.4 Design basis and activities

4.4.1 This section sets out the design basis for this assessment of effects. 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 would be adopted to reduce adverse effects as inherent design features or by implementation of standard industry good working practice.

4.4.2 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 an air quality perspective taking into consideration the flexibility afforded by the parameters.

4.4.3 As discussed previously in this chapter, the Wylfa Newydd Project would increase road traffic flows (i.e. the Annual Average Daily Traffic (AADT) flows) on the A5025, principal roads such as the A55 and other local roads. These increases are associated with the movement of construction materials and construction workers to and from the Wylfa Newydd Development Area and other development sites, including the Off-Site Power Station Facilities, Park and Ride and Logistics Centre. Similarly, once the Power Station is operational, road traffic movements would be generated by the operational workforce and also from transporting other materials required for the operation of the Power Station.

4.4.4 Full details of how the changes in traffic flows have been determined and the basis of the traffic flow modelling that was used to inform the air quality assessment are provided in chapter C2 (traffic and transport) (Application Reference Number: 6.3.2).

4.4.5 The project-wide air quality effects of road traffic were considered for the following stages of the Wylfa Newydd Project:

- opening year of the A5025 Off-line Highway Improvements (anticipated to be in 2020, i.e. Year 2 of the construction programme);
- peak construction (representing the peak project-wide traffic flows during the Wylfa Newydd Project anticipated to occur in 2023, i.e. Year 5 of the construction programme); and
- peak operation (representing the peak project-wide traffic flows during operation of the Power Station anticipated to occur in 2033, i.e. Year 15 of the programme).

4.4.6 The traffic modelling undertaken as part of the traffic and transport assessment (as reported in chapter C2, Application Reference Number: 6.3.2) was based on a single worst case scenario, which assessed traffic conditions during a Reference Case (i.e. without the Wylfa Newydd Project) model run and Wylfa Newydd Project (i.e. with Wylfa Newydd Project) model run for 2020 (both with and without the A5025 Off-line Highway Improvements), 2023 and 2033. This adopted assumptions which would result in the highest traffic flows on the road network, for example, using the maximum construction worker numbers of 9,000 and assuming only 60% of the materials required to

construct the WNDA Development would be transported by sea (the target is 80%). Further detail is provided in chapter C2 (Application Reference Number: 6.3.2).

4.4.7 The environmental effects reported in this chapter are therefore representative of the likely worst case taking into consideration the assumptions adopted in the traffic modelling which is the key input to the air quality assessment presented in this chapter.

4.4.8 The modelling and assessment work (and selection of scenario years) has been undertaken on the basis of an assumed implementation year of the Wylfa Newydd DCO Project of 2019. 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). The scenario years would remain as described above (i.e. Year 2, Year 5 and Year 15 of the programme) and any delay to the implementation year would not materially change the conclusions of the assessment presented in this chapter. For example, if the Wylfa Newydd DCO Project commenced in 2020 instead of 2019, any relatively small increases in baseline traffic flows would be likely be offset by improvements in emissions due to the increasing uptake of lower-emission vehicles brought about by the adoption of more stringent emission standards in future years.

Common factors

4.4.9 There are a number of common factors which would influence the concentrations of pollutants experienced by sensitive air quality receptors in the vicinity of the affected roads. The principal factors are detailed below.

I. The distance from the emission source (i.e. the modelled road link) to the receptor. Generally, the closer an emission source is to a receptor location, the higher the contribution that emission source will make to pollutant concentrations at the receptor. In this assessment, due to the relatively low height of the emission sources (i.e. vehicles), the closest receptors to the roadside would generally experience the highest predicted concentrations, and the assessment and discussions have consequently focused on the nearest receptors.

II. For the prediction of long-term average concentrations, the highest annual mean concentrations would generally be predicted downwind along the most frequently occurring wind directions from the source (i.e. at receptor locations which are to the east or north of the A5025, depending on the local alignment of the A5025 near the receptor, or receptor locations to the north of the A55).

III. Emissions from road vehicles are expected to decrease in the long term as more stringent emission standards are introduced and there is increasing uptake of low-emission and zero-emission vehicles. This is reflected in the average vehicle type emissions for future years, which show reductions on a year-by-year basis. There have been issues with the on-road performance of some vehicle types, particularly diesel cars, not adhering to the emission standards. This assessment has applied

the CUREDv2a [RD7] approach to address this disparity, which uplifts the NOx emissions, but uses the same fleet and speed information as the latest published emission factors by Defra [RD8] (for the full details see chapter B5, Application Reference Number: 6.2.5).

IV. As with any modelling process, there is inherent uncertainty in the traffic and transport and air quality models. Further details of the traffic and transport and air quality modelling process and uncertainties are provided in appendix C2-4 (DCO TA Appendix G - Strategic Traffic Model – Overview) (Application Reference Number: 6.3.21) and in appendix C4-1 (Application Reference Number: 6.3.27).

4.4.10 The factors affecting air quality outlined above have been considered throughout the modelling and assessment of air quality to present a worst case approach. This has been done so that the results presented and discussed in this chapter are the highest predicted magnitudes of changes in concentrations or effects which could potentially arise as a result of emissions from road traffic on the affected roads. With regard to uncertainty, this was addressed by making worst case assumptions in the traffic modelling (e.g. assuming the maximum construction worker numbers and lowest of the range of material being delivered via the Marine Off-Loading Facility). The air quality modelling was also verified against roadside measurements to improve the performance of the model. The uncertainty in the traffic and air quality modelling would not materially change the conclusions of the assessment presented in this chapter.

Opening year of the A5025 Off-line Highway Improvements

4.4.11 This scenario assesses road traffic emissions during the opening year of the A5025 Off-line Highway Improvements (referred to as the ‘bypasses’).

Basis of assessment and assumptions

4.4.12 Two scenarios were assessed: 2020 Wylfa Newydd Project ‘without bypasses’ and 2020 Wylfa Newydd Project ‘with bypasses’, as the completion date for the A5025 Off-line Highway Improvements would be mid to late 2020 (i.e. there would be a period of time when the traffic associated with the Wylfa Newydd Project would be travelling on the sections of the existing A5025 alignment which would be bypassed on completion of the A5025 Off-line Highway Improvements). Both of these scenarios were compared to the 2020 Reference Case representing conditions that would prevail in the absence of the Wylfa Newydd Project (hereafter referred to the as the ‘2020 Baseline’) to determine whether there would be any significant effects on receptors within the Isle of Anglesey study area.

4.4.13 Additional consideration was given to the effects of implementing the A5025 Off-line Highway Improvements. This compared the Wylfa Newydd Project without bypasses to the Wylfa Newydd Project with bypasses. This comparison enabled an understanding of the air quality effects of the improvements (i.e. the bypasses) themselves.

4.4.14 See chapter C2 (Application Reference Number: 6.3.2) for the basis of the assessment and assumptions relevant to the traffic flow data used for the 2020 scenarios.

Appendix C4-1 (Application Reference Number: 6.3.27) presents the road traffic flows in two-way AADT (including the split between light-duty vehicles (LDVs) such as cars and vans and heavy-duty vehicles (HDVs) such as lorries and buses) vehicle movements for the baseline and the scenario with the Wylfa Newydd Project on the modelled road links for 2020 on the Isle of Anglesey.

Embedded mitigation

4.4.15 There are a number of measures included in the Wylfa Newydd Project design that would reduce traffic flows and related air quality effects from road traffic emissions during the opening year of the A5025 Off-line Highway Improvements. These measures have been taken into account in the assessment and include:

- a Logistics Centre to control the flow of heavy goods vehicles (HGVs) travelling to/from the Wylfa Newydd Development Area as set out in the Phasing Strategy (Application Reference Number: 8.29); and
- a Park and Ride and associated bus services for the Park and Ride to reduce the number of private vehicle movements to the Wylfa Newydd Development Area as set out in the Phasing Strategy (Application Reference Number: 8.29).

Good practice mitigation

4.4.16 The principal good practice mitigation measures relevant to the assessment of emissions from road traffic during construction of the Wylfa Newydd Project is the Traffic and Transport Management Strategy, which is set out in the Wylfa Newydd Code of Construction Practice (Application Reference Number: 8.6). The measures, which are intended to reduce the number of private vehicle movements by construction workers and therefore reduce the emissions to air of pollutants from road traffic, include:

- measures to promote and encourage car sharing and use of public transport by staff; and
- dedicated shuttle bus services for construction workers living in the north of Anglesey.

Peak construction

4.4.17 The peak construction scenario represents the year that peak construction traffic would be present on the road network and the peak workforce that would be required to construct the Power Station. This coincides with the peak in traffic movements associated with the operation of the Associated Development, including the Park and Ride and Logistics Centre.

Basis of assessment and assumptions

4.4.18 The peak road traffic emissions during the construction phase are anticipated to occur in 2023. This assessment scenario captures the peak project-wide road traffic air quality effects at any point during the Wylfa Newydd Project.

4.4.19 The 2023 peak construction scenario (i.e. the 2023 Wylfa Newydd Project with bypasses scenario) was assessed against the 2023 Baseline scenario (i.e. representing conditions that would prevail in the absence of the Wylfa Newydd Project in 2023) to determine whether there would be any significant effects on receptors within the Isle of Anglesey study area. See chapter C2 (Application Reference Number: 6.3.2) for the basis of assessment and assumptions relevant to the traffic flow data used for the 2023 scenarios.

4.4.20 The assessment of the project-wide road traffic air quality effects in the mainland Wales study area was undertaken for this peak traffic flow scenario only. Road traffic flows during all other years of the Wylfa Newydd Project would be less than those assessed. As the A5025 Off-line Highway Improvements would not influence air quality on mainland Wales, the scenario was termed the '2023 Wylfa Newydd Project (mainland Wales) scenario'.

4.4.21 Appendix C4-1 (Application Reference Number: 6.3.27) presents the road traffic flows in two-way AADT (including the split between LDVs and HDVs) vehicle movements for the baseline and the scenario with the Wylfa Newydd Project on the modelled road links on the Isle of Anglesey for 2023. Appendix C4-2 (Application Reference Number: 6.3.28) provides the increase in AADT, LDV and HDV movements on the A55 within the mainland Wales study area due the Wylfa Newydd Project in 2023.

Embedded mitigation

There are a number of measures included in the Wylfa Newydd Project design that would reduce traffic flows and the potential for congestion, which in turn reduces the related air quality effects from road traffic emissions during the peak construction phase of the Wylfa Newydd Project. These would lead to lower NO_2, PM_{10} and $PM_{2.5}$ concentrations particularly at those human receptor locations close or adjacent to the affected roads. This would also lead to lower NOx concentrations and deposition rates of nitrogen and acid at sensitive ecological receptors in close proximity to the affected roads. These measures have been taken into account in the assessments and are described below and set out in the Phasing Strategy (Application Reference Number: 8.29).

- Construction and operation of a Marine Off-Loading Facility to allow large and bulk freight items to be imported by sea directly to the Wylfa Newydd Development Area. Using marine vessels to deliver material directly to the Wylfa Newydd Development Area would significantly reduce the number of HGV movements on the road network.
- Site Campus for up to 4,000 construction workers, which would reduce the traffic flows on the local road network as there would be no need for transport to and from the Wylfa Newydd Development Area.

- Logistics Centre to control the flow of HGVs travelling along the A5025 to/from the Wylfa Newydd Development Area and reducing the potential for congestion.
- Park and Ride and associated shuttle bus services to reduce the number of private vehicle movements to the Wylfa Newydd Development Area. Even assuming all buses are empty on the return legs of their journeys, the use of the Park and Ride would lead to decreased emissions of pollutants from road vehicles compared to all private vehicles travelling to the Wylfa Newydd Development Area.
- A5025 Off-line Highway Improvements, which would move sections of the A5025 away from certain villages, leading to reductions in concentrations of pollutants at locations which were in close proximity to the A5025. There would be a number of receptors close to the new routes which would experience adverse effects, but a far greater number of receptors would experience more beneficial effects (see section 4.5).

Good practice mitigation

4.4.23 The principal good practice mitigation measures relevant to the assessment of emissions from road traffic during construction of the Wylfa Newydd Project is the traffic and transport management strategy, which is set out in the Wylfa Newydd Code of Construction Practice (Application Reference Number: 8.6). The measures, which are intended to reduce the number of private vehicle movements by construction workers, include:

- measures to promote and incentivise car sharing and use of public transport;
- dedicated shuttle bus services for construction workers living in the north of Anglesey; and
- dedicated shuttle bus services for construction workers living in Holyhead, Bangor and Caernarfon.

Peak operation

4.4.24 The peak operation scenario represents the maximum road traffic flows which are anticipated to occur during operation of the Power Station when generating electricity at full capacity.

Basis of assessment and assumptions

4.4.25 The year of assessment with regard to traffic flows was assumed to be 2033, which would be the peak year for Power Station operation with construction of the radioactive waste facilities. The assessment also assumes two Scheduled Outages in that year, which would be the maximum that would occur in any single year. The traffic flows, and therefore the emissions from road traffic, during any other year of operation would be less than the assessed scenario. As a worst case approach with regard to emissions, it was assumed that the scenario occurred in the first year of operation of the Power Station when generating electricity at full capacity (anticipated to be in 2028). This is

because the vehicle emissions in 2028 would be slightly higher than in 2033 due to expected year-on-year improvements in vehicle emissions. It is still referred to as the 2033 scenario for consistency with other topics, as it uses the traffic flow data representative of 2033.

4.4.26 The 2033 peak operation scenario (i.e. the 2033 Wylfa Newydd Project with bypasses scenario) was assessed against the 2033 Baseline scenario (i.e. representing conditions that would prevail in the absence of the Wylfa Newydd Project in 2033) to determine the potential significance of effects for the Isle of Anglesey study area. Chapter C2 (Application Reference Number: 6.3.2) sets out the basis of assessment and assumptions relevant to the traffic flow data used for the 2033 scenarios.

4.4.27 Appendix C4-1 (Application Reference Number: 6.3.27) presents the road traffic flows in two-way AADT (including the split between LDVs and HDVs) vehicle movements for the baseline and the scenario with the Wylfa Newydd Project on the modelled road links on the Isle of Anglesey for 2033.

Embedded mitigation

4.4.28 The main embedded mitigation is the A5025 Off-line Highway Improvements as set out in the Phasing Strategy (Application Reference Number: 8.29), which would move sections of the A5025 away from certain villages and ecological sites, leading to reductions in concentrations of pollutants at locations which are in close proximity to the A5025. As noted previously, there would be some adverse effects from the A5025 Off-line Highway Improvements but these are outweighed by the beneficial effects.

Good practice mitigation

4.4.29 The principal good practice mitigation relevant to the assessment of emissions from road traffic during operation of the Power Station is the traffic and transport strategy which is set out in the Wylfa Newydd Code of Operational Practice (Application Reference Number: 8.13), particularly the promotion of sustainable modes of travel such as walking, cycling, public transport and car sharing. These, and other related measures, would reduce the number of private vehicle movements by operational staff travelling to and from the Power Station and therefore reduce emissions of pollutants from road traffic.

4.5 Assessment of effects

4.5.1 This section presents the findings of the assessment of the potential air quality effects of traffic.

4.5.2 The determination of the significance of air quality effects included in this assessment of effects differs from that described in chapter B1 (Application Reference Number: 6.2.1), as defining a level of significance beyond either ‘significant’ or ‘not significant’ is not appropriate for air quality effects. This is because the relevant guidance on this subject relates to defining whether an air quality effect is significant or not across the study areas as a whole, rather than at individual properties (or at specific sensitive ecological sites). In addition, the level of value of a receptor is already incorporated within the specific methods prescribed in the standard good practice guidance

documents for describing the effects and ultimately defining the significance of air quality effects. The full details of how the significance of the air quality effects has been determined are set out in chapter B5 (Application Reference Number: 6.2.5), which also sets out:

- the effect descriptors to describe the magnitude of change in air quality, both adverse (i.e. increase) and beneficial (i.e. decrease) at specific receptors; and
- the criteria for changes in air pollution at ecological receptors for identifying where an effect can be concluded to be not significant based on the model predictions or where further consideration is required by experienced and qualified ecologists.

4.5.3 Where a predicted change in pollutant concentration at a receptor is described as a small adverse effect, this relates to the description of the change only, incorporating the total concentrations, and not the significance.

4.5.4 Where further consideration at ecological receptors was required, this was undertaken and reported within this chapter as there is no separate terrestrial and freshwater ecology chapter within volume C (Application Reference Number: 6.3). In these cases, the determination of significance followed the methodology and approach for the assessment of terrestrial and freshwater ecology (see chapter B9, terrestrial and freshwater ecology, Application Reference Number: 6.2.9).

Opening year of the A5025 Off-line Highway Improvements

Effects on human receptors

2020 Wylfa Newydd Project with bypasses

4.5.5 In 2020 with the bypasses open (and future assessment years of 2023 and 2033), the road traffic generated by the Wylfa Newydd Project would use the A5025 including the new alignments. For all other sections of the A5025 and other affected roads (i.e. A55) on the Isle of Anglesey, the traffic would use the baseline road alignments. Consequently, the predicted changes in air pollutant concentrations (i.e. increases) at receptors close to these road links are a result of increases in road traffic flows due to the Wylfa Newydd Project only. Those receptors close to areas which are being bypassed would experience changes in pollutant concentrations (i.e. increases and decreases) as a result of changes in road traffic flows due to the Wylfa Newydd Project and also changes to the physical alignment of the A5025 and routing of road traffic.

4.5.6 The predicted concentrations of NO_2, PM_{10} and $PM_{2.5}$ for the future assessment year baseline and Wylfa Newydd Project with bypasses scenarios are reported in table C4-11. The magnitude of the change in annual mean concentrations is reported as a percentage of the respective AQO values.

4.5.7 Figure C4-3 (Application Reference Number: 6.3.32) illustrates the spatial pattern of annual mean NO_2 concentration changes across the whole affected road network on the Isle of Anglesey. The receptors coloured pale blue are

predicted to experience a change of less than ±0.4µg/m^3 (which is equal to or less than 1% of the AQO) and is regarded, for illustrative purposes in the figures only, as being no effective change from the baseline scenario. A predicted worsening of annual mean NO_2 concentrations from future baseline conditions (i.e. greater than 0.4µg/m^3) is coloured pink, shading to red as the magnitude of the change increases. A predicted improvement in annual mean NO_2 concentrations from future baseline conditions (i.e. less than -0.4µg/m^3) is coloured green, shading to a darker green as the magnitude of the change increases.

4.5.8 To the north of the site access, additional road traffic using the A5025 at Cemaes (R2 to R4) and Tregele (R5 to R7) is predicted to increase annual mean NO_2 concentrations by the equivalent of between 1% and 2% of the AQO value. Figure C4-3 (Application Reference Number: 6.3.32) illustrates how, within Cemaes and Tregele, the magnitude of the change decreases to less than 1% of the AQO values rapidly, with increasing distance from the A5025. The additional road traffic on the A5025 between Cemaes and Amlwch as represented by R1 would have a negligible adverse effect on local air quality.

4.5.9 The closest receptors to the A5025 to the south of the site access to the Wylfa Newydd Development Area (R9) are predicted to experience an increase in annual mean NO_2 concentrations equivalent to 4% (1.5µg/m^3) of the AQO value, with total annual mean NO_2 concentrations remaining at levels that are about one-quarter or less of the AQO set for the protection of human health. The 4% increase in concentrations relative to the AQO represents a negligible adverse effect on air quality at these receptors.

4.5.10 The emissions from road traffic using the A5025 at Cefn Coch, are predicted to result in a change in NO_2 concentrations equivalent to an increase of 1% or less of the AQO value at those properties to the east of the new alignment of the A5025 (R11) and an improvement of up to 2% of the AQO value at properties to the west of the new alignment (R10 and R12). Given the good standard of predicted future baseline air quality, changes of ±5% or less of the AQO values are considered to have a negligible adverse or beneficial effect at these receptor locations (as per the assessment criteria in chapter B5, Application Reference Number: 6.2.5).

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Table C4-11 Predicted annual mean concentrations at key human receptors – 2020 Wylfa Newydd Project with bypasses

Receptor	2020 Baseline			2020 Wylfa Newydd Project with bypasses			Magnitude of change as percentage of AQO value		
	NO_2 ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	NO_2 (AQO = 40$\mu g/m^3$)	PM_{10} (AQO = 40$\mu g/m^3$)	$PM_{2.5}$ (AQO = 25$\mu g/m^3$)
R1	5.6	15.0	7.9	5.7	15.1	7.9	0% (n)	0% (n)	0% (n)
R2	7.1	15.2	8.0	7.4	15.3	8.0	+1% (n)	0% (n)	0% (n)
R3	8.1	15.3	8.1	8.5	15.4	8.1	+1% (n)	0% (n)	0% (n)
R4	10.4	15.6	8.2	11.2	15.7	8.3	+2% (n)	0% (n)	0% (n)
R5	7.5	15.3	8.0	7.9	15.3	8.0	+1% (n)	0% (n)	0% (n)
R6	8.4	15.4	8.1	9.3	15.5	8.2	+2% (n)	0% (n)	0% (n)
R7	6.1	15.1	7.9	6.5	15.2	8.0	+1% (n)	0% (n)	0% (n)
R8	5.1	15.0	7.9	5.5	15.0	7.9	+1% (n)	0% (n)	0% (n)
R9	8.1	15.4	8.1	9.7	15.6	8.2	+4% (n)	+0% (n)	0% (n)
R10	6.1	15.1	7.9	5.2	15.0	7.9	-2% (n)	0% (n)	0% (n)
R11	4.5	14.9	7.8	4.8	15.0	7.8	+1% (n)	0% (n)	0% (n)
R12	6.0	15.1	7.9	5.5	15.1	7.9	-1% (n)	0% (n)	0% (n)
R13	8.6	15.4	8.1	10.2	15.6	8.2	+4% (n)	0% (n)	0% (n)
R14	8.7	15.4	8.1	10.3	15.6	8.2	+4% (n)	0% (n)	0% (n)
R15	7.1	15.3	7.3	8.2	15.4	7.3	+3% (n)	0% (n)	0% (n)
R16	7.8	15.4	7.3	9.2	15.6	7.4	+3% (n)	0% (n)	0% (n)
R17	6.5	15.2	7.6	5.0	15.0	7.5	-4% (n)	0% (n)	0% (n)

Receptor	2020 Baseline			2020 Wylfa Newydd Project with bypasses			Magnitude of change as percentage of AQO value		
	NO_2 ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	NO_2 (AQO = 40$\mu g/m^3$)	PM_{10} (AQO = 40$\mu g/m^3$)	$PM_{2.5}$ (AQO = 25$\mu g/m^3$)
R18	8.6	15.4	7.7	5.5	15.1	7.5	-8% (s)	-1% (n)	-1% (n)
R19	7.4	15.3	7.6	7.4	15.3	7.7	0% (n)	0% (n)	0% (n)
R20	12.3	15.9	7.3	14.7	16.2	7.5	+6% (s)	+1% (n)	+1% (n)
R21	8.0	15.4	7.2	8.6	15.5	7.3	+2% (n)	0% (n)	0% (n)
R22	11.0	15.7	7.9	6.2	15.1	7.6	-12% (m)	-1% (n)	-1% (n)
R23	4.8	15.0	7.5	5.8	15.1	7.5	+3% (n)	0% (n)	0% (n)
R24	9.0	15.5	7.4	10.3	15.7	7.5	+3% (n)	0% (n)	0% (n)
R25	12.6	15.9	7.5	14.5	16.1	7.6	+5% (n)	+1% (n)	+1% (n)
R26	11.7	15.7	8.2	11.8	15.7	8.2	0% (n)	0% (n)	0% (n)
R27	11.4	15.7	7.6	11.7	15.7	7.6	+1% (n)	0% (n)	0% (n)
R28	18.3	16.4	8.1	19.0	16.5	8.2	+2% (n)	0% (n)	0% (n)
R29	14.4	16.0	7.7	15.0	16.1	7.7	+2% (n)	0% (n)	0% (n)
R30	8.1	15.3	7.2	8.4	15.3	7.2	+1% (n/a)	0% (n/a)	0% (n/a)
R31	5.1	15.0	7.0	5.2	15.0	7.0	0% (n)	0% (n)	0% (n)
R32	10.3	15.5	8.0	10.7	15.6	8.0	+1% (n)	0% (n)	0% (n)
R33	14.2	15.9	8.0	14.6	16.0	8.1	+1% (n)	0% (n)	0% (n)
R34	8.8	15.3	8.2	9.0	15.4	8.2	+1% (n)	0% (n)	0% (n)
R35	14.4	16.0	8.3	14.8	16.0	8.3	+1% (n)	0% (n)	0% (n)

Receptor	2020 Baseline			2020 Wylfa Newydd Project with bypasses			Magnitude of change as percentage of AQO value		
	NO_2 ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	NO_2 (AQO = 40$\mu g/m^3$)	PM_{10} (AQO = 40$\mu g/m^3$)	$PM_{2.5}$ (AQO = 25$\mu g/m^3$)
R36	39.4	19.1	9.9	40.8	19.3	10.0	+3% (n/a)	0% (n/a)	0% (n/a)
R37	17.3	16.3	8.3	17.9	16.3	8.4	+1% (n)	0% (n)	0% (n)
R38	16.0	16.1	8.5	16.4	16.2	8.6	+1% (n)	0% (n)	0% (n)
R39	16.7	16.4	8.7	17.1	16.5	8.7	+1% (n)	0% (n)	0% (n)

Note 1: Impact magnitude rounded to whole numbers and reported as a percentage of the respective AQO value.

Note 2: Effect descriptors at individual receptors in parentheses as per table B5-14 of chapter B5 (Application Reference Number: 6.2.5): ‘n’ is negligible, ‘s’ is small, ‘m’ is medium and ‘l’ is large. ‘n/a’ is ‘not applicable’ and used for short-term exposure receptors.

Note 3: Any changes of 0% (i.e. less than 0.5%) are described as negligible (‘n’).

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4.5.11 At Llanfaethlu, the combination of the increase in vehicle movements and the proposed new alignment of the A5025 is predicted to result in a similar pattern of changes to air pollutant concentrations as described for Cefn Coch, with increases at receptors located closer to the new alignment than they are to the current alignment of the A5025 and decreases at receptors further from the new alignment than they are to the current alignment. At the receptor locations most affected by the improvements to the A5025 and Wylfa Newydd Project road traffic, the annual mean NO_2 concentration is predicted to increase by a value equivalent to 3% of the AQO value (1.4µg/m^3) or less (R16) or to improve by a value equivalent to 8% of the AQO value (R18), representing a negligible adverse and small beneficial effect on local air quality, respectively, given the low baseline concentrations. As shown on figure C4-3 (Application Reference Number: 6.3.32), for the majority of Llanfaethlu, represented by receptor R17, the effect on air quality would be negligible beneficial as the A5025 is moved further from the centre of the village. Llanfaethlu Primary School is predicted to experience small beneficial effects at the closest parts of the school boundary to the A5025 due to the Wylfa Newydd Project, once the A5025 Off-line Highway Improvements are in place. The effects are negligible beneficial at 10m or more from the school boundary closest to the A5025.

4.5.12 At Llanfachraeth, the proposed alignment of the A5025 would move the traffic further away from the village than what is proposed at Llanfaethlu, and this is reflected in the magnitudes of the changes in annual mean NO_2 concentrations at properties that are closest to the current alignment. The annual mean NO_2 concentrations at the facades of properties facing onto the current alignment of the A5025 through Llanfachraeth (R22) are predicted to decrease by the equivalent of 12% of the AQO value (-4.8µg/m^3) or less. This represents a medium beneficial effect. For those individual properties located closest to the new alignment at Llanfachraeth (R23), the annual mean concentrations are predicted to increase from future baseline conditions by the equivalent of an increase of 3% of the AQO value or less. This is a negligible adverse effect. Annual mean NO_2 concentrations would remain at less than one-third of the AQO value at any receptors at Llanfachraeth (i.e. R21 to R24). Figure C4-3 (Application Reference Number: 6.3.32) shows that the majority of the receptors at Llanfachraeth are predicted to experience beneficial effects due to the Wylfa Newydd Project, once the A5025 Off-line Highway Improvements are in place.

4.5.13 At other key receptor locations on the A5025 route which are not close to the A5025 alignment changes where the highest increases were predicted (represented by R13, R14, R15, R20, R24 and R25), the maximum increase in NO_2 concentrations is equivalent to an increase of 6% of the AQO value (2.4µg/m^3). These changes are considered to represent a maximum of a small adverse effect at a small number of receptors close to the A5025.

4.5.14 At receptor locations on the A55 route between Junction 2 of the A55 and the Britannia Bridge to the east of Llanfair Pwllgwyngyll (R26 to R39), the predicted increase in annual mean NO_2 concentrations at all receptors near the A55 representative of long-term exposure would be equivalent to an increase of 2% of the AQO value or less. Given the good standard of air

quality predicted for the future baseline scenario in 2020, these changes are considered to represent a negligible adverse effect at all receptors.

4.5.15 Through the consultation process, the IACC has requested that specific consideration be given to the likely effect of changes in short-term (one-hour mean) NO_2 concentrations at locations along the route of the A5025 and A55, including gardens and laybys. Some of the receptors on the A5025 are very close (within 1m and 2m) to the edge of the A5025 carriageway (i.e. R20) and are considered representative of the gardens of properties which are also close to the A5025. Annual mean concentrations of NO_2 at R20 and other receptors close to the A5025 are predicted to be less than 20µg/m^3. This is considerably lower than the empirically derived value of 60µg/m^3 that is a representative threshold for consideration of potential risk of exceedance of the one-hour mean AQO [RD4]. This also applies to other short-term exposure locations such as the go-karting facility close to the Park and Ride and A55 (R30), where the total concentration was less than 10µg/m^3.

4.5.16 The IACC measured annual mean NO_2 concentrations of 39.7µg/m^3 at a layby off the A55 (see table C4-1) at Llanfair Pwllgwyngyll in 2016 (close to R36). The predicted future baseline concentration at the edge of the layby closest to the A55 carriageway in 2020 is 39.4µg/m^3, and this is predicted to increase to 40.8µg/m^3 due to the Wylfa Newydd Project road traffic emissions (R36). These values are considerably lower than the empirically derived value of 60µg/m^3 and an exceedance of the one-hour mean AQO is very unlikely.

4.5.17 The impact on annual mean concentrations of PM_{10} and $PM_{2.5}$ is equivalent to a change of ±1% of the AQO value or less at all receptors within the Isle of Anglesey study area. These changes are considered to represent a negligible beneficial or adverse effect at all receptors. The total PM_{10} concentrations are well within the concentration of 31.8µg/m^3 at all receptors indicating that the 24-hour mean AQO is complied with (see section 5.4 of chapter B5, Application Reference Number: 6.2.5).

4.5.18 Overall, in the 2020 scenario with improvements to the A5025 and Wylfa Newydd Project traffic, there would not be a significant adverse effect on local air quality.

2020 Wylfa Newydd Project without bypasses

4.5.19 For all receptors which are not close to the A5025 alignment changes, the results are the same as those described above for the 2020 Wylfa Newydd Project with bypasses scenario (i.e. R1 – R9, R13 – R15, R20, R24, R25, R26 – R39) (see table C4-11). For all other receptors, a discussion is presented below which provides an assessment of the likely increases in NO_2, PM_{10} and $PM_{2.5}$ concentrations which would be experienced prior to the opening of the bypasses. The predicted concentrations of NO_2, PM_{10} and $PM_{2.5}$ for the future assessment year baseline and Wylfa Newydd Project without bypasses scenarios for those relevant receptors are reported in table C4-12.

4.5.20 Figure C4-4 (Application Reference Number: 6.3.32) illustrates the spatial pattern of annual mean NO_2 concentration changes across the whole affected road network on the Isle of Anglesey. The receptors are coloured using the same colour scheme as described for the 2020 Wylfa Newydd Project with

bypasses scenario. The main differences between figures C4-3 and C4-4 (Application Reference Number: 6.3.32) are at the sections of the A5025 Off-line Highway Improvements prior to completion, where the increases in road traffic from the Wylfa Newydd Project would lead to increases in predicted concentrations at all receptors, with no green-coloured receptors.

4.5.21 The emissions from road traffic using the A5025 at Cefn Coch are predicted to result in a change in NO_2 concentrations equivalent to an increase less than 1% of the AQO value at those properties to the east of the current alignment of the A5025 (R11) and an increase of 2% or less of the AQO value at properties to the west of the current alignment of the A5025 (R10 and R12). Given the good standard of predicted future baseline air quality, changes of ±5% or less of the AQO values are considered to have a negligible adverse effect at these receptor locations.

4.5.22 At Llanfaethlu, the annual mean NO_2 concentrations are predicted to worsen by 3% of the AQO value or less (R16 and R18), representing a negligible adverse effect on local air quality given the low baseline concentrations. For the majority of Llanfaethlu, represented by receptor R17, the effect on air quality would be negligible adverse (i.e. an increase of 2% of the AQO or less). The receptors close to the existing A5025 immediately to the north of R17 represent the closest boundary of Llanfaethlu Primary School to the A5025. The maximum increase at the closest receptors to the A5025 is 1.7µg/m^3 (total of 10.6µg/m^3) which drops to 0.85µg/m^3 (total of 7.4µg/m^3) within 10m of the school grounds. These increases represent a negligible adverse effect.

4.5.23 The annual mean NO_2 concentrations at the facades of properties facing onto the current alignment of the A5025 through Llanfachraeth (R22) are predicted to increase by 5% of the AQO value (1.9µg/m^3) or less. Annual mean NO_2 concentrations would remain at just over one-third of the AQO value. This represents a negligible adverse effect at this one receptor and at all other receptors in Llanfachraeth.

4.5.24 The maximum increase in annual mean concentrations in the vicinity of the A5025 and A5 junction at Valley is 5% of the AQO value (1.8µg/m^3), with a total concentration of 19.5µg/m^3. This represents a negligible adverse effect.

4.5.25 The impact on annual mean concentrations of PM_{10} and $PM_{2.5}$ is equivalent to a change of ±1% or less of the AQO value at all receptors. These changes are considered to represent a negligible adverse effect at all receptors. The total PM_{10} concentrations are well within the concentration of 31.8µg/m^3 at all receptors indicating that the 24-hour mean AQO is complied with.

4.5.26 Taking into account the predicted changes in concentrations presented for the receptors which do not differ between the two scenarios (predominantly representing negligible adverse effects), the overall effect on local air quality of the 2020 scenario without improvements to the A5025 (i.e. the air quality effects associated with the project-wide traffic for the year prior to opening of the A5025 bypasses) would be not significant.

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Table C4-12 Predicted annual mean concentrations at key human receptors – 2020 Wylfa Newydd Project without bypasses

Receptor	Future baseline			Future with development			Magnitude of change as percentage of AQO value		
	NO_2 ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	NO_2 (AQO = 40$\mu g/m^3$) (%)	PM_{10} (AQO = 40$\mu g/m^3$) (%)	$PM_{2.5}$ (AQO = 25$\mu g/m^3$) (%)
R10	6.1	15.1	7.9	6.8	15.2	8.0	+2% (n)	0% (n)	0% (n)
R11	4.5	14.9	7.8	4.7	15.0	7.8	0% (n)	0% (n)	0% (n)
R12	6.0	15.1	7.9	6.7	15.2	8.0	+2% (n)	0% (n)	0% (n)
R16	7.8	15.4	7.3	9.2	15.6	7.4	+3% (n)	0% (n)	0% (n)
R17	6.5	15.2	7.6	7.3	15.3	7.7	+2% (n)	0% (n)	0% (n)
R18	8.6	15.4	7.8	10.0	15.6	7.9	+3% (n)	0% (n)	0% (n)
R19	7.4	15.3	7.7	8.4	15.4	7.8	+2% (n)	0% (n)	0% (n)
R21	8.0	15.4	7.2	9.2	15.6	7.3	+3% (n)	0% (n)	0% (n)
R22	11.0	15.7	7.9	12.8	16.0	8.1	+5% (n)	+1% (n)	+1% (n)
R23	4.8	15.0	7.5	4.9	15.0	7.5	0% (n)	0% (n)	0% (n)
R24	9.0	15.5	7.4	10.3	15.7	7.5	+3% (n)	0% (n)	0% (n)

Note 1: Impact magnitude rounded to whole numbers and reported as a percentage of the respective AQO value.

Note 2: Effect descriptors at individual receptors in parentheses as per table B5-14 of chapter B5 (Application Reference Number: 6.2.5): ‘n’ is negligible, ‘s’ is small, ‘m’ is medium and ‘l’ is large. ‘n/a’ is ‘not applicable’ and used for short-term exposure receptors.

Note 3: Any changes of 0% (i.e. less than 0.5%) are described as negligible (‘n’).

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The effects of implementing the A5025 Off-line Highway Improvements

4.5.27 As discussed above, the opening of the A5025 Off-line Highway Improvements in 2020 would bring about net improvements in local air quality for some communities relative to conditions experienced in the 2020 future baseline scenario or the 2020 Wylfa Newydd Project without bypasses scenario. The number of receptors experiencing positive or adverse effects of varying magnitudes is summarised in table C4-13 (based on the effect descriptors from the EPUK/IAQM guidance [RD1] as set out in chapter B5, Application Reference Number: 6.2.5). This is presented for the predicted changes in annual mean NO_2 concentrations as this is the only pollutant where effects are above negligible. The receptors included in the summary table are restricted to the affected roads between Junction 3 of the A55 and the Wylfa Newydd Development Area site entrance on the A5025 (to the south of Tregele).

Table C4-13 Number of human receptors experiencing predicted effects in 2020 (annual mean NO_2 concentrations)

Effect descriptor	Number of receptors experiencing predicted effects		
	2020 Wylfa Newydd Project without bypasses	2020 Wylfa Newydd Project with bypasses	Difference
Large adverse	0	0	0
Medium adverse	0	0	0
Small adverse	1	1	0
Negligible adverse	471	245	-226
Negligible beneficial	0	170	+170
Small beneficial	0	48	+48
Medium beneficial	0	8	+8
Large beneficial	0	0	0

4.5.28 Air quality is currently of a good standard within the study area encompassing the A5025 Off-line Highway Improvements and is predicted to remain so in 2020 if the Wylfa Newydd Project is implemented. The bypasses improve air quality for 226 receptor locations between the A55 Junction 3 and the site entrance to the Wylfa Newydd Development Area to the south of Tregele. The bypasses provide small and medium beneficial effects to 56 receptor locations. The bypasses would provide a net benefit to local air quality during the construction of the Wylfa Newydd Project in 2020 and would continue to provide a net benefit during the remainder of the construction period and during operation of the Power Station.

4.5.29 Furthermore, Llanfaethlu Primary School and other community receptors located in the bypassed areas, which represent a larger number of people, are predicted to experience air quality benefits as a result of the bypass (although

represented using a single receptor location in table C4-13). The receptors likely to experience adverse effects are predominantly individual dwellings, which represent fewer people.

Effects on ecological receptors

2020 Wylfa Newydd Project with bypasses

4.5.30 The predicted changes in NOx concentrations from baseline conditions for the 2020 Wylfa Newydd Project with bypasses scenario are presented in table C4-14. Predicted changes to deposition rates of nitrogen and acid are reported in tables C4-15 and C4-16, respectively.

4.5.31 On the Isle of Anglesey there are two ecological receptors with a national or international designation where the likely significant effect of the predicted change in the NOx concentration, rate of nitrogen or acid deposition were considered further. This was due to the magnitude of the predicted increase from baseline conditions (i.e. the predicted increase is greater than 1% of the critical level or critical load and the total concentration is greater than 70% of the critical level or critical load – see chapter B5, Application Reference Number: 6.2.5). At all other SSSI and SAC designated sites on Anglesey, the predicted increases were so small that the effects would be negligible.

4.5.32 As discussed in chapter B5 (Application Reference Number: 6.2.5), the total nitrogen-derived acid deposition at Beddmanarch-Cymyran SSSI (A55) is less than the CLminN acid critical load aspect and the assessment of acid deposition should be based on the predicted increase in sulphur-derived acid against the CLmaxS critical load aspect. However, as SO_2 is negligible for road traffic emissions and not modelled, the assessment was based on comparison of the increase in nitrogen-derived acid to the CLmaxN critical load aspect[1]. This was also applied to the other assessment scenarios.

4.5.33 Malltraeth Marsh/Cors Ddyga SSSI is predicted to be exposed to annual mean concentrations of NOx at parts of the designated site within 20m of the boundary closest to the A55 that would be increased relative to baseline conditions by an amount equivalent to more than 1% of the critical level of 30µg/m^3, where the PEC is above 70% of the critical level. On this basis, further consideration of the predicted changes in annual mean NOx concentrations by ecologists is required, and is presented below.

4.5.34 The nitrogen and acid deposition rates are predicted to change by 1% of the critical load values. The IAQM position statement on using a criterion for identifying insignificant effects on designated SAC, Special Protection Area and SSSI ecological sites [RD10] notes that the criterion of using 1% of the critical level or critical load value as a trigger to consider the issue in greater detail is appropriate. However, it also notes that the original proposals intended the criterion to be used where the change was clearly above 1%, rather than 1% or slightly greater. The predicted nitrogen and acid deposition contributions are slightly above and slightly below 1% respectively (and round

[1] CLmaxN, CLminN and CLmaxS are specific critical loads as defined by APIS [RD9].

to 1% as a whole number) at the nearest point of the Malltraeth Marsh/Cors Ddyga SSSI to the A55. The predicted nitrogen and acid deposition set further back from this point are smaller. As such, the Wylfa Newydd Project traffic would not lead to a significant effect and further consideration of nitrogen and acid deposition by ecologists is not required.

4.5.35 Malltraeth Marsh SSSI is designated for the important breeding bird community which uses the lowland damp grassland, the wet meadow habitat, and the botanical interest of its ditches and watercourses. It covers an area of 1,367ha, with its northern boundary running parallel with the A55 for approximately 1.75km. The predicted baseline NO_X concentration of 33.5µg/m^3 already exceeds the critical level of 30µg/m^3, and the modelled annual mean NO_X concentration in 2020 predicts a rise in concentrations from 33.5µg/m^3 to 34.4µg/m^3, an increase of 3% on the predicted baseline concentration at the very closest parts of the SSSI to the A55. The total concentration at 10m further from the A55 into the SSSI is less than 30µg/m^3 indicating that the critical level is only exceeded at the very closest part of the SSSI to the A55.

4.5.36 The increases are predicted to be above 1% of the critical level and the PEC above 70% of the critical level at a distance of up to 20m from the A55 into the SSSI after which, the increase in NO_X concentration falls below this threshold. The area affected by the air quality change requiring further consideration covers approximately 3.5 hectares (ha), less than 1% of the total area of the SSSI.

4.5.37 Plant responses to increased concentrations are typically growth stimulus of aerial shoots and, at high concentrations, physiological damage, with gross effects on habitats being a loss of plant diversity. Given the predicted increases in NO_X concentrations during construction, and taking into consideration the area of the SSSI potentially affected by these increases, it is considered that there may be a very minor detrimental alteration to the botanical diversity of the SSSI. This negligible magnitude of change is predicted to result in a negligible effect on the SSSI.

4.5.38 Beddmanarch-Cymyran SSSI is predicted to be exposed to concentrations of NOx at parts of the designated site within 30m of the A55 carriageway that would be increased relative to baseline conditions by an amount equivalent to greater than 1% of the critical level and where the PEC is above 70% of the critical level. On this basis, further consideration of the predicted changes in annual mean NOx concentrations by ecologists is required, and is presented below. The nitrogen and acid deposition rates are predicted to change by 1% or less compared to the critical load values and therefore do not require further consideration.

4.5.39 Beddmanarch-Cymran SSSI is designated for its ornithological and botanical interest. Over-wintering and passage water fowl are supported by extensive sandbanks, mudflat and saltmarsh, and a number of coastal species breed in the area. The mudflats, saltmarsh and the dune heath support a variety of specialist botanical species. The site covers an area of 911ha, with its closest point to the road network potentially affected by the Wylfa Newydd Project where the A55 crosses the Cymyran Strait, a distance of approximately 1km.

The predicted baseline NO_X concentration of 33.2µg/m^3 already exceeds the critical level of 30µg/m^3, and the modelled annual mean NO_X concentration in 2020 predicts a rise in concentration from 33.2µg/m^3 to 34.1µg/m^3, an increase of 2.8% on the predicted baseline concentration at the very closest parts of the SSSI to the A55. The total concentration at 10m further from the A55 into the SSSI is less than 30µg/m^3 indicating that the critical level is only exceeded at the very closest part of the SSSI to the A55.

4.5.40 The increases are predicted to be above 1% of the critical level and the PEC above 70% of the critical level at a distance of up to 30m from the A55 (north and south) into the SSSI, after which, the increase in NO_X concentration falls below the threshold. The area affected by the air quality change requiring further consideration covers approximately 6ha, approximately 0.7% of the total area of the SSSI. The predominant habitat in this area is sandbank, which is exposed at low tide.

4.5.41 Given the slight percentage increases in NOx concentration across a relatively small area of the SSSI, the limited botanical interest in this area and the dynamic environment created through tidal inundation, it is considered that, at worst, there may be a very minor detrimental alteration to the botanical diversity of the SSSI. This negligible magnitude of change is predicted to result in a negligible effect on the SSSI.

4.5.42 At the section of the Beddmanarch-Cymyran SSSI close to the A5025 at Llanfachraeth, the NOx concentrations (and nitrogen and acid deposition) are predicted to decrease as a result of the realignment of the A5025, which would move existing traffic and the Wylfa Newydd Project traffic further from the ecological site. Similar reductions were also determined at the Ancient Woodland at Cefn Coch (ID 26051), which is located adjacent to the A5025.

4.5.43 The predicted change in annual mean NOx concentrations, nitrogen and acid deposition rates at all Wildlife Sites and Ancient Woodlands on the Isle of Anglesey is well within the threshold criteria of 100% of the annual mean critical level or critical load for determining the potential for significant effects at these types of ecological sites, as set out in chapter B5 (Application Reference Number: 6.2.5).

4.5.44 The effects associated with changes in NOx concentration, nitrogen and acid deposition rates of the magnitudes discussed above are therefore concluded to be not significant.

Table C4-14 Predicted maximum annual mean NOx concentrations at ecological receptors – 2020 Wylfa Newydd Project with bypasses

Receptor	Critical level (µg/m^3)	2020 Baseline (µg/m^3)	2020 Wylfa Newydd Project with bypasses (µg/m^3)	Change as % of critical level	Further consideration required?
Beddmanarch-Cymyran SSSI – A5025	30	8.0	7.1	-3%	No
Beddmanarch-Cymyran SSSI – A55	30	33.2	34.1	+3%	Yes
Llyn Dinam SAC/Llynnau Y Fali SSSI	30	6.7	6.8	0%	No
Llyn Traffwll SSSI	30	6.8	6.9	0%	No
Malltraeth Marsh/Cors Ddyga SSSI	30	33.5	34.4	+3%	Yes
Afon Wygyr Wildlife Site	30	10.4	10.9	+2%	No
Cae Barcdy Wildlife Site	30	9.9	10.1	+1%	No
Coed Braint Siglen Dyfnia Wildlife Site	30	10.7	10.9	+1%	No
Cors Hendre Fawr Wildlife Site	30	42.3	45.1	+9%	No
Cors Plas Wildlife Site	30	6.5	6.6	0%	No
Cors Tafarn-y-Grib Wildlife Site	30	9.1	9.4	+1%	No
Cors Tregarnedd Fawr Wildlife Site	30	66.4	69.7	+11%	No
Gwely Cyrs Caergeiliog Wildlife Site	30	27.1	28.0	+3%	No
Rhostir a Pwll Caergeiliog Wildlife Site	30	7.5	7.6	0%	No
Ancient Woodland (26051)	30	12.9	12.1	-3%	No
Ancient Woodland (25883)	30	42.6	44.6	+7%	No
Ancient Woodland (25882)	30	40.5	42.4	+6%	No
Ancient Woodland (26076)	30	6.4	6.5	0%	No

Receptor	Critical level (µg/m^3)	2020 Baseline (µg/m^3)	2020 Wylfa Newydd Project with bypasses (µg/m^3)	Change as % of critical level	Further consideration required?
Ancient Woodland (26066)	30	30.3	31.0	+2%	No
Ancient Woodland (43665)	30	15.9	16.2	+1%	No
Ancient Woodland (26037)	30	15.6	15.7	0%	No
Ancient Woodland (26067)	30	11.1	11.2	0%	No
Ancient Woodland (25084)	30	19.4	20.1	+2%	No
Ancient Woodland (25083)	30	40.1	41.3	+4%	No
Ancient Woodland (25087)	30	67.0	69.1	+7%	No
Ancient Woodland (43393)	30	62.8	64.8	+6%	No
Ancient Woodland (24252)	30	39.5	40.6	+4%	No

Table C4-15 Predicted maximum nitrogen deposition at ecological receptors – 2020 Wylfa Newydd Project with bypasses

Receptor	Vegetation type	Nitrogen deposition rate (kgN/ha/year)				Change as a percentage of CL	Total deposition rate as a percentage of CL	Further consideration required?
		Critical load (CL)	Existing deposition rate	Change due to 2020 Wylfa Newydd Project with bypasses	Total deposition rate			
Beddmanarch-Cymyran SSSI – A5025	Short	10	13.2	-0.1	13.1	-1%	131%	Yes
Beddmanarch-Cymyran SSSI – A55	Short	10	9.2	+0.1	9.3	+1%	93%	No
Llyn Dinam SAC/Llynnau Y Fali SSSI	Short	10	12.2	0.0	12.2	0%	122%	No
Llyn Traffwll SSSI	Short	10	12.2	0.0	12.2	0%	122%	No
Malltraeth Marsh/Cors Ddyga SSSI	Short	15	14.4	+0.1	14.5	+1%	97%	No
Afon Wygyr Wildlife Site	Short	10	13.0	+0.1	13.1	+1%	131%	No
	Tall	10	20.4	+0.1	20.5	+1%	205%	No
Cae Barcdy Wildlife Site	Short	10	9.2	0.0	9.3	0%	93%	No
	Tall	10	15.0	0.0	15.0	0%	150%	No
Coed Braint Siglen Dyfnia Wildlife Site	Short	10	19.7	0.0	19.8	0%	198%	No
	Tall	10	31.8	0.0	31.8	0%	318%	No

Receptor	Vegetation type	Nitrogen deposition rate (kgN/ha/year)				Change as a percentage of CL	Total deposition rate as a percentage of CL	Further consideration required?
		Critical load (CL)	Existing deposition rate	Change due to 2020 Wylfa Newydd Project with bypasses	Total deposition rate			
Cors Hendre Fawr Wildlife Site	Short	10	15.1	+0.3	15.4	+3%	154%	No
	Tall	10	24.1	0.6	24.6	+6%	246%	No
Cors Plas Wildlife Site	Short	10	12.2	0.0	12.2	0%	122%	No
	Tall	10	19.6	0.0	19.6	0%	196%	No
Cors Tafarn-y-Grib Wildlife Site	Short	10	15.0	0.0	15.0	0%	150%	No
	Tall	10	24.4	+0.1	24.4	+1%	244%	No
Cors Tregarnedd Fawr Wildlife Site	Short	10	14.4	+0.3	14.8	+3%	148%	No
	Tall	10	23.2	+0.7	23.9	+7%	239%	No
Gwely Cyrs Caergeiliog Wildlife Site	Short	10	12.2	+0.1	12.3	+1%	123%	No
	Tall	10	19.6	+0.2	19.8	+2%	198%	No
Rhostir a Pwll Caergeiliog Wildlife Site	Short	10	12.2	0.0	12.2	0%	122%	No
	Tall	10	19.6	0.0	19.6	0%	196%	No
Ancient Woodland (26051)	Tall	5	16.0	-0.2	15.8	-3%	316%	No
Ancient Woodland (25883)	Tall	5	23.2	+0.4	23.6	+8%	473%	No
Ancient Woodland (25882)	Tall	5	23.2	+0.4	23.6	+8%	473%	No

Receptor	Vegetation type	Nitrogen deposition rate (kgN/ha/year)				Change as a percentage of CL	Total deposition rate as a percentage of CL	Further consideration required?
		Critical load (CL)	Existing deposition rate	Change due to 2020 Wylfa Newydd Project with bypasses	Total deposition rate			
Ancient Woodland (26076)	Tall	5	20.4	0.0	20.5	0%	409%	No
Ancient Woodland (26066)	Tall	5	13.3	+0.1	13.4	+3%	269%	No
Ancient Woodland (43665)	Tall	5	13.3	+0.1	13.4	+1%	267%	No
Ancient Woodland (26037)	Tall	5	13.3	0.0	13.3	+0%	266%	No
Ancient Woodland (26067)	Tall	5	13.3	0.0	13.3	+0%	266%	No
Ancient Woodland (25084)	Tall	5	31.8	+0.1	31.9	+2%	638%	No
Ancient Woodland (25083)	Tall	5	31.8	+0.2	32.0	+5%	640%	No
Ancient Woodland (25087)	Tall	5	31.8	+0.4	32.2	+8%	644%	No
Ancient Woodland (43393)	Tall	5	31.8	+0.4	32.2	+8%	643%	No
Ancient Woodland (24252)	Tall	5	31.8	+0.2	32.0	+5%	640%	No

Table C4-16 Predicted acid deposition at ecological receptors – 2020 Wylfa Newydd Project with bypasses

Receptor	Vegetation type	Acid deposition rate (keq/ha/year)				Change as a % of CL	Total deposition rate as a % of CL	Further consideration required?
		Critical load (CLmaxN)	Existing deposition rate (N+S)	Change due to 2020 Wylfa Newydd Project with bypasses	Total deposition rate			
Beddmanarch-Cymyran SSSI – A5025	Short	2.25	1.080	-0.006	1.07	0%	48%	No
Beddmanarch-Cymyran SSSI – A55	Short	2.25	0.800	0.006	0.81	0%	36%	No
Llyn Dinam SAC / Llynnau Y Fali SSSI	Short	0.50	1.020	0.001	1.02	0%	204%	No
Llyn Traffwll SSSI	Short	4.26	1.020	0.001	1.02	0%	24%	No
Malltraeth Marsh/Cors Ddyga SSSI	Short	1.24	1.210	0.007	1.22	+1%	98%	No
Afon Wygyr Wildlife Site	Short	1.99	1.100	0.004	1.10	0%	55%	No
	Tall	2.77	1.660	0.008	1.67	0%	60%	No
Cae Barcdy Wildlife Site	Short	1.98	0.800	0.001	0.80	0%	40%	No
	Tall	2.71	1.240	0.002	1.24	0%	46%	No
Coed Braint Siglen Dyfnia Wildlife Site	Short	0.59	1.590	0.002	1.59	0%	270%	No
	Tall	1.64	2.480	0.003	2.48	0%	151%	No
	Short	1.99	1.240	0.020	1.26	+1%	63%	No

Receptor	Vegetation type	Acid deposition rate (keq/ha/year)				Change as a % of CL	Total deposition rate as a % of CL	Further consideration required?
		Critical load (CLmaxN)	Existing deposition rate (N+S)	Change due to 2020 Wylfa Newydd Project with bypasses	Total deposition rate			
Cors Hendre Fawr Wildlife Site	Tall	2.78	1.920	0.041	1.96	+1%	71%	No
Cors Plas Wildlife Site	Short	0.51	1.020	0.001	1.02	0%	200%	No
	Tall	2.73	1.580	0.001	1.58	0%	58%	No
Cors Tafarn-y-Grib Wildlife Site	Short	0.53	1.220	0.002	1.22	0%	231%	No
	Tall	1.54	1.930	0.004	1.93	0%	126%	No
Cors Tregarnedd Fawr Wildlife Site	Short	0.56	1.210	0.024	1.23	+4%	220%	No
	Tall	2.82	1.870	0.048	1.92	+2%	68%	No
Gwely Cyrs Caergeiliog Wildlife Site	Short	0.50	1.020	0.007	1.03	+1%	205%	No
	Tall	2.72	1.580	0.014	1.59	+0%	59%	No
Rhostir a Pwll Caergeiliog Wildlife Site	Short	0.50	1.020	0.001	1.02	0%	204%	No
	Tall	2.72	1.580	0.002	1.58	0%	58%	No
Ancient Woodland (26051)	Tall	2.74	1.320	-0.012	1.31	0%	48%	No
Ancient Woodland (25883)	Tall	1.60	1.870	0.029	1.90	+2%	119%	No
Ancient Woodland (25882)	Tall	1.60	1.870	0.028	1.90	+2%	119%	No

Receptor	Vegetation type	Acid deposition rate (keq/ha/year)				Change as a % of CL	Total deposition rate as a % of CL	Further consideration required?
		Critical load (CLmaxN)	Existing deposition rate (N+S)	Change due to 2020 Wylfa Newydd Project with bypasses	Total deposition rate			
Ancient Woodland (26076)	Tall	2.77	1.660	0.001	1.66	0%	60%	No
Ancient Woodland (26066)	Tall	1.79	1.110	0.011	1.12	+1%	63%	No
Ancient Woodland (43665)	Tall	1.79	1.110	0.004	1.11	0%	62%	No
Ancient Woodland (26037)	Tall	1.79	1.110	0.002	1.11	0%	62%	No
Ancient Woodland (26067)	Tall	1.79	1.110	0.002	1.11	0%	62%	No
Ancient Woodland (25084)	Tall	1.65	2.480	0.009	2.49	+1%	151%	No
Ancient Woodland (25083)	Tall	1.64	2.480	0.017	2.50	+1%	152%	No
Ancient Woodland (25087)	Tall	1.64	2.480	0.029	2.51	+2%	153%	No
Ancient Woodland (43393)	Tall	1.64	2.480	0.028	2.51	+2%	153%	No
Ancient Woodland (24252)	Tall	1.64	2.480	0.016	2.50	+1%	152%	No

2020 Wylfa Newydd Project without bypasses

4.5.45 For all ecological receptors which are not close to the A5025 alignment changes, the results are the same as those described above for the 2020 Wylfa Newydd Project with bypasses scenario, i.e. all ecological receptors except for the Ancient Woodland near Cefn Coch (ID 26051) and Beddmanarch-Cymyran SSSI at Llanfachraeth. For these two sites, a discussion is presented below which provides an assessment of the likely increases in NOx concentrations and nitrogen and acid deposition which would be experienced prior to the opening of the bypasses.

4.5.46 The predicted increases in NOx concentrations for the 2020 Wylfa Newydd Project without bypasses scenario are presented in table C4-17. Predicted changes to deposition rates of nutrient nitrogen and acid gases are reported in table C4-18 and table C4-19 respectively.

4.5.47 The predicted changes in NOx concentrations, rates of nitrogen or acid deposition are below the criteria (see chapter B5, Application Reference Number: 6.2.5) which would require further consideration and represent a not significant effect.

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Table C4-17 Predicted maximum annual mean NOx concentrations at ecological receptors – 2020 Wylfa Newydd Project without bypasses

Receptor	Critical level (µg/m^3)	2020 Baseline (µg/m^3)	2020 Wylfa Newydd Project without bypasses (µg/m^3)	Change as % of critical level	Further consideration required?
Beddmanarch-Cymyran SSSI – A5025	30	8.0	8.6	+2%	No
Ancient Woodland (26051)	30	12.9	16.0	+10%	No

Table C4-18 Predicted maximum nitrogen deposition at ecological receptors – 2020 Wylfa Newydd Project without bypasses

Receptor	Vegetation type	Nitrogen deposition rate (kgN/ha/year)				Change as a % of CL	Total deposition rate as a % of CL	Further consideration required?
		Critical load (CL)	Existing deposition rate	Change due to 2020 Wylfa Newydd Project without bypasses	Total deposition rate			
Beddmanarch-Cymyran SSSI – A5025	Short	10	13.2	+0.1	13.2	+1%	132%	No
Ancient Woodland (26051)	Tall	5	16.0	+0.6	16.6	+12%	332%	No

Table C4-19 Predicted maximum acid deposition at ecological receptors – 2020 Wylfa Newydd Project without bypasses

Receptor	Vegetation type	Acid deposition rate (keq/ha/year)				Change as a % of CL	Total deposition rate as a % of CL	Further consider-ation required?
		Critical load (CLmaxN)	Existing deposition rate (N+S)	Change due to 2020 Wylfa Newydd Project without bypasses	Total deposition rate			
Beddmanarch-Cymyran SSSI – A5025	Short	2.25	1.080	+0.005	1.08	0%	48%	No
Ancient Woodland (26051)	Tall	2.74	1.320	+0.044	1.36	+2%	50%	No

Peak construction

4.5.48 This assesses road traffic emissions during the peak construction year for the Isle of Anglesey study area and the mainland Wales study area.

Effects on human receptors

2023 Wylfa Newydd Project with bypasses – Isle of Anglesey study area

4.5.49 The predicted concentrations of NO_2, PM_{10} and $PM_{2.5}$ for the future assessment year baseline and for the Wylfa Newydd Project with bypasses scenarios are reported in table C4-20. The magnitude of the change in annual mean concentrations is reported as a percentage of the respective AQO values.

4.5.50 Figure C4-5 (Application Reference Number: 6.3.32) illustrates the spatial pattern of annual mean NO_2 concentration changes across the whole affected road network on the Isle of Anglesey. The receptors are coloured using the same colour scheme as described for figure C4-3 (Application Reference Number: 6.3.32) in paragraph 4.5.7.

4.5.51 To the north of the site access, additional road traffic using the A5025 at Cemaes (R2 to R4) and Tregele (R5 to R7) is predicted to increase annual mean NO_2 concentrations by the equivalent of between 1% and 3% of the AQO value. Figure C4-5 (Application Reference Number: 6.3.32) illustrates how, within Cemaes and Tregele, the magnitude of the change decreases to less than 1% of the AQO values rapidly with increasing distance from the A5025. The additional road traffic on the A5025 between Cemaes and Amlwch (R1) would have a negligible adverse effect on local air quality.

4.5.52 The closest receptors to the A5025 to the south of the site access to the Wylfa Newydd Development Area (R9) are predicted to experience an increase in annual mean NO_2 concentrations equivalent to increase by 6% (2.4µg/m^3) of the AQO value or less. With the total annual mean NO_2 concentrations remaining at levels that are less than one-third of the AQO set for the protection of human health, the 6% increase in concentrations relative to the AQO represents a maximum of a small adverse effect on air quality at these receptors.

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Table C4-20 Predicted annual mean concentrations at key human receptors – 2023 Wylfa Newydd Project with bypasses

Receptor	2023 Baseline			2023 Wylfa Newydd Project with bypasses			Magnitude of change as percentage of AQO value		
	NO_2 ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	NO_2 (AQO = 40$\mu g/m^3$)	PM_{10} (AQO = 40$\mu g/m^3$)	$PM_{2.5}$ (AQO = 25$\mu g/m^3$)
R1	5.4	15.0	7.9	5.6	15.1	7.9	0% (n)	0% (n)	0% (n)
R2	6.8	15.2	8.0	7.2	15.3	8.0	+1% (n)	0% (n)	0% (n)
R3	7.6	15.3	8.0	8.3	15.4	8.1	+2% (n)	0% (n)	0% (n)
R4	9.7	15.6	8.2	10.8	15.8	8.3	+3% (n)	0% (n)	0% (n)
R5	7.1	15.2	8.0	7.6	15.3	8.0	+1% (n)	0% (n)	0% (n)
R6	7.8	15.4	8.1	9.0	15.6	8.2	+3% (n)	0% (n)	0% (n)
R7	5.8	15.1	7.9	6.4	15.2	8.0	+2% (n)	0% (n)	0% (n)
R8	5.0	15.0	7.9	5.5	15.1	7.9	+1% (n)	0% (n)	0% (n)
R9	7.6	15.3	8.1	10.1	15.7	8.3	+6% (s)	+1% (n)	+1% (n)
R10	5.8	15.1	7.9	5.2	15.1	7.9	-1% (n)	0% (n)	0% (n)
R11	4.4	14.9	7.8	4.8	15.0	7.9	+1% (n)	0% (n)	0% (n)
R12	5.7	15.1	7.9	5.5	15.1	7.9	-1% (n)	0% (n)	0% (n)
R13	8.1	15.4	8.1	10.3	15.7	8.3	+5% (n)	+1% (n)	+1% (n)
R14	8.2	15.4	8.1	10.4	15.7	8.3	+6% (s)	+1% (n)	+1% (n)
R15	6.7	15.3	7.3	8.2	15.5	7.4	+4% (n)	+1% (n)	+1% (n)
R16	7.4	15.4	7.3	9.2	15.7	7.5	+5% (n)	+1% (n)	+1% (n)
R17	6.2	15.2	7.6	4.9	15.0	7.5	-3% (n)	0% (n)	0% (n)

Receptor	2023 Baseline			2023 Wylfa Newydd Project with bypasses			Magnitude of change as percentage of AQO value		
	NO_2 ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	NO_2 (AQO = 40$\mu g/m^3$)	PM_{10} (AQO = 40$\mu g/m^3$)	$PM_{2.5}$ (AQO = 25$\mu g/m^3$)
R18	8.2	15.4	7.7	5.2	15.1	7.5	-7% (s)	-1% (n)	-1% (n)
R19	7.0	15.3	7.6	7.4	15.4	7.7	+1% (n)	0% (n)	0% (n)
R20	11.5	15.8	7.3	15.0	16.3	7.6	+9% (s)	+1% (n)	+1% (n)
R21	7.6	15.4	7.2	8.7	15.6	7.3	+3% (n)	+0% (n)	0% (n)
R22	10.2	15.7	7.9	6.0	15.1	7.6	-10% (s)	-1% (n)	-1% (n)
R23	4.6	15.0	7.5	5.7	15.1	7.6	+3% (n)	0% (n)	0% (n)
R24	8.4	15.5	7.3	10.0	15.7	7.5	+4% (n)	+1% (n)	+1% (n)
R25	11.8	15.9	7.5	14.3	16.2	7.7	+6% (s)	+1% (n)	+1% (n)
R26	10.8	15.7	8.2	11.0	15.7	8.2	+0% (n)	0% (n)	0% (n)
R27	10.3	15.7	7.6	10.6	15.7	7.6	+1% (n)	0% (n)	0% (n)
R28	16.2	16.4	8.1	17.0	16.5	8.1	+2% (n)	0% (n)	0% (n)
R29	12.8	16.0	7.6	13.6	16.0	7.7	+2% (n)	0% (n)	0% (n)
R30	7.4	15.3	7.2	7.8	15.3	7.2	+1% (n/a)	0% (n/a)	0% (n/a)
R31	4.9	15.0	7.0	5.0	15.0	7.0	0% (n)	0% (n)	0% (n)
R32	9.3	15.5	8.0	9.8	15.6	8.0	+1% (n)	0% (n)	0% (n)
R33	12.8	15.9	8.0	13.3	16.0	8.0	+1% (n)	0% (n)	0% (n)
R34	8.1	15.3	8.2	8.3	15.4	8.2	+1% (n)	0% (n)	0% (n)
R35	12.8	15.9	8.2	13.3	16.0	8.2	+1% (n)	0% (n)	0% (n)

Receptor	2023 Baseline			2023 Wylfa Newydd Project with bypasses			Magnitude of change as percentage of AQO value		
	NO_2 ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	NO_2 (AQO = 40$\mu g/m^3$)	PM_{10} (AQO = 40$\mu g/m^3$)	$PM_{2.5}$ (AQO = 25$\mu g/m^3$)
R36	34.6	19.0	9.7	36.1	19.2	9.8	+4% (n/a)	+1% (n/a)	+1% (n/a)
R37	15.3	16.2	8.3	15.9	16.3	8.3	+2% (n)	0% (n)	0% (n)
R38	14.3	16.1	8.5	14.8	16.1	8.5	+1% (n)	0% (n)	0% (n)
R39	14.6	16.4	8.7	15.0	16.4	8.7	+1% (n)	0% (n)	0% (n)

Note 1: Impact magnitude rounded to whole numbers and reported as a percentage of the respective AQO value.

Note 2: Effect descriptors at individual receptors in parentheses as per table B5-14 of chapter B5 (Application Reference Number: 6.2.5): ‘n’ is negligible, ‘s’ is small, ‘m’ is medium and ‘l’ is large. ‘n/a’ is ‘not applicable’ and used for short-term exposure receptors.

Note 3: Any changes of 0% (i.e. less than 0.5%) are described as negligible (‘n’).

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4.5.53 The emissions from road traffic using the A5025 at Cefn Coch, are predicted to result in a change in NO_2 concentrations equivalent to an increase of 1% or less of the AQO value at those properties to the east of the new alignment of the A5025 (R11) and an improvement of up to 1% of the AQO value at properties to the west of the new alignment (R10 and R12). Given the good standard of predicted future baseline air quality in 2023, changes of ±5% or less of the AQO values are considered to have a negligible adverse or beneficial effect at these receptor locations.

4.5.54 At Llanfaethlu, at the receptor locations most affected by the A5025 Off-line Highway Improvements and Wylfa Newydd Project road traffic, the annual mean NO_2 concentration is predicted to increase by a value equivalent to 5% of the AQO value (2.2µg/m^3) or less (R16) or to improve by a value equivalent to 7% of the AQO value (-3.5µg/m^3) (R18), representing a negligible adverse and small beneficial effect on local air quality, respectively, given the low baseline concentrations. As shown on figure C4-5 (Application Reference Number: 6.3.32), for the majority of Llanfaethlu represented by receptor R17, the effect on air quality would be negligible beneficial. In the 2023 assessment year, Llanfaethlu Primary School is predicted to experience small beneficial effects at the closest parts of the school boundary to the A5025 and negligible beneficial effects at 10m or more from the school boundary.

4.5.55 At Llanfachraeth, the annual mean NO_2 concentrations at the facades of properties facing onto the current alignment of the A5025 through Llanfachraeth (R22) are predicted to decrease from future baseline conditions by the equivalent of 10% of the AQO value (-4.2µg/m^3). This represents a small beneficial effect. For those individual properties located closest to the new alignment at Llanfachraeth (R23), the annual mean NO_2 concentrations are predicted to increase from future baseline conditions by the equivalent of 3% of the AQO value or less (1.1µg/m^3). This is a negligible adverse effect. Annual mean NO_2 concentrations would remain at less than one-third of the AQO value at any receptors at Llanfachraeth (i.e. R21 to R24). Figure C4-5 (Application Reference Number: 6.3.32) shows that the majority of the receptors at Llanfachraeth are predicted to experience beneficial effects due to the Wylfa Newydd Project, with the A5025 Off-line Highway Improvements improvements in place.

4.5.56 At other key receptor locations on the A5025 route which are not close to the A5025 alignment changes where the highest increases were predicted (represented by R13, R14, R15, R20, R24 and R25), the maximum increase in NO_2 concentrations is equivalent to 9% of the AQO value (3.5µg/m^3). These changes are considered to represent a maximum of a small adverse effect at a relatively small number of receptors close to the A5025, with negligible adverse effects at all other locations.

4.5.57 At receptors on the A55 route between Junction 2 of the A55 and the Britannia Bridge to the east of Llanfair Pwllgwyngyll (R26 to R39), the predicted increase in annual mean NO_2 concentrations at all receptors near the A55 representative of long-term exposure would be equivalent to 2% of the AQO value or less. Given the good standard of air quality predicted for the future baseline scenario in 2023, these changes are considered to represent a negligible adverse effect at all receptors.

4.5.58 The predicted total annual mean concentrations at R20 (representing the closest gardens to the A5025), R30 (leisure use close to the Park and Ride) and R36 (the A55 layby) are considerably lower than the empirically derived value of 60µg/m^3 that is a representative threshold for consideration of potential risk of exceedance of the one-hour mean AQO [RD4] for short-term exposure locations such as gardens, leisure facilities and laybys within the study area. The highest concentration of 36.1µg/m^3 was predicted at the A55 layby (R36). These values are considerably lower than the empirically derived value of 60µg/m^3 and an exceedance of the one-hour mean AQO is very unlikely.

4.5.59 The impact on annual mean concentrations of PM_{10} and $PM_{2.5}$ is equivalent to a change of ±1% or less of the AQO value at all receptors. These changes are considered to represent a negligible beneficial or adverse effect at all receptors within the Isle of Anglesey study area. The total PM_{10} concentrations are well within the concentration of 31.8µg/m^3 at all receptors indicating that the 24-hour mean AQO is complied with.

4.5.60 Overall, for the 2023 Wylfa Newydd Project with bypasses scenario, there would not be a significant adverse effect on local air quality at human receptors on the Isle of Anglesey.

2023 Wylfa Newydd Project with bypasses – mainland Wales study area

4.5.61 A screening approach to assessment (differing from the methodology on the Isle of Anglesey) was undertaken for the mainland Wales study area, as described in chapter B5 (Application Reference Number: 6.2.5). The predicted changes in pollutant concentrations on mainland Wales as a result of increased traffic flow associated with the Wylfa Newydd Project are presented in appendix C4-2 (Application Reference Number: 6.3.28). Table C4-21 presents the percentage change and associated effect descriptor at long-term receptors assessed, and these are discussed below. Further comment is included with reference to the potential effects at the layby assessed, which is assessed separately as a short-term exposure receptor location.

4.5.62 The maximum predicted increase in annual mean NO_2 concentrations was 0.72µg/m^3 at receptor R45 which is closest to the A55 and is indicative of the likely maximum contributions experienced at properties 9m or more from the A55. The increase is equivalent to 2% of the annual mean AQO.

4.5.63 A 2% increase in the annual mean NO_2 concentration would have a negligible effect on local air quality when the total concentration is less than 30µg/m^3. The maximum representative monitored NO_2 concentration measured within the study area was 20.9µg/m^3 at the CBC-018 monitoring location in 2016 (see table C4-4). CBC-018 is a similar distance to the edge of the A55 as R45 (approximately 9m). On that basis, and because ambient concentrations of NO_2 are expected to decrease between 2016 and 2023, the total concentrations are likely to be lower than 30µg/m^3 and the effect at receptor R45 would be described as negligible adverse. Given that the predicted increases in annual mean NO_2 concentrations at all other receptors are lower than predicted at R45, the effects would be negligible adverse at all other

human receptor locations. Should the measured 2015 NO_2 concentration be applied (22.6µg/m^3), the effects would still be negligible.

4.5.64 The annual mean NO_2 concentrations would also be well below 60µg/m^3. Therefore, it is unlikely that an exceedance of the one-hour mean AQO for NO_2 would occur at long-term receptor locations.

4.5.65 The predicted increase in annual mean NO_2 concentration at the short-term exposure layby location (R41) was 1.73µg/m^3. It is understood that measurements undertaken at the layby location close to the kerbside of the A55 indicate that annual mean concentrations could exceed 60µg/m^3 [RD6]. On this basis, there is the possibility that the one-hour mean AQO value of 200µg/m^3 could be exceeded more than the permitted 18 times in the year. A further consultation meeting with GC is planned to review the full monitoring dataset once 12 months of data have been recorded. Further monitoring and assessment work is anticipated following this meeting in order to identify the significance of air quality effects and to explore mitigation options.

4.5.66 The significance of the predicted changes in NO_2 concentrations at long-term exposure across the study area is therefore considered to be not significant. Further consideration of the effects of increases in NO_2 concentrations at short-term exposure locations are anticipated to determine the significance of effects.

4.5.67 The maximum predicted increase in the annual mean PM_{10} concentration is 0.23µg/m^3 at receptors R45 and R46. These are the closest long-term exposure human receptors to the A55 on mainland Wales and are indicative of the likely maximum contributions predicted to be experienced at properties close to the A55. A 1% change in the annual mean PM_{10} concentration would have a negligible adverse effect on local air quality when the total concentration of PM_{10} at the receptor is less than 38µg/m^3. The PM_{10} measurement site is further from the A55 than R45 and R46 are (20m compared to 9m), and recorded 16.6µg/m^3 in 2015. Additionally, there are no published roadside PM_{10} measurements close to or above 38µg/m^3 within Wales, as reported by the national air quality website for 2015 and 2016 [RD11]. This indicates that it is very unlikely that total PM_{10} concentrations would be 38µg/m^3 at any long-term assessed receptor location within the study area.

4.5.68 On this basis, the effects at receptors R45 and R46 would be described as negligible adverse. The change at all other receptors was less than 1%, which represents a negligible adverse effect. The negligible change in annual mean PM_{10} concentrations would not affect compliance with the 24-hour mean AQO at long-term receptor locations.

4.5.69 For $PM_{2.5}$, the predicted increases in annual mean concentrations were less than 1% of the AQO value for all receptors except R45 and R46. The predicted maximum increase in the annual mean $PM_{2.5}$ concentration is 0.14µg/m^3, which equates to 1% of the AQO value of 25µg/m^3. On the same basis as above for PM_{10}, a predicted increase of this magnitude would represent a negligible effect.

4.5.70 The effect on local air quality of the predicted changes in PM_{10} and $PM_{2.5}$ concentrations at long-term exposure receptors assessed across the study area is therefore considered to be not significant.

Table C4-21 Predicted change in annual mean concentrations at key human receptors – 2023 Wylfa Newydd Project with bypasses

Receptor	Magnitude of changes as a percentage of AQO value		
	NO_2	PM_{10}	$PM_{2.5}$
R40	+1% (n)	0% (n)	0% (n)
R42	+1% (n)	0% (n)	0% (n)
R43	+1% (n)	0% (n)	0% (n)
R44	+1% (n)	0% (n)	0% (n)
R45	+2% (n)	+1% (n)	+1% (n)
R46	+2% (n)	+1% (n)	+1% (n)
R47	+1% (n)	0% (n)	0% (n)
R48	+1% (n)	0% (n)	0% (n)
R49	+1% (n)	0% (n)	0% (n)
R50	+1% (n)	0% (n)	0% (n)
R51	+1% (n)	0% (n)	0% (n)
R52	+1% (n)	0% (n)	0% (n)
R53	+1% (n)	0% (n)	0% (n)
R54	+1% (n)	0% (n)	0% (n)
R55	+1% (n)	0% (n)	0% (n)
R56	+1% (n)	0% (n)	0% (n)
R57	0% (n)	0% (n)	0% (n)
R58	0% (n)	0% (n)	0% (n)
R59	0% (n)	0% (n)	0% (n)

Note 1: Magnitude of change from mainland Wales road traffic emission assessment in appendix C4-2 (Application Reference Number: 6.3.28) reports percentage change to whole numbers.

Note 2: Descriptors of effects at individual receptors in parentheses as per table B5-14 in chapter B5 (Application Reference Number: 6.2.5): ‘n’ is negligible, ‘s’ is small, ‘m’ is medium and ‘l’ is large.

Note 3: Any changes of 0% (i.e. less than 0.5%) are described as negligible.

Effects on ecological receptors

2023 Wylfa Newydd Project with bypasses – Isle of Anglesey study area

4.5.71 The predicted increases in NOx concentrations for the 2023 Wylfa Newydd Project with bypasses scenario are presented in table C4-22. Predicted changes to deposition rates of nitrogen and acid are reported in tables C4-23 and C4-24, respectively.

4.5.72 Similar to the 2020 Wylfa Newydd Project with bypasses scenario, two ecological sites with a national designation were considered further due to the magnitude of the predicted change in NOx concentrations from baseline conditions. At all other SSSI and SAC designated sites on Anglesey, the impact of emissions from road traffic is so small that the effects would be negligible from both NOx concentrations and nitrogen/acid deposition.

4.5.73 Malltraeth Marsh/Cors Ddyga SSSI is predicted to be exposed to annual mean NOx concentrations at parts of the designated site within 20m of the boundary closest to the A55 that would be increased relative to baseline conditions by more than 1% of the critical level and where the PEC is above 70% of the critical level. On this basis, further consideration of the predicted changes in annual mean NOx concentrations by ecologists is required, and is presented below.

4.5.74 The nitrogen and acid deposition rates are predicted to change by 1% or less of the critical load values. On this basis, the Wylfa Newydd Project traffic would not lead to a significant effect and further consideration of nitrogen and acid deposition by ecologists is not required.

4.5.75 The predicted baseline NO_X concentration of 30.2µg/m^3 already exceeds the critical level of 30µg/m^3, and the modelled annual mean NO_X concentration in 2023 predicts a rise in concentrations from 30.2µg/m^3 to 31.3µg/m^3, an increase of +3% on the baseline concentration. The total concentration at 10m further from the A55 into the SSSI is less than 30µg/m^3 indicating that the critical level is only exceeded at the very closest part of the SSSI to the A55.

4.5.76 The increases are predicted to be above 1% of the critical level and the PEC above 70% of the critical level at a distance of up to 20m from the A55 into the SSSI after which the NO_X concentration falls below this threshold. The area affected by the air quality change requiring further consideration covers approximately 3.5ha, less than 1% of the total area of the SSSI.

4.5.77 As discussed for the 2020 scenario, given the predicted increases in NO_X concentrations, and taking into consideration the area of the SSSI potentially affected by these increases, it is considered that there may be a very minor detrimental alteration to the botanical diversity of the SSSI. This negligible magnitude of change is predicted to result in a negligible effect on the SSSI.

4.5.78 Beddmanarch-Cymyran SSSI is predicted to be exposed to annual mean NOx concentrations at parts of the designated site within 20m of the boundary closest to the A55 that would be increased relative to baseline conditions by greater than +1% of the critical level and where the PEC is above 70% of the critical level. On this basis, further consideration of the predicted changes in

annual mean NOx concentrations by ecologists is required, and is presented below.

4.5.79 At the Beddmanarch-Cymyran SSSI at the A55, the predicted baseline NO_X concentration of 29.2µg/m^3 is below the critical level of 30µg/m^3. The modelled annual mean NO_X concentration in 2023 predicts a rise in concentrations from 29.2µg/m^3 to 30.3µg/m^3, an increase of +3% on the baseline concentration. The total concentration at 10m further from the A55 into the SSSI is less than 30µg/m^3 indicating that the critical level is only exceeded at the very closest part of the SSSI to the A55.

4.5.80 The increases are predicted to be above 1% of the critical level and the PEC above 70% of the critical level at a distance of up to 20m from the A55 into the SSSI after which the NO_X concentration falls below this threshold. The area affected by the air quality change requiring further consideration covers approximately 4.0ha, approximately 0.4% of the total area of the SSSI.

4.5.81 As discussed for the 2020 scenario, given the slight percentage increases in NOx concentration across a relatively small area of the SSSI, the limited botanical interest in this area and the dynamic environment created through tidal inundation, it is considered that at worst there may be a very minor detrimental alteration to the botanical diversity of the SSSI. This negligible magnitude of change is predicted to result in a negligible effect on the SSSI.

4.5.82 As for the 2020 Wylfa Newydd Project with bypasses scenario, the NOx concentrations (and nitrogen and acid deposition) at the section of the Beddmanarch-Cymyran SSSI close to the A5025 at Llanfachraeth, are predicted to decrease as a result of the realignment of the A5025.

4.5.83 The predicted changes in annual mean NOx concentrations, nitrogen deposition and acid deposition rates at all Wildlife Sites and Ancient Woodlands on the Isle of Anglesey are less than 100% of the long-term NOx environmental standard (the critical level of 30µg/m^3) and the respective nitrogen and acid deposition critical loads for the 2023 peak construction scenario.

4.5.84 The effects associated with changes in NOx concentrations of the magnitudes discussed above is concluded to be not significant. The predicted increases in nitrogen and acid deposition were also identified to be not significant.

Table C4-22 Predicted maximum annual mean NOx concentrations at ecological receptors – 2023 Wylfa Newydd Project with bypasses

Receptor	Critical level (µg/m^3)	2023 Baseline (µg/m^3)	2023 Wylfa Newydd Project with bypasses (µg/m^3)	Change as % of critical level	Further consideration required?
Beddmanarch-Cymyran SSSI – A5025	30	7.7	7.0	-3%	No
Beddmanarch-Cymyran SSSI – A55	30	29.2	30.3	+3%	Yes
Llyn Dinam SAC/Llynnau Y Fali SSSI	30	6.6	6.7	0%	No
Llyn Traffwll SSSI	30	6.6	6.7	0%	No
Malltraeth Marsh/Cors Ddyga SSSI	30	30.2	31.3	+3%	Yes
Afon Wygyr Wildlife Site	30	10.0	10.7	+2%	No
Cae Barcdy Wildlife Site	30	9.4	9.6	+1%	No
Coed Braint Siglen Dyfnia Wildlife Site	30	10.0	10.3	+1%	No
Cors Hendre Fawr Wildlife Site	30	36.8	40.0	+11%	No
Cors Plas Wildlife Site	30	6.3	6.4	0%	No
Cors Tafarn-y-Grib Wildlife Site	30	8.5	8.9	+1%	No
Cors Tregarnedd Fawr Wildlife Site	30	57.6	61.3	+12%	No
Gwely Cyrs Caergeiliog Wildlife Site	30	23.9	25.0	+4%	No
Rhostir a Pwll Caergeiliog Wildlife Site	30	7.3	7.4	+0%	No
Ancient Woodland (26051)	30	12.2	12.8	+2%	No
Ancient Woodland (25883)	30	37.3	39.5	+7%	No
Ancient Woodland (25882)	30	35.5	37.6	+7%	No
Ancient Woodland (26076)	30	6.3	6.4	0%	No

Receptor	Critical level (µg/m^3)	2023 Baseline (µg/m^3)	2023 Wylfa Newydd Project with bypasses (µg/m^3)	Change as % of critical level	Further consideration required?
Ancient Woodland (26066)	30	26.6	27.6	+3%	No
Ancient Woodland (43665)	30	14.6	14.9	+1%	No
Ancient Woodland (26037)	30	14.8	14.9	+0%	No
Ancient Woodland (26067)	30	10.6	10.7	+0%	No
Ancient Woodland (25084)	30	17.5	18.1	+2%	No
Ancient Woodland (25083)	30	34.2	35.4	+4%	No
Ancient Woodland (25087)	30	56.8	58.7	+7%	No
Ancient Woodland (43393)	30	53.1	55.0	+6%	No
Ancient Woodland (24252)	30	33.8	34.9	+4%	No

Table C4-23 Predicted maximum nitrogen deposition at ecological receptors – 2023 Wylfa Newydd Project with bypasses

Receptor	Vegetation type	Nitrogen deposition rate (kgN/ha/year)				Change as a percentage of CL	Total deposition rate as a percentage of CL	Further consideration required?
		Critical load (CL)	Existing deposition rate	Change due to 2023 Wylfa Newydd Project with bypasses	Total deposition rate			
Beddmanarch-Cymyran SSSI – A5025	Short	10	13.2	-0.1	13.1	-1%	131%	No
Beddmanarch-Cymyran SSSI – A55	Short	10	9.2	+0.1	9.3	+1%	93%	No
Llyn Dinam SAC/Llynnau Y Fali SSSI	Short	10	12.2	0.0	12.2	0%	122%	No
Llyn Traffwll SSSI	Short	10	12.2	0.0	12.2	0%	122%	No
Malltraeth Marsh/Cors Ddyga SSSI	Short	15	14.4	+0.1	14.5	+1%	97%	No
Afon Wygyr Wildlife Site	Short	10	13.0	+0.1	13.1	+1%	131%	No
	Tall	10	20.4	+0.1	20.6	+2%	206%	No
Cae Barcdy Wildlife Site	Short	10	9.2	0.0	9.3	0%	93%	No
	Tall	10	15.0	0.0	15.0	0%	150%	No
Coed Braint Siglen Dyfnia Wildlife Site	Short	10	19.7	0.0	19.8	0%	198%	No
	Tall	10	31.8	0.0	31.8	+1%	318%	No

Receptor	Vegetation type	Nitrogen deposition rate (kgN/ha/year)				Change as a percentage of CL	Total deposition rate as a percentage of CL	Further consideration required?
		Critical load (CL)	Existing deposition rate	Change due to 2023 Wylfa Newydd Project with bypasses	Total deposition rate			
Cors Hendre Fawr Wildlife Site	Short	10	15.1	+0.3	15.4	+4%	154%	No
	Tall	10	24.1	+0.6	24.7	+8%	247%	No
Cors Plas Wildlife Site	Short	10	12.2	0.0	12.2	0%	122%	No
	Tall	10	19.6	0.0	19.6	0%	196%	No
Cors Tafarn-y-Grib Wildlife Site	Short	10	15.0	0.0	15.0	0%	150%	No
	Tall	10	24.4	+0.1	24.4	+1%	244%	No
Cors Tregarnedd Fawr Wildlife Site	Short	10	14.4	+0.4	14.8	+4%	148%	No
	Tall	10	23.2	+0.7	24.0	+9%	240%	No
Gwely Cyrs Caergeiliog Wildlife Site	Short	10	12.2	+0.1	12.3	+1%	123%	No
	Tall	10	19.6	+0.2	19.8	+3%	198%	No
Rhostir a Pwll Caergeiliog Wildlife Site	Short	10	12.2	0.0	12.2	0%	122%	No
	Tall	10	19.6	0.0	19.6	0%	196%	No
Ancient Woodland (26051)	Tall	5	16.0	+0.1	16.1	+3%	322%	No
Ancient Woodland (25883)	Tall	5	23.2	+0.4	23.7	+11%	474%	No
Ancient Woodland (25882)	Tall	5	23.2	+0.4	23.7	+10%	473%	No

Receptor	Vegetation type	Nitrogen deposition rate (kgN/ha/year)				Change as a percentage of CL	Total deposition rate as a percentage of CL	Further consideration required?
		Critical load (CL)	Existing deposition rate	Change due to 2023 Wylfa Newydd Project with bypasses	Total deposition rate			
Ancient Woodland (26076)	Tall	5	20.4	0.0	20.5	+1%	409%	No
Ancient Woodland (26066)	Tall	5	13.3	+0.2	13.5	+4%	270%	No
Ancient Woodland (43665)	Tall	5	13.3	+0.1	13.4	+2%	267%	No
Ancient Woodland (26037)	Tall	5	13.3	0.0	13.3	+1%	267%	No
Ancient Woodland (26067)	Tall	5	13.3	0.0	13.3	+1%	267%	No
Ancient Woodland (25084)	Tall	5	31.8	+0.1	31.9	+3%	638%	No
Ancient Woodland (25083)	Tall	5	31.8	+0.2	32.0	+7%	640%	No
Ancient Woodland (25087)	Tall	5	31.8	+0.4	32.2	+12%	644%	No
Ancient Woodland (43393)	Tall	5	31.8	+0.4	32.2	+11%	643%	No
Ancient Woodland (24252)	Tall	5	31.8	+0.2	32.0	+6%	640%	No

Table C4-24 Predicted maximum acid deposition at ecological receptors – 2023 Wylfa Newydd Project with bypasses

Receptor	Vegetation type	Acid deposition rate (keq/ha/year)				Change as a % of CL	Total deposition rate as a % of CL	Further consideration required?
		Critical load (CLmaxN)	Existing deposition rate (N+S)	Change due to 2023 Wylfa Newydd Project with bypasses	Total deposition rate			
Beddmanarch-Cymyran SSSI – A5025	Short	2.25	1.080	-0.006	1.07	0%	48%	No
Beddmanarch-Cymyran SSSI – A55	Short	2.25	0.800	0.007	0.81	0%	36%	No
Llyn Dinam SAC/Llynnau Y Fali SSSI	Short	0.50	1.020	0.001	1.02	0%	204%	No
Llyn Traffwll SSSI	Short	4.26	1.020	0.001	1.02	0%	24%	No
Malltraeth Marsh/Cors Ddyga SSSI	Short	1.24	1.210	0.008	1.22	+1%	98%	No
Afon Wygyr Wildlife Site	Short	1.99	1.100	0.005	1.11	0%	56%	No
	Tall	2.77	1.660	0.010	1.67	0%	60%	No
Cae Barcdy Wildlife Site	Short	1.98	0.800	0.001	0.80	0%	40%	No
	Tall	2.71	1.240	0.003	1.24	0%	46%	No
	Short	0.59	1.590	0.002	1.59	0%	270%	No

Receptor	Vegetation type	Acid deposition rate (keq/ha/year)				Change as a % of CL	Total deposition rate as a % of CL	Further consideration required?
		Critical load (CLmaxN)	Existing deposition rate (N+S)	Change due to 2023 Wylfa Newydd Project with bypasses	Total deposition rate			
Coed Braint Siglen Dyfnia Wildlife Site	Tall	1.64	2.480	0.003	2.48	0%	151%	No
Cors Hendre Fawr Wildlife Site	Short	1.99	1.240	0.023	1.26	+1%	63%	No
	Tall	2.78	1.920	0.046	1.97	+2%	71%	No
Cors Plas Wildlife Site	Short	0.51	1.020	0.001	1.02	0%	200%	No
	Tall	2.73	1.580	0.002	1.58	0%	58%	No
Cors Tafarn-y-Grib Wildlife Site	Short	0.53	1.220	0.002	1.22	+1%	231%	No
	Tall	1.54	1.930	0.005	1.93	0%	126%	No
Cors Tregarnedd Fawr Wildlife Site	Short	0.56	1.210	0.027	1.24	+6%	221%	No
	Tall	2.82	1.870	0.053	1.92	+2%	68%	No
Gwely Cyrs Caergeiliog Wildlife Site	Short	0.50	1.020	0.008	1.03	+2%	206%	No
	Tall	2.72	1.580	0.015	1.60	+1%	59%	No
Rhostir a Pwll Caergeiliog Wildlife Site	Short	0.50	1.020	0.001	1.02	0%	204%	No
	Tall	2.72	1.580	0.002	1.58	0%	58%	No

Receptor	Vegetation type	Acid deposition rate (keq/ha/year)				Change as a % of CL	Total deposition rate as a % of CL	Further consideration required?
		Critical load (CLmaxN)	Existing deposition rate (N+S)	Change due to 2023 Wylfa Newydd Project with bypasses	Total deposition rate			
Ancient Woodland (26051)	Tall	2.74	1.320	0.009	1.33	0%	49%	No
Ancient Woodland (25883)	Tall	1.60	1.870	0.032	1.90	+2%	119%	No
Ancient Woodland (25882)	Tall	1.60	1.870	0.030	1.90	+2%	119%	No
Ancient Woodland (26076)	Tall	2.77	1.660	0.002	1.66	0%	60%	No
Ancient Woodland (26066)	Tall	1.79	1.110	0.013	1.12	+1%	63%	No
Ancient Woodland (43665)	Tall	1.79	1.110	0.005	1.11	0%	62%	No
Ancient Woodland (26037)	Tall	1.79	1.110	0.002	1.11	0%	62%	No

Receptor	Vegetation type	Acid deposition rate (keq/ha/year)				Change as a % of CL	Total deposition rate as a % of CL	Further consideration required?
		Critical load (CLmaxN)	Existing deposition rate (N+S)	Change due to 2023 Wylfa Newydd Project with bypasses	Total deposition rate			
Ancient Woodland (26067)	Tall	1.79	1.110	0.002	1.11	0%	62%	No
Ancient Woodland (25084)	Tall	1.65	2.480	0.010	2.49	+1%	151%	No
Ancient Woodland (25083)	Tall	1.64	2.480	0.016	2.50	+2%	152%	No
Ancient Woodland (25087)	Tall	1.64	2.480	0.029	2.51	+3%	153%	No
Ancient Woodland (43393)	Tall	1.64	2.480	0.027	2.51	+2%	153%	No
Ancient Woodland (24252)	Tall	1.64	2.480	0.016	2.50	+1%	152%	No

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2023 Wylfa Newydd Project with bypasses – mainland Wales study area

4.5.85 The predicted increase in NOx concentrations during the peak construction scenario (2023) are presented in table C4-25.

Table C4-25 Predicted maximum change in annual mean NOx concentrations at ecological receptors – 2023 Wylfa Newydd Project with bypasses

Receptor	Increase in NOx concentration (µg/m^3)	Change relative to critical level	Further consideration required?
Coedydd Afon Menai SSSI	1.06	+4%	Yes
Coedydd Aber SAC/SSSI	0.40	+1%	No
Sychnant Pass SSSI	0.16	+1%	No
Llanddulas Limestone and Gwrych Castle Wood SSSI	0.07	0%	No
Traeth Pensarn SSSI	0.13	0%	No
Halkyn Mountain/Mynydd Helygain SAC & Halkyn Common and Holywell Grasslands SSSI	0.44	+1%	No

4.5.86 The maximum predicted increase in annual mean NOx concentrations was 1.1µg/m^3 at Coedydd Afon Menai SSSI, which equates to 4% of the critical level of 30µg/m^3. NOx is not measured by GC or any of the other local authorities in Wales, and due to the complexity of the site's location in relation to the road source (i.e. below the Britannia Bridge), it is difficult to determine the existing NOx concentrations. Due to its location between 30m and 40m below the Britannia Bridge and relatively rural location adjacent to the Afon Menai, it is likely that ambient concentrations would be well below the critical level of 30µg/m^3 at ground level within the Coedydd Afon Menai SSSI. The 2013 Defra background map concentration for the 1km by 1km grid square representative of the site location is 11.7µg/m^3.

4.5.87 Although it is unlikely to directly represent the NOx concentrations at the closest part of the Coedydd Afon Menai SSSI to the A55, it indicates that, generally, the concentrations across the site are likely to be considerably lower than the critical level of 30µg/m^3. The conservative approach to the assessment should also be taken into account when considering the potential for a significant effect to occur. The assessment used the highest adjustment factor from any of the verification points rather than the average ratio and a distance of 15m was used for the dispersion calculation to potentially represent the very closest part of the tree canopy.

4.5.88 Further modelling was undertaken to estimate the PEC. The Wylfa Newydd Project traffic flows including the baseline traffic flows were obtained from the

Strategic Traffic Model (see chapter C2, Application Reference Number: 6.3.2) and the predicted contributions based were added to the 2013 sector removed Defra background map concentrations. A PEC of 35.6µg/m^3 was predicted, which, in line with the Environment Agency criteria, was indicative of the potential for significant effects and the requirement for an ecologist to examine the site in more detail. However, the modelling was based on the highest verification adjustment factor (1.4) and nearest potential canopy distance of 15m, both of which are considered to be conservative. Applying an average verification adjustment factor of the five sites considered during verification (a factor of 0.66, see appendix 1-1 of appendix C4-2 (Application Reference Number: 6.3.28), which follows the approach set out in the LAQM TG16 [RD4] guidance. The predicted PEC for annual mean NOx was considerably lower (21.3µg/m^3) at a distance of 15m from the edge of the A55. At 20m from the A55, the predicted annual mean NOx PEC was 18.9µg/m^3.

4.5.89 On the above basis, it is considered that the predicted increase in annual mean NOx concentrations due to the Wylfa Newydd Project during the peak construction period would be solely due to road traffic emissions and would not lead to a significant effect on air quality at the Coedydd Afon Menai SSSI.

4.5.90 The predicted increase in annual mean NOx concentrations was 1% of the critical level at Coedydd Aber SAC/SSSI, Sychnant Pass SSSI and Halkyn Mountain/Mynydd Helygain SAC & Halkyn Common and Holywell Grasslands SSSI and less than 1% for all other site locations. On this basis, it is unlikely that the Wylfa Newydd Project traffic would lead to a significant effect at any of these sites.

4.5.91 The predicted increases in nitrogen deposition rates at the ecological sites is presented in table C4-26.

Table C4-26 Predicted maximum change in nitrogen deposition at ecological receptors – 2023 Wylfa Newydd Project with bypasses

Receptor	Vegetation type	Nitrogen deposition rate (kgN/ha/year)		Contribution as a percentage of CL	Further consider-ation required ?
		Contribution due to Wylfa Newydd Project	Critical load (CL)		
Coedydd Afon Menai SSSI	Tall	0.17	10	+2%	No
Coedydd Aber SAC/SSSI	Tall	0.06	10	+1%	No
Sychnant Pass SSSI	Short	0.01	10	0%	No
Llanddulas Limestone and Gwrych Castle Wood SSSI	Tall	0.01	15	0%	No
Traeth Pensarn SSSI	Short	0.01	Not sensitive		
Halkyn Mountain/Mynydd Helygain SAC & Halkyn Common and Holywell Grasslands SSSI	Short	0.03	10	0%	No

4.5.92 The results in table C4-26 show the predicted contributions to nutrient nitrogen deposition are equal to or less than 1% of the relevant critical loads at all sites except Coedydd Afon Menai SSSI and further consideration is not required.

4.5.93 As the predicted increase in deposition was above 1%, further consideration of Coedydd Afon Menai SSSI was undertaken and is presented in appendix C4-2 (Application Reference Number: 6.3.28). The existing deposition rate is 31.8kgN/ha/yr, which exceeds the critical load of 10kgN/ha/yr. The predicted increase in nitrogen deposition equates to 0.5% of the existing nitrogen deposition rate. As discussed in paragraph 4.5.88, the conservative approach to the assessment means that the predicted nitrogen deposition is likely to be an overestimate. Using the average bias adjustment factor in accordance with the LAQM TG16 guidance [RD4] results in a predicted increase of 0.8% of the critical load value.

4.5.94 The additional nitrogen deposition is considered to be unlikely to cause a significant effect on the current condition status of the SSSI, nor would it be detrimental to the maintenance of the site's conservation status.

4.5.95 The predicted increase in acid deposition rates at the ecological sites is presented in table C4-27. The results show the predicted contributions to acid deposition are 1% or less of the relevant critical loads and the predicted effects at each site do not require further consideration, representing a not significant effect.

Table C4-27 Predicted maximum change in acid deposition at ecological receptors – 2023 Wylfa Newydd Project with bypasses

Receptor	Vegetation type	Acid deposition rate (keq/ha/year)		Contribution as a percentage of CL	Further consideration required?
		Contribution due to Wylfa Newydd Project	Critical load (CLmaxN)		
Coedydd Afon Menai SSSI	Tall	0.012	2.82	0%	No
Coedydd Aber SAC/SSSI	Tall	0.005	2.13	0%	No
Sychnant Pass SSSI	Short	0.001	0.64	0%	No
Llanddulas Limestone and Gwrych Castle Wood SSSI	Tall	0.001	2.91	0%	No
Traeth Pensarn SSSI	Short	0.001	2.04	0%	No
Halkyn Mountain/Mynydd Helygain SAC & Halkyn Common and Holywell Grasslands SSSI	Short	0.002	1.01	0%	No

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Peak operation

4.5.96 This section assesses road traffic emissions during the peak operation year.

Effects on human receptors

2033 Wylfa Newydd Project with bypasses

4.5.97 The predicted concentrations of NO_2, PM_{10} and $PM_{2.5}$ for the future assessment year baseline and for the Wylfa Newydd Project with bypasses scenarios are reported in table C4-28. The magnitude of the change in annual mean concentrations is reported as a percentage of the respective AQO values.

4.5.98 Figure C4-6 (Application Reference Number: 6.3.32) illustrates the spatial pattern of annual mean NO_2 concentration changes across the whole affected road network on the Isle of Anglesey. The receptors are coloured using the same colour scheme as described for figure C4-3 (Application Reference Number: 6.3.32) in paragraph 4.5.7.

4.5.99 To the north of the site access, additional road traffic using the A5025 at Cemaes (R2 to R4) is predicted to increase annual mean NO_2 concentrations by the equivalent of between 1% and 3% of the AQO value and at Tregele (R5 to R7) by the equivalent of between 1% and 2% of the AQO value. Figure C4-6 (Application Reference Number: 6.3.32) illustrates how, within Cemaes and Tregele, the magnitude of the change decreases to less than 1% of the AQO values rapidly with increasing distance from the A5025. The additional road traffic on the A5025 between Cemaes and Amlwch (R1) would have a negligible adverse effect on local air quality.

4.5.100 The closest receptors to the A5025 to the south of the site access to the Wylfa Newydd Development Area (R9) are predicted to experience an increase in annual mean NO_2 concentrations equivalent to 4% (1.8µg/m^3) of the AQO value or less, with total annual mean NO_2 concentrations remaining at levels that are approximately one-quarter of the AQO set for the protection of human health. The 4% increase in concentrations relative to the AQO represents a negligible adverse effect on air quality at these receptors.

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Table C4-28 Predicted annual mean concentrations at key human receptors – 2033 Wylfa Newydd Project with bypasses

Receptor	2033 Baseline			2033 Wylfa Newydd Project with bypasses			Magnitude of change as percentage of AQO value		
	NO_2 (µg/m^3)	PM_{10} (µg/m^3)	$PM_{2.5}$ (µg/m^3)	NO_2 (µg/m^3)	PM_{10} (µg/m^3)	$PM_{2.5}$ (µg/m^3)	NO_2 (AQO = 40µg/m^3)	PM_{10} (AQO = 40µg/m^3)	$PM_{2.5}$ (AQO = 25µg/m^3)
R1	5.2	15.0	7.9	5.4	15.1	7.9	0% (n)	0% (n)	0% (n)
R2	6.5	15.2	8.0	6.8	15.3	8.0	+1% (n)	0% (n)	0% (n)
R3	7.7	15.4	8.1	8.3	15.5	8.1	+2% (n)	0% (n)	0% (n)
R4	9.8	15.7	8.3	10.8	15.9	8.4	+3% (n)	0% (n)	0% (n)
R5	7.1	15.3	8.0	7.6	15.4	8.1	+1% (n)	0% (n)	0% (n)
R6	7.6	15.4	8.1	8.4	15.6	8.2	+2% (n)	0% (n)	0% (n)
R7	5.7	15.1	7.9	6.1	15.2	8.0	+1% (n)	0% (n)	0% (n)
R8	4.9	15.0	7.9	5.3	15.1	7.9	+1% (n)	0% (n)	0% (n)
R9	7.6	15.4	8.1	9.4	15.6	8.2	+4% (n)	+1% (n)	+1% (n)
R10	5.7	15.1	7.9	5.0	15.0	7.9	-2% (n)	0% (n)	0% (n)
R11	4.3	15.0	7.8	4.6	15.0	7.9	+1% (n)	0% (n)	0% (n)
R12	5.7	15.1	7.9	5.3	15.1	7.9	-1% (n)	0% (n)	0% (n)
R13	8.1	15.4	8.1	9.7	15.7	8.2	+4% (n)	+1% (n)	0% (n)
R14	8.2	15.5	8.1	9.8	15.7	8.2	+4% (n)	+1% (n)	+1% (n)
R15	6.6	15.3	7.3	7.6	15.5	7.4	+3% (n)	0% (n)	0% (n)
R16	7.2	15.4	7.3	8.4	15.6	7.4	+3% (n)	0% (n)	0% (n)
R17	6.1	15.2	7.6	4.7	15.0	7.5	-3% (n)	-1% (n)	0% (n)

Receptor	2033 Baseline			2033 Wylfa Newydd Project with bypasses			Magnitude of change as percentage of AQO value		
	NO_2 ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	NO_2 (AQO = 40$\mu g/m^3$)	PM_{10} (AQO = 40$\mu g/m^3$)	$PM_{2.5}$ (AQO = 25$\mu g/m^3$)
R18	8.1	15.4	7.7	5.0	15.1	7.5	-8% (s)	-1% (n)	-1% (n)
R19	7.0	15.3	7.6	7.0	15.3	7.7	0% (n)	0% (n)	0% (n)
R20	11.6	15.9	7.4	14.1	16.3	7.6	+6% (s)	+1% (n)	+1% (n)
R21	7.5	15.4	7.2	8.1	15.5	7.3	+1% (n)	0% (n)	0% (n)
R22	10.0	15.8	7.9	5.8	15.2	7.6	-10% (s)	-2% (n)	-1% (n)
R23	4.5	15.0	7.5	5.5	15.1	7.6	+2% (n)	0% (n)	0% (n)
R24	8.3	15.5	7.4	9.3	15.7	7.5	+3% (n)	0% (n)	0% (n)
R25	12.5	16.0	7.6	14.2	16.3	7.7	+4% (n)	+1% (n)	+1% (n)
R26	11.3	15.9	8.3	11.3	15.9	8.3	+0% (n)	0% (n)	0% (n)
R27	11.4	15.9	7.7	11.5	15.9	7.7	0% (n)	0% (n)	0% (n)
R28	17.8	16.8	8.3	18.3	16.8	8.3	+1% (n)	0% (n)	0% (n)
R29	13.8	16.2	7.8	14.3	16.2	7.8	+1% (n)	0% (n)	0% (n)
R30	7.7	15.4	7.2	7.9	15.4	7.3	0% (n/a)	0% (n/a)	0% (n/a)
R31	4.9	15.0	7.0	4.9	15.0	7.0	0% (n)	0% (n)	0% (n)
R32	9.6	15.6	8.0	9.8	15.6	8.0	+1% (n)	0% (n)	0% (n)
R33	13.0	16.0	8.1	13.2	16.1	8.1	+1% (n)	0% (n)	0% (n)
R34	8.1	15.4	8.2	8.2	15.4	8.2	0% (n)	0% (n)	0% (n)
R35	12.9	16.1	8.3	13.1	16.1	8.3	+1% (n)	0% (n)	0% (n)

Receptor	2033 Baseline			2033 Wylfa Newydd Project with bypasses			Magnitude of change as percentage of AQO value		
	NO_2 ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	NO_2 (AQO = 40$\mu g/m^3$)	PM_{10} (AQO = 40$\mu g/m^3$)	$PM_{2.5}$ (AQO = 25$\mu g/m^3$)
R36	34.7	19.5	10.0	35.5	19.6	10.0	+2% (n/a)	0% (n/a)	0% (n/a)
R37	15.4	16.4	8.4	15.7	16.4	8.4	+1% (n)	0% (n)	0% (n)
R38	14.2	16.2	8.6	14.4	16.2	8.6	+1% (n)	0% (n)	0% (n)
R39	14.2	16.5	8.7	14.3	16.6	8.7	0% (n)	0% (n)	0% (n)

Note 1: Impact magnitude rounded to whole numbers and reported as a percentage of the respective AQO value.

Note 2: Effect descriptors at individual receptors in parentheses as per table B5-14 of chapter B5 (Application Reference Number: 6.2.5): ‘n’ is negligible, ‘s’ is small, ‘m’ is medium and ‘l’ is large. ‘n/a’ is ‘not applicable’ and used for short-term exposure receptors.

Note 3: Any changes of 0% (i.e. less than 0.5%) are described as negligible (‘n’).

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4.5.101 The emissions from road traffic using the A5025 at Cefn Coch are predicted to result in a change in NO_2 concentrations equivalent to an increase of 1% or less of the AQO value at those properties to the east of the new alignment of the A5025 (R11) and an improvement of up to 2% of the AQO value at properties to the west of the new alignment (R10 and R12). Given the good standard of predicted future baseline air quality, changes of ±5% or less of the AQO values are considered to have a negligible adverse or beneficial effect at these receptor locations.

4.5.102 At Llanfaethlu, at the receptor locations most affected by the improvements to the A5025 and Wylfa Newydd Project road traffic, the annual mean NO_2 concentration is predicted to increase by a value equivalent to 3% of the AQO value (1.2µg/m^3) or less (R16) or to improve by a value equivalent to 8% of the AQO value (-3.1µg/m^3) (R18), representing a negligible adverse and small beneficial effect on local air quality, respectively, given the low baseline concentrations. As shown on figure C4-6 (Application Reference Number: 6.3.32), for the majority of Llanfaethlu represented by receptor R17, the effect on air quality would be negligible beneficial. In the 2023 assessment year, Llanfaethlu Primary School is predicted to experience small beneficial effects at the closest parts of the school boundary to the A5025 and negligible beneficial effects at 10m or more within the school boundary, away from the A5025.

4.5.103 At Llanfachraeth, the annual mean NO_2 concentrations at the facades of properties facing onto the current alignment of the A5025 through Llanfachraeth (R22) are predicted to decrease from future baseline conditions by the equivalent of 10% of the AQO value (-4.1µg/m^3). This represents a small beneficial effect. For those individual properties located closest to the new alignment at Llanfachraeth (R23), the annual mean NO_2 concentrations are predicted to increase from future baseline conditions by the equivalent of 2% of the AQO value or less (0.9µg/m^3). This is a negligible adverse effect. Annual mean concentrations of NO_2 would remain at less than one-third of the AQO value at any receptors at Llanfachraeth (i.e. R21 to R24). Figure C4-6 (Application Reference Number: 6.3.32) shows that the majority of the receptors at Llanfachraeth are predicted to experience beneficial effects due to the Wylfa Newydd Project with the bypasses in place.

4.5.104 At other key receptor locations on the A5025 route which are not close to the A5025 alignment changes where the highest increases were predicted (represented by R13, R14, R15, R20, R24 and R25), the maximum increase in NO_2 concentrations is equivalent to 6% of the AQO value (2.5µg/m^3). These changes are considered to represent a maximum of a small adverse effect at a small number of receptors close to the A5025, with negligible adverse effects at all other locations.

4.5.105 At receptor locations on the A55 route between Junction 2 of the A55 and the Britannia Bridge to the east of Llanfair Pwllgwyngyll (R26 to R39), the predicted increase in annual mean NO_2 concentrations at all receptors near the A55 representative of long-term exposure would be equivalent to 1% of the AQO value or less. Given the good standard of air quality predicted for the future baseline scenario in 2033, these changes are considered to represent a negligible adverse effect at all receptors.

4.5.106 The predicted total annual mean concentrations at R20 (representing the closest gardens to the A5025), R30 (leisure use close to the Park and Ride) and R36 (the A55 layby) are considerably lower than the empirically derived value of 60µg/m^3 that is a representative threshold for consideration of potential risk of exceedance of the hourly AQO [RD4] for short-term exposure locations such as gardens, leisure facilities and laybys within the study area. The highest concentration of 35.5µg/m^3 was predicted at the A55 layby (R36). This is considered to be a not significant effect.

4.5.107 The impact on annual mean concentrations of PM_{10} and $PM_{2.5}$ is equivalent to a change of ±2% or less of the AQO value at all receptors. These changes are considered to represent a negligible beneficial or adverse effect at all receptors within the Isle of Anglesey study area. The total PM_{10} concentrations are well within the concentration of 31.8µg/m^3 at all receptors indicating that the 24-hour mean AQO is complied with.

4.5.108 Overall, there would not be a significant adverse effect on local air quality at human receptors on the Isle of Anglesey for the peak operation scenario.

Effects on ecological receptors

2033 Wylfa Newydd Project with bypasses

4.5.109 The predicted increases in NOx concentrations for the 2033 peak operation scenario are presented in table C4-29. Predicted changes to deposition rates of nitrogen and acid are reported in table C4-30 and table C4-31, respectively.

4.5.110 Similar to the 2020 and 2023 Wylfa Newydd Project with bypasses scenarios, two ecological sites with a national designation were considered further due to the magnitude of the predicted change in NOx concentrations. At all other SSSI and SAC designated sites on Anglesey, the impact of emissions from road traffic would be so small that the effects would be negligible from both NOx concentrations and nitrogen/acid deposition.

4.5.111 Malltraeth Marsh/Cors Ddyga SSSI is predicted to be exposed to annual mean NOx concentrations at parts of the designated site that are within 10m of the boundary closest to the A55 that would be increased relative to baseline conditions by an amount equivalent to more than 1% of the critical level and where the PEC is above 70% of the critical level. On this basis, further consideration of the predicted changes in annual mean NOx concentrations by ecologists is required, and is presented below. The nitrogen and acid deposition rates are predicted to change by less than 1% of the critical load values. As such, the Wylfa Newydd Project traffic would not lead to a significant effect and further consideration of nitrogen and acid deposition by ecologists is not required.

4.5.112 The modelled increases in NO_X concentrations rise from a baseline of 30.9µg/m^3 to 31.5µg/m^3, an increase of 1.8% on the baseline concentration. The total concentration at 10m further from the A55 into the SSSI is less than 30µg/m^3 indicating that the critical level is only exceeded at the very closest part of the SSSI to the A55.

4.5.113 The predicted increase is above 1% of the critical level and the PEC above 70% of the critical level up to 10m from the boundary of the SSSI along its

1.75km length; an area of 1.8ha. It is therefore considered that, at worst, there may be a very minor detrimental alteration to the botanical diversity of the SSSI, and this negligible magnitude of change would result in a negligible effect on the SSSI.

4.5.114 Beddmanarch-Cymyran SSSI is predicted to be exposed to annual mean NOx concentrations at parts of the designated site that are within 10m of the boundary with the A55 that would be increased relative to baseline conditions by an amount equivalent to greater than 1% of the critical level and where the PEC is above 70% of the critical level. On this basis, further consideration of the predicted changes in annual mean NOx concentrations by ecologists is required, and is presented below.

4.5.115 At the Beddmanarch-Cymyran SSSI at the A55, the modelled increases in NO_X concentrations rise from a predicted baseline of 35.5µg/m^3 to 36.0µg/m^3, an increase of 1.6% on the baseline concentration. The total concentration at 10m further from the A55 into the SSSI is less than 30µg/m^3 indicating that the critical level is only exceeded at the very closest part of the SSSI to the A55.

4.5.116 The predicted increase is above 1% of the critical level and the PEC above 70% of the critical level up to 10m into the SSSI from the A55, an area of approximately 2ha (0.2% of the total area of the SSSI). It is therefore considered that, at worst, there may be a very minor detrimental alteration to the botanical diversity of the SSSI, and this negligible magnitude of change would result in a negligible effect on the SSSI.

4.5.117 As for the previous 2020 and 2023 Wylfa Newydd Project with bypasses scenarios, the NOx concentrations (and nitrogen and acid deposition) at the section of the Beddmanarch-Cymyran SSSI close to the A5025 at Llanfachraeth, are predicted to decrease as a result of the realignment of the A5025.

4.5.118 The predicted annual mean NOx concentrations at all Wildlife Sites and Ancient Woodlands on the Isle of Anglesey are predicted to increase by considerably less than 100% of the long-term environmental standard (the critical level of 30µg/m^3) for the 2033 peak operation scenario. The predicted change in nitrogen and acid deposition rates are well within 100% of the critical loads.

4.5.119 The effects associated with changes in NOx concentrations of the magnitudes discussed above is concluded to be not significant. The predicted changes in nitrogen and acid deposition were well below 100% of the relevant critical loads, and are also identified to be not significant.

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Table C4-29 Predicted maximum annual mean NOx concentrations at ecological receptors – 2033 Wylfa Newydd Project with bypasses

Receptor	Critical level (µg/m^3)	2033 Baseline (µg/m^3)	2033 Wylfa Newydd Project with bypasses (µg/m^3)	Change as % of critical level	Further consideration required?
Beddmanarch-Cymyran SSSI – A5025	30	7.8	7.0	-3%	No
Beddmanarch-Cymyran SSSI – A55	30	35.5	36.0	+2%	Yes
Llyn Dinam SAC/Llynnau Y Fali SSSI	30	6.7	6.8	0%	No
Llyn Traffwll SSSI	30	6.7	6.8	0%	No
Malltraeth Marsh/Cors Ddyga SSSI	30	30.9	31.5	+2%	Yes
Afon Wygyr Wildlife Site	30	9.8	10.4	+2%	No
Cae Barcdy Wildlife Site	30	10.1	10.2	0%	No
Coed Braint Siglen Dyfnia Wildlife Site	30	10.2	10.3	0%	No
Cors Hendre Fawr Wildlife Site	30	40.2	41.8	+5%	No
Cors Plas Wildlife Site	30	6.5	6.5	0%	No
Cors Tafarn-y-Grib Wildlife Site	30	8.9	9.1	+1%	No
Cors Tregarnedd Fawr Wildlife Site	30	60.2	62.1	+6%	No
Gwely Cyrs Caergeiliog Wildlife Site	30	28.1	28.7	+2%	No
Rhostir a Pwll Caergeiliog Wildlife Site	30	7.5	7.6	0%	No
Ancient Woodland (26051)	30	12.6	12.2	-1%	No
Ancient Woodland (25883)	30	38.9	40.0	+4%	No
Ancient Woodland (25882)	30	37.0	38.1	+4%	No

Receptor	Critical level (µg/m^3)	2033 Baseline (µg/m^3)	2033 Wylfa Newydd Project with bypasses (µg/m^3)	Change as % of critical level	Further consideration required?
Ancient Woodland (26076)	30	6.3	6.4	0%	No
Ancient Woodland (26066)	30	32.2	32.6	+1%	No
Ancient Woodland (43665)	30	16.5	16.6	+1%	No
Ancient Woodland (26037)	30	15.4	15.5	+0%	No
Ancient Woodland (26067)	30	11.2	11.3	+0%	No
Ancient Woodland (25084)	30	17.9	18.2	+1%	No
Ancient Woodland (25083)	30	33.6	34.1	+2%	No
Ancient Woodland (25087)	30	55.8	56.6	+3%	No
Ancient Woodland (43393)	30	52.2	53.0	+3%	No
Ancient Woodland (24252)	30	33.3	33.7	+2%	No

Table C4-30 Predicted maximum nitrogen deposition at ecological receptors – 2033 Wylfa Newydd Project with bypasses

Receptor	Vegetation type	Nitrogen deposition rate (kgN/ha/year)				Change as a percentage of CL	Total deposition rate as a percentage of CL	Further consideration required?
		Critical load (CL)	Existing deposition rate	Change due to 2033 Wylfa Newydd Project with bypasses	Total deposition rate			
Beddmanarch-Cymyran SSSI – A5025	Short	10	13.2	-0.1	13.1	-1%	131%	No
Beddmanarch-Cymyran SSSI – A55	Short	10	9.2	0.0	9.3	+1%	93%	No
Llyn Dinam SAC/Llynnau Y Fali SSSI	Short	10	12.2	0.0	12.2	0%	122%	No
Llyn Traffwll SSSI	Short	10	12.2	0.0	12.2	0%	122%	No
Malltraeth Marsh/Cors Ddyga SSSI	Short	15	14.4	+0.1	14.5	0%	96%	No
Afon Wygyr Wildlife Site	Short	10	13.0	+0.1	13.1	+1%	131%	No
	Tall	10	20.4	+0.1	20.6	+1%	206%	No
Cae Barcdy Wildlife Site	Short	10	9.2	0.0	9.2	0%	92%	No
	Tall	10	15.0	0.0	15.0	0%	150%	No
	Short	10	19.7	0.0	19.8	0%	198%	No

Receptor	Vegetation type	Nitrogen deposition rate (kgN/ha/year)				Change as a percentage of CL	Total deposition rate as a percentage of CL	Further consideration required?
		Critical load (CL)	Existing deposition rate	Change due to 2033 Wylfa Newydd Project with bypasses	Total deposition rate			
Coed Braint Siglen Dyfnia Wildlife Site	Tall	10	31.8	0.0	31.8	0%	318%	No
Cors Hendre Fawr Wildlife Site	Short	10	15.1	+0.2	15.3	+2%	153%	No
	Tall	10	24.1	+0.3	24.4	+4%	244%	No
Cors Plas Wildlife Site	Short	10	12.2	0.0	12.2	0%	122%	No
	Tall	10	19.6	0.0	19.6	0%	196%	No
Cors Tafarn-y-Grib Wildlife Site	Short	10	15.0	0.0	15.0	0%	150%	No
	Tall	10	24.4	0.0	24.4	0%	244%	No
Cors Tregarnedd Fawr Wildlife Site	Short	10	14.4	+0.2	14.6	+2%	146%	No
	Tall	10	23.2	+0.4	23.6	+4%	236%	No
Gwely Cyrs Caergeiliog Wildlife Site	Short	10	12.2	+0.1	12.2	+1%	122%	No
	Tall	10	19.6	+0.1	19.7	+1%	197%	No
Rhostir a Pwll Caergeiliog Wildlife Site	Short	10	12.2	0.0	12.2	0%	122%	No
	Tall	10	19.6	0.0	19.6	0%	196%	No

Receptor	Vegetation type	Nitrogen deposition rate (kgN/ha/year)				Change as a percentage of CL	Total deposition rate as a percentage of CL	Further consideration required?
		Critical load (CL)	Existing deposition rate	Change due to 2033 Wylfa Newydd Project with bypasses	Total deposition rate			
Ancient Woodland (26051)	Tall	5	16.0	-0.1	15.9	-2%	318%	No
Ancient Woodland (25883)	Tall	5	23.2	+0.2	23.5	+5%	469%	No
Ancient Woodland (25882)	Tall	5	23.2	+0.2	23.5	+5%	469%	No
Ancient Woodland (26076)	Tall	5	20.4	0.0	20.5	0%	409%	No
Ancient Woodland (26066)	Tall	5	13.3	+0.1	13.4	0%	268%	No
Ancient Woodland (43665)	Tall	5	13.3	0.0	13.3	-2%	267%	No
Ancient Woodland (26037)	Tall	5	13.3	0.0	13.3	-3%	266%	No

Receptor	Vegetation type	Nitrogen deposition rate (kgN/ha/year)				Change as a percentage of CL	Total deposition rate as a percentage of CL	Further consideration required?
		Critical load (CL)	Existing deposition rate	Change due to 2033 Wylfa Newydd Project with bypasses	Total deposition rate			
Ancient Woodland (26067)	Tall	5	13.3	0.0	13.3	-3%	266%	No
Ancient Woodland (25084)	Tall	5	31.8	+0.1	31.8	+2%	637%	No
Ancient Woodland (25083)	Tall	5	31.8	+0.1	31.9	+3%	638%	No
Ancient Woodland (25087)	Tall	5	31.8	+0.2	32.0	+5%	639%	No
Ancient Woodland (43393)	Tall	5	31.8	+0.2	31.9	+5%	639%	No
Ancient Woodland (24252)	Tall	5	31.8	+0.1	31.9	+3%	638%	No

Table C4-31 Predicted maximum acid deposition at ecological receptors – 2033 Wylfa Newydd Project with bypasses

Receptor	Vegetation type	Acid deposition rate (keq/ha/year)				Contribution as a % of CL	Total deposition rate as a % of CL	Further consideration required?
		Critical load (CLmaxN)	Existing deposition (N+S)	Change due to 2033 Wylfa Newydd Project with bypasses	Total deposition rate			
Beddmanarch-Cymyran SSSI – A5025	Short	2.25	1.080	-0.006	1.07	0%	48%	No
Beddmanarch-Cymyran SSSI – A55	Short	2.25	0.800	+0.003	0.80	0%	36%	No
Llyn Dinam SAC/Llynnau Y Fali SSSI	Short	0.50	1.020	0.000	1.02	0%	204%	No
Llyn Traffwll SSSI	Short	4.26	1.020	0.000	1.02	0%	24%	No
Malltraeth Marsh/Cors Ddyga SSSI	Short	1.24	1.210	+0.004	1.21	0%	98%	No
Afon Wygyr Wildlife Site	Short	1.99	1.100	+0.005	1.10	0%	56%	No
	Tall	2.77	1.660	+0.010	1.67	0%	60%	No
Cae Barcdy Wildlife Site	Short	1.98	0.800	+0.001	0.80	0%	40%	No
	Tall	2.71	1.240	+0.001	1.24	0%	46%	No
Coed Braint Siglen Dyfnia Wildlife Site	Short	0.59	1.590	+0.001	1.59	0%	270%	No
	Tall	1.64	2.480	+0.002	2.48	0%	151%	No
	Short	1.99	1.240	+0.011	1.25	+1%	63%	No

Receptor	Vegetation type	Acid deposition rate (keq/ha/year)				Contribution as a % of CL	Total deposition rate as a % of CL	Further consideration required?
		Critical load (CLmaxN)	Existing deposition (N+S)	Change due to 2033 Wylfa Newydd Project with bypasses	Total deposition rate			
Cors Hendre Fawr Wildlife Site	Tall	2.78	1.920	+0.023	1.94	+1%	70%	No
Cors Plas Wildlife Site	Short	0.51	1.020	0.000	1.02	0%	200%	No
	Tall	2.73	1.580	+0.001	1.58	0%	58%	No
Cors Tafarn-y-Grib Wildlife Site	Short	0.53	1.220	+0.001	1.22	0%	230%	No
	Tall	1.54	1.930	+0.002	1.93	0%	125%	No
Cors Tregarnedd Fawr Wildlife Site	Short	0.56	1.210	+0.013	1.22	+3%	218%	No
	Tall	2.82	1.870	+0.027	1.90	+1%	67%	No
Gwely Cyrs Caergeiliog Wildlife Site	Short	0.50	1.020	+0.004	1.02	+1%	205%	No
	Tall	2.72	1.580	+0.009	1.59	0%	58%	No
Rhostir a Pwll Caergeiliog Wildlife Site	Short	0.50	1.020	+0.001	1.02	0%	204%	No
		2.72	1.580	+0.001	1.58	0%	58%	No
Ancient Woodland (26051)	Tall	2.74	1.320	-0.005	1.31	0%	48%	No
Ancient Woodland (25883)	Tall	1.60	1.870	+0.016	1.89	+1%	118%	No

Receptor	Vegetation type	Acid deposition rate (keq/ha/year)				Contribution as a % of CL	Total deposition rate as a % of CL	Further consideration required?
		Critical load (CLmaxN)	Existing deposition (N+S)	Change due to 2033 Wylfa Newydd Project with bypasses	Total deposition rate			
Ancient Woodland (25882)	Tall	1.60	1.870	+0.015	1.89	+1%	118%	No
Ancient Woodland (26076)	Tall	2.77	1.660	+0.001	1.66	0%	60%	No
Ancient Woodland (26066)	Tall	1.79	1.110	+0.006	1.12	0%	62%	No
Ancient Woodland (43665)	Tall	1.79	1.110	+0.002	1.11	0%	62%	No
Ancient Woodland (26037)	Tall	1.79	1.110	+0.001	1.11	0%	62%	No
Ancient Woodland (26067)	Tall	1.79	1.110	+0.001	1.11	0%	62%	No
Ancient Woodland (25084)	Tall	1.65	2.480	+0.005	2.48	0%	151%	No
Ancient Woodland (25083)	Tall	1.64	2.480	+0.007	2.49	+1%	152%	No
Ancient Woodland (25087)	Tall	1.64	2.480	+0.013	2.49	+1%	152%	No
Ancient Woodland (43393)	Tall	1.64	2.480	+0.012	2.49	+1%	152%	No

Receptor	Vegetation type	Acid deposition rate (keq/ha/year)				Contribution as a % of CL	Total deposition rate as a % of CL	Further consideration required?
		Critical load (CLmaxN)	Existing deposition (N+S)	Change due to 2033 Wylfa Newydd Project with bypasses	Total deposition rate			
Ancient Woodland (24252)	Tall	1.64	2.480	+0.007	2.49	+1%	152%	No

Summary

Human receptors

4.5.120 A summary of the changes in annual mean NO_2 concentrations for the Isle of Anglesey study area is provided in table C4-32. This includes 1,950 receptors representing long-term exposure locations. Receptors represented in the modelling using transects or multiple receptor points have been reduced to a single receptor location for the purposes of the data shown in table C4-32.

4.5.121 The results for NO_2 show that, until the bypasses open in 2020, only adverse effects are forecast, which are predominantly negligible adverse effects (only one receptor location is categorised as a small adverse effect). When the bypasses open in 2020, a lower number of small and negligible adverse effects are predicted, with a number of beneficial effects predicted at receptor locations close to the existing roads that will be bypassed. The beneficial effects represent more meaningful changes in annual mean NO_2 concentrations compared to the adverse effects for the scenario before the bypasses open (i.e. a greater number of small beneficial effects and the generation of medium beneficial effects).

4.5.122 The effects for the 2020, 2023 and 2033 assessment years are relatively similar and show that the Wylfa Newydd Project would provide meaningful beneficial effects in air quality with regard to NO_2 at locations where the bypasses are proposed on the A5025 (i.e. Valley, Llanfachraeth and Llanfaethlu). The number of small adverse effects ranges from one to five receptors for the range of assessment years. These are forecast at locations which are predominantly adjacent to the A5025, in between those areas where bypasses are proposed.

4.5.123 The predicted total NO_2 concentrations at relevant short-term exposure locations for any of the assessment years are within the empirically derived value of 60µg/m^3 that is a representative threshold for consideration of potential risk of exceedance of the one-hour mean AQO [RD4].

4.5.124 The maximum change in annual mean concentrations of PM_{10} and $PM_{2.5}$ at all receptors is an increase or decrease equivalent to 2% of the respective AQO values. These changes are considered to represent a negligible adverse effect at all receptors. The total concentrations were well within the relevant annual mean AQOs. The total PM_{10} concentrations are well within the concentration of 31.8µg/m^3 at all receptors indicating compliance with the 24-hour mean AQO.

Table C4-32 Number of human receptors experiencing predicted effects (annual mean NO_2 concentrations) – overall summary for the Isle of Anglesey

Effect descriptor	Number of receptors experiencing predicted effects			
	2020 Wylfa Newydd Project without bypasses	2020 Wylfa Newydd Project with bypasses	2023 Wylfa Newydd Project with bypasses	2033 Wylfa Newydd Project with bypasses
Large adverse	0	0	0	0
Medium adverse	0	0	0	0
Small adverse	1	1	5	1
Negligible adverse	1,949	1,723	1,735	1,688
Negligible beneficial	0	170	159	208
Small beneficial	0	48	50	52
Medium beneficial	0	8	1	1
Large beneficial	0	0	0	0

4.5.125 The assessment of the potential air quality effects on mainland Wales showed that increases in annual mean concentrations of NO_2, PM_{10} and $PM_{2.5}$ at long-term exposure receptor locations would represent a maximum of a negligible adverse effect and the effect would not be significant.

4.5.126 The one-hour mean NO_2 AQO is also unlikely to be exceeded at long-term exposure locations based on the estimated total annual mean NO_2 concentrations being below 60µg/m^3. The Wylfa Newydd Project road traffic is estimated to increase annual mean concentrations by 1.7µg/m^3 at a short-term exposure layby location adjacent to the A55 to the southeast of the Britannia Bridge within the GC local authority area. It is likely that the annual mean threshold of 60µg/m^3 would be exceeded at this location, indicating the potential for the one-hour mean AQO to be exceeded. Further assessment is planned following consultation with GC and review of new monitoring data.

4.5.127 On balance, the predicted changes in pollutant concentrations across the Isle of Anglesey and mainland Wales study areas as a result of the Wylfa Newydd Project are therefore considered to be not significant. Further assessment is proposed for relevant short-term exposure locations adjacent to the A55.

Ecological receptors

4.5.128 The predicted increase in annual mean NOx concentrations at three ecological receptors were above the 1% criteria that indicated further consideration by experienced ecologists was required (Beddmanarch-Cymyran SSSI, Malltraeth Marsh/Cors Ddyga SSSI and Coedydd Afon Menai SSSI) as part of this assessment. The further assessment of these sites presented in this chapter concluded that the increases in annual mean NOx concentrations for the 2020, 2023 and 2033 assessment years would not lead to a significant effect.

4.5.129 The predicted changes in nitrogen and acid deposition were below 100% of the relevant critical load and as such no further consideration was required. It was concluded that effects would be not significant.

4.6 Additional mitigation

4.6.1 In accordance with chapter B1 (Application Reference Number: 6.2.1), embedded and good practice mitigation measures relevant to air quality 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.

4.6.2 As no potentially significant effects have been identified, no additional mitigation measures are proposed.

4.7 Residual effects

4.7.1 Taking into account both the adverse and beneficial effects identified in the assessment, it is concluded that the overall effect on air quality due to project-wide road traffic emissions is not significant.

4.7.2 The assessment of the intra-project additive air quality effects of road traffic sources and emission sources within the Wylfa Newydd Development Area (e.g. construction plant, machinery and marine vessels) does not alter the outcome of the above assessment (see appendix I4-2, Application Reference Number: 6.9.10).

4.8 References

Table C4-33 Schedule of references

ID	Reference
RD1	Environmental Protection UK (EPUK) and Institute of Air Quality Management (IAQM). 2017. *Land-Use Planning and Development Control: Planning for Air Quality*. Version 1.2. London: Institute of Air Quality Management.
RD2	North Wales Combined Authority. 2017. Annual Progress Report 2017, September 2017.
RD3	Isle of Anglesey County Council (IACC). 2015. *2015 Updating and Screening Assessment for Isle of Anglesey County Council*. Llangefni: Isle of Anglesey County Council.
RD4	Department for Environment, Food and Rural Affairs. 2016. *Local Air Quality Management: Technical Guidance (TG16)*. London: Department for Environment, Food and Rural Affairs.
RD5	Department for Transport. 2017. *Traffic Counts.* [Online]. [Accessed: May 2017]. Available from https://www.dft.gov.uk/traffic-counts/.
RD6	As discussed in a meeting with Horizon, IACC, GC and National Grid, 11th January 2018.
RD7	Air Quality Consultants Ltd. 2016. *CURED_V2A (the Calculator Using Realistic Emissions for Diesels)*. [Online]. [Accessed: August 2016]. Available from: http://www.aqconsultants.co.uk/Resources/Download-Reports.aspx.
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RD9	Centre for Ecology and Hydrology. 2017. *UK Air Pollution Information System*. [Online]. [Accessed: August 2016 – April 2017]. Available from: http://www.apis.ac.uk/.
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