Appendix 11.1 – IAQM Construction Dust Assessment Methodology

STEP 1 – SCREENING THE NEED FOR A DETAILED ASSESSMENT

1.1.1 An assessment will normally be required where there are:

- 'Human receptors' within 350m of the site boundary; or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s); and/or
- 'Ecological receptors' within 50m of the site boundary; or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).

1.1.2 Where the need for a more detailed assessment is screened out, it can be concluded that the level of risk is "negligible".

STEP 2A – DEFINE THE POTENTIAL DUST EMISSION MAGNITUDE

1.1.3 The following are examples of how the potential dust emission magnitude for different activities can be defined. (Note that not all the criteria need to be met for a particular class). Other criteria may be used if justified in the assessment

Table 2A: Examples of Human Receptor Sensitivity to Construction Phase Impacts

Dust Emission Magnitude	Activity
Large	**Demolition** >50,000m^3 building demolished, dusty material (e.g. concrete), on-site crushing/screening, demolition >20m above ground level
	Earthworks >10,000m^2 site area, dusty soil type (e.g. clay), >10 earth moving vehicles active simultaneously, >8m high bunds formed, >100,000 tonnes material moved
	Construction >100,000m^3 building volume, on site concrete batching, sandblasting
	Trackout >50 HDVs out / day, dusty surface material (e.g. clay), >100m unpaved roads
Medium	**Demolition** 20,000 - 50,000m^3 building demolished, dusty material (e.g. concrete) 10-20m above ground level
	Earthworks 2,500 - 10,000m^2 site area, moderately dusty soil (e.g. silt), 5-10 earth moving vehicles active simultaneously, 4m - 8m high bunds, 20,000 -100,000 tonnes material moved
	Construction 25,000 - 100,000m^3 building volume, dusty material e.g. concrete, on site concrete batching
	Trackout 10 - 50 HDVs out / day, moderately dusty surface material (e.g. clay), 50 -100m unpaved roads

Small	**Demolition** <20,000m^3 building demolished, non-dusty material (e.g metal cladding), <10m above ground level, work during wetter months
	Earthworks <2,500m^2 site area, soil with large grain size (e.g. sand), <5 earth moving vehicles active simultaneously, <4m high bunds, <20,000 tonnes material moved, earthworks during wetter months
	Construction <25,000m^3, non-dusty material (e.g. metal cladding or timber)
	Trackout <10 HDVs out / day, non-dusty soil, < 50m unpaved roads

STEP 2B – DEFINE THE SENSITIVITY OF THE AREA

1.1.4 The tables below present the IAQM assessment methodology to determine the sensitivity of the area to dust soiling, human health and ecological impacts respectively. The IAQM guidance provides guidance to allow the sensitivity of individual receptors to dust soiling and health effects to assist in the assessment of the overall sensitivity of the study area.

Table 2Ba: Sensitivity of the Study Area to Dust Soiling Effects

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

Table 2Bb: Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM10 Concentration (µg/m3)	Number of Receptors	Distance from the Source (m)				
			<20	<50	<100	<200	<350
High	>32	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low

		1-10	High	Medium	Low	Low	Low
	28-32	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	>32	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	28-32	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	24-28	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	<24	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

Table 2Bc: Sensitivity of the Area to Ecological Impacts

Receptor Sensitivity	Distance from the Sources (m)	
	<20	**<50**
High	High	Medium
Medium	Medium	Low
Low	Low	Low

STEP 2C – DEFINE THE RISK OF IMPACTS

1.1.5 The dust emissions magnitude determined at Step 2A should be combined with the sensitivity of the area determined at Step 2B to determine the risk of impacts without mitigation applied. For those cases where the risk category is 'negligible' no mitigation measures beyond those required by legislation will be required.

Table 2C: Risk of Dust Impacts

Sensitivity of surrounding area	Dust Emission Magnitude		
	Large	**Medium**	**Small**
Demolition			
High	High Risk	Medium Risk	Medium Risk

Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible
Earthworks and Construction			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible
Trackout			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

STEP 3 – SITE SPECIFIC MITIGATION

1.1.6 Having determined the risk categories for each of the four activities it is possible to determine the site-specific measures to be adopted. These measures will be related to whether the site is considered to be a low, medium or high-risk site. The IAQM guidance details the mitigation measures required for high, medium and low risk sites as determined in Step 2C.

STEP 4 – DETERMINE SIGNIFICANT EFFECTS

1.1.7 Once the risk of dust impacts has been determined in Step 2C and the appropriate dust mitigation measures identified in Step 3, the final step is to determine whether there are significant effects arising from the construction phase. For almost all construction activities, the application of effective mitigation should prevent any significant effects occurring to sensitive receptors and therefore the residual effect will normally be negligible.

Appendix 11.2 – Model Verification

1.1.8 The comparison of modelled concentrations with local monitored concentrations is a process termed 'verification'. Model verification investigates the discrepancies between modelled and measured concentrations, which can arise due to the presence of inaccuracies and/or uncertainties in model input data, modelling and monitoring data assumptions. The following are examples of potential causes of such discrepancy:

- Estimates of background pollutant concentrations;
- Meteorological data uncertainties;
- Traffic data uncertainties;
- Model input parameters, such as 'roughness length'; and
- Overall limitations of the dispersion model.

NITROGEN DIOXIDE

1.1.9 Most nitrogen dioxide is produced in the atmosphere by the reaction of nitric oxide (NO) with ozone. It is therefore most appropriate to verify the model in terms of the primary pollutant emissions of nitrogen oxides (NOx = NO + NO_2), in line with the guidance provided within LAQM.TG(16).

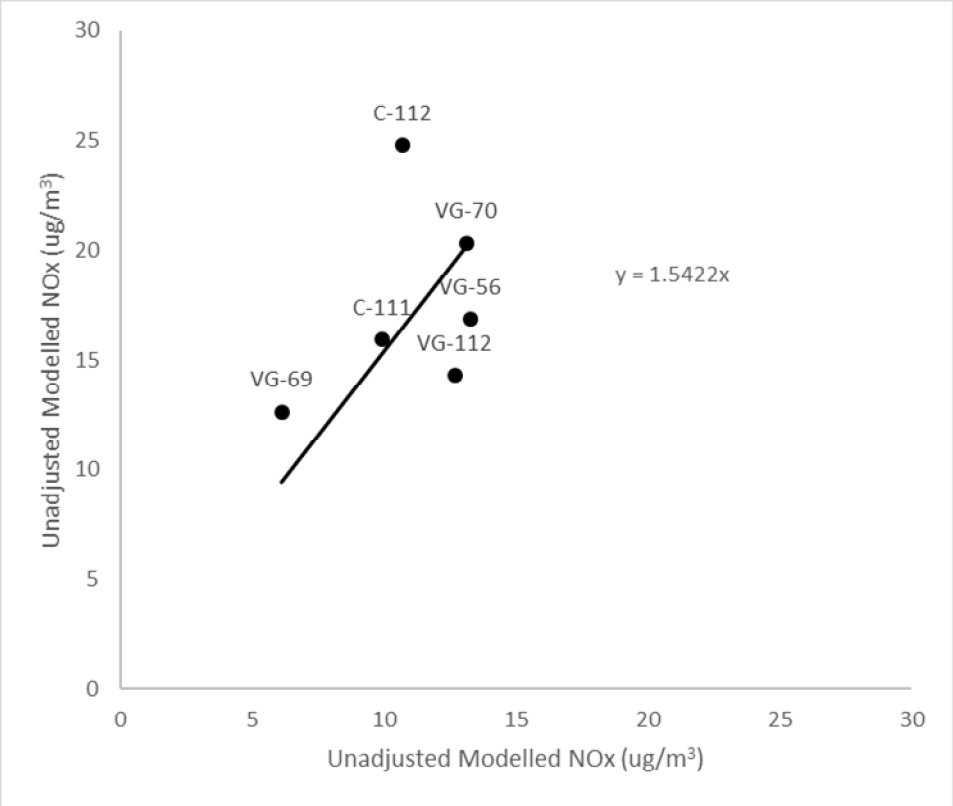
1.1.10 The model has been run to predict the 2019 annual mean road-NOx contribution at seven roadside diffusion tubes within the modelled road network. The model outputs of road-NOx have been compared with the 'measured' road-NOx, which was determined from the NO_2 concentrations measured using diffusion tubes at the monitoring locations, utilising the NOx from NO_2 calculator provided by Defra and the sector removed NOx background concentration (from the Defra background map). As discussed in the methodology section, the most recent suitable data available for model verification purposes is 2018. However, the traffic data was provided as 2019 flows so the monitored concentrations have been factored from 2018 to 2019 using the annualisation process as per IAQM methodology.

1.1.11 The table and figure below present the data used in the verification.

Table A11.1: Data used in Model Verification

Authority Monitoring Site	Measured 2019 Annual Mean NO_2 Concentration ($\mu g/m^3$)	Background NOx ($\mu g/m^3$)	Measured Road-NO_x ($\mu g/m^3$) (from NO_x:NO_2 calculator)	Modelled Road-NO_x ($\mu g/m^3$)	Ratio
Cardiff	111	21.2	17.8	15.9	9.9	1.61
Cardiff	112	25.6	17.8	24.8	10.7	2.32
Glamorgan	56	19.6	14.0	16.9	13.3	1.27
Glamorgan	68	14.6	14.0	7.1	7.2	0.99
Glamorgan	69	17.5	14.0	12.6	6.1	2.07
Glamorgan	70	21.4	14.0	20.3	13.1	1.55
Glamorgan	112	18.6	14.5	14.3	12.7	1.12

Figure A11.1: Comparison of Measured Road NOx with Unadjusted Modelled Road NOx



PM_{10} and $PM_{2.5}$

1.1.12 There are no local PM_{10} or $PM_{2.5}$ monitoring data against which the model could be verified. Consequently, the verification factor determined above for adjusting the road-NOx contribution has been applied to the predicted road-PM_{10} and road-$PM_{2.5}$ contributions, consistent with guidance set out in LAQM.TG(16).

Appendix 11.3 – Traffic Data

Table A11.2: Baseline 2019 Traffic Data

Road Name	AADT	HDV%	Speed (kph)
B4267 Leckwith Road, northeast of Sloper Road/Broad Street	26474	2.7%	48.3
Sloper Road	13704	3.4%	48.3
B4267 Leckwith Road, southwest of Sloper Road/Broad Street	27748	2.1%	48.3
Broad Street	14037	1.6%	48.3
B4267 Leckwith Road, northeast of Ffordd Fred Keenor	26951	2.1%	48.3
Ffordd Fred Keenor	2636	8.5%	48.3
B4267 Leckwith Road, southwest of Ffordd Fred Keenor	27639	2.1%	48.3
P&R/Other Parking Areas	1641	5.4%	48.3
CCFC Stadium Exit	286	2.4%	48.3
Ffordd Fred Keenor	2391	6.8%	48.3
B4267 Leckwith Road, northeast of Brian Clarke Way	27203	2.0%	48.3
Brian Clarke Way	14317	1.1%	48.3
B4267 Leckwith Road, southwest of Brian Clarke Way	30214	2.0%	48.3
CISC	1444	4.7%	48.3
B4267 Leckwith Road, northeast of Leckwith Interchange	30220	2.2%	48.3
Hadfield Road	18281	5.9%	48.3
A4232 Southbound On-Slip	5619	3.9%	48.3
A4232 Northbound Off-Slip	5742	2.3%	48.3
B4267 Leckwith Road, southwest of Leckwith Interchange	22088	1.3%	48.3
A4232 Northbound On-Slip	13145	3.6%	48.3
A4232 Southbound Off-Slip	14984	3.0%	48.3
B4267, northeast of existing site land uses	21959	1.4%	48.3
Existing site land uses	504	13.5%	48.3
B4267, southwest of existing site land uses	21727	1.1%	48.3
B4267, northeast of proposed site access	21727	1.1%	48.3
Proposed site access (southeast)	0	-	48.3
B4267, southwest of proposed site access	21727	1.1%	48.3

Road Name	AADT	HDV%	Speed (kph)
Proposed site access (northwest)	0	-	48.3
B4267 Leckwith Road, northwest of Pen-y-Turnpike Road	20685	1.0%	64.4
Pen-y-Turnpike Road	13295	0.3%	64.4
B4267 Leckwith Road, southeast of Pen-y-Turnpike Road	10850	1.4%	64.4
B4267 Penlan Road, north of University Hospital Llandough	10986	1.5%	48.3
B4267 Penlan Road, south of University Hospital Llandough	11333	2.5%	48.3
University Hospital Llandough	10387	2.2%	48.3
B4267 Penlan Road, north of Merrie Harrier	12628	2.8%	48.3
A4055 Barry Road, east of Merrie Harrier	24955	2.5%	48.3
Andrew Road	41	33.3%	48.3
B4267 Redlands Road, south of Merrie Harrier	18805	1.8%	48.3
A4055 Cardiff Road, south of Merrie Harrier	17245	3.4%	48.3
Corbett Road	61	0.0%	48.3
A4055, northeast of Barons Court	40219	1.9%	48.3
A4160 Cogan Hill, southeast of Barons Court	31501	1.6%	48.3
A4055, southwest of Barons Court	24846	2.5%	48.3
A4160 Penarth Road, northwest of Barons Court	15638	3.3%	48.3

Table A11.3: Do Minimum 2025 and 2030 Traffic Data

Road Name	AADT	HDV%	Speed (kph)	AADT	HDV%	Speed (kph)
B4267 Leckwith Road, northeast of Sloper Road/Broad Street	28409	2.7%	48.3	29599	2.7%	48.3
Sloper Road	16442	3.0%	48.3	17103	3.0%	48.3
B4267 Leckwith Road, southwest of Sloper Road/Broad Street	31717	2.0%	48.3	33009	2.0%	48.3
Broad Street	16843	1.5%	48.3	17473	1.5%	48.3
B4267 Leckwith Road, northeast of Ffordd Fred Keenor	29655	2.1%	48.3	30866	2.1%	48.3
Ffordd Fred Keenor	2849	8.4%	48.3	2967	8.4%	48.3

Road Name	AADT	HDV%	Speed (kph)	AADT	HDV%	Speed (kph)
B4267 Leckwith Road, southwest of Ffordd Fred Keenor	30358	2.1%	48.3	31600	2.1%	48.3
P&R/Other Parking Areas	1780	5.3%	48.3	1854	5.3%	48.3
CCFC Stadium Exit	310	2.3%	48.3	323	2.3%	48.3
Ffordd Fred Keenor	2587	6.8%	48.3	2694	6.8%	48.3
B4267 Leckwith Road, northeast of Brian Clarke Way	29892	1.9%	48.3	31114	1.9%	48.3
Brian Clarke Way	15476	1.1%	48.3	16119	1.1%	48.3
B4267 Leckwith Road, southwest of Brian Clarke Way	32925	2.0%	48.3	34282	2.0%	48.3
CISC	1561	4.7%	48.3	1626	4.7%	48.3
B4267 Leckwith Road, northeast of Leckwith Interchange	32933	2.1%	48.3	34290	2.1%	48.3
Hadfield Road	19640	5.9%	48.3	20461	5.9%	48.3
A4232 Southbound On-Slip	6079	3.8%	48.3	6332	3.8%	48.3
A4232 Northbound Off-Slip	6199	2.2%	48.3	6457	2.2%	48.3
B4267 Leckwith Road, southwest of Leckwith Interchange	23832	1.3%	48.3	24824	1.3%	48.3
A4232 Northbound On-Slip	14172	3.5%	48.3	14762	3.5%	48.3
A4232 Southbound Off-Slip	16150	3.0%	48.3	16824	3.0%	48.3
B4267, northeast of existing access to existing site land uses	23694	1.4%	48.3	24681	1.4%	48.3
Existing access to existing site land uses	538	13.5%	48.3	561	13.5%	48.3
B4267, southwest of existing access to existing site land uses	23446	1.1%	48.3	24423	1.1%	48.3
B4267, northeast of proposed site access	23446	1.1%	48.3	24423	1.1%	48.3
Proposed site access (southeast)	0	-	48.3	0	-	48.3
B4267, southwest of proposed site access	23446	1.1%	48.3	24423	1.1%	48.3
Proposed site access (northwest)	0	-	48.3	0	-	48.3
B4267 Leckwith Road, northwest of Pen-y-Turnpike Road	22333	0.9%	64.4	23262	0.9%	64.4
Pen-y-Turnpike Road	14297	0.3%	64.4	14895	0.3%	64.4

Road Name	AADT	HDV%	Speed (kph)	AADT	HDV%	Speed (kph)
B4267 Leckwith Road, southeast of Pen-y-Turnpike Road	11732	1.4%	64.4	12220	1.4%	64.4
B4267 Penlan Road, north of University Hospital Llandough	11878	1.5%	48.3	12372	1.5%	48.3
B4267 Penlan Road, south of University Hospital Llandough	12211	2.5%	48.3	12721	2.5%	48.3
University Hospital Llandough	11211	2.1%	48.3	11678	2.1%	48.3
B4267 Penlan Road, north of Merrie Harrier	13594	2.7%	48.3	14162	2.7%	48.3
A4055 Barry Road, east of Merrie Harrier	27035	2.5%	48.3	28156	2.5%	48.3
Andrew Road	44	33.3%	48.3	46	33.3%	48.3
B4267 Redlands Road, south of Merrie Harrier	20215	1.8%	48.3	21060	1.8%	48.3
A4055 Cardiff Road, south of Merrie Harrier	18665	3.3%	48.3	19440	3.3%	48.3
Corbett Road	65	0.0%	48.3	68	0.0%	48.3
A4055, northeast of Barons Court	43677	1.9%	48.3	45484	1.9%	48.3
A4160 Cogan Hill, southeast of Barons Court	34104	1.6%	48.3	35519	1.6%	48.3
A4055, southwest of Barons Court	26919	2.5%	48.3	28035	2.5%	48.3
A4160 Penarth Road, northwest of Barons Court	16922	3.2%	48.3	17624	3.2%	48.3

Table A11.4: Do Nothing 2025 and 2030 Traffic Data

Road Name	AADT	HDV%	Speed (kph)	AADT	HDV%	Speed (kph)
B4267 Leckwith Road, northeast of Sloper Road/Broad Street	28841	2.6%	48.3	30031	2.7%	48.3
Sloper Road	16445	3.0%	48.3	17106	3.0%	48.3
B4267 Leckwith Road, southwest of Sloper Road/Broad Street	32231	1.9%	48.3	33523	1.9%	48.3
Broad Street	16921	1.5%	48.3	17552	1.5%	48.3
B4267 Leckwith Road, northeast of Ffordd Fred Keenor	30169	2.1%	48.3	31380	2.1%	48.3
Ffordd Fred Keenor	2849	8.4%	48.3	2967	8.4%	48.3

Road Name	AADT	HDV%	Speed (kph)	AADT	HDV%	Speed (kph)
B4267 Leckwith Road, southwest of Ffordd Fred Keenor	30872	2.0%	48.3	32114	2.0%	48.3
P&R/Other Parking Areas	1780	5.3%	48.3	1854	5.3%	48.3
CCFC Stadium Exit	310	2.3%	48.3	323	2.3%	48.3
Ffordd Fred Keenor	2587	6.8%	48.3	2694	6.8%	48.3
B4267 Leckwith Road, northeast of Brian Clarke Way	30406	1.9%	48.3	31628	1.9%	48.3
Brian Clarke Way	15476	1.1%	48.3	16119	1.1%	48.3
B4267 Leckwith Road, southwest of Brian Clarke Way	33439	1.9%	48.3	34796	1.9%	48.3
CISC	1561	4.7%	48.3	1626	4.7%	48.3
B4267 Leckwith Road, northeast of Leckwith Interchange	33447	2.1%	48.3	34804	2.1%	48.3
Hadfield Road	19887	5.8%	48.3	20708	5.8%	48.3
A4232 Southbound On-Slip	6214	3.7%	48.3	6467	3.8%	48.3
A4232 Northbound Off-Slip	6334	2.2%	48.3	6592	2.2%	48.3
B4267 Leckwith Road, southwest of Leckwith Interchange	25256	1.2%	48.3	26249	1.2%	48.3
A4232 Northbound On-Slip	14368	3.5%	48.3	14958	3.5%	48.3
A4232 Southbound Off-Slip	16346	2.9%	48.3	17020	2.9%	48.3
B4267, northeast of existing access to existing site land uses	25118	1.3%	48.3	26105	1.3%	48.3
Existing access to existing site land uses	0	-	48.3	0	-	48.3
B4267, southwest of existing access to existing site land uses	25118	1.3%	48.3	26105	1.3%	48.3
B4267, northeast of proposed site access	25118	1.3%	48.3	26105	1.3%	48.3
Proposed site access (southeast)	1204	0.0%	48.3	1204	0.0%	48.3
B4267, southwest of proposed site access	23793	1.1%	48.3	24769	1.1%	48.3

Road Name	AADT	HDV%	Speed (kph)	AADT	HDV%	Speed (kph)
Proposed site access (northwest)	1105	6.6%	48.3	1128	6.7%	48.3
B4267 Leckwith Road, northwest of Pen-y-Turnpike Road	22680	0.9%	64.4	23609	0.9%	64.4
Pen-y-Turnpike Road	14487	0.3%	64.4	15084	0.3%	64.4
B4267 Leckwith Road, southeast of Pen-y-Turnpike Road	11889	1.4%	64.4	12377	1.4%	64.4
B4267 Penlan Road, north of University Hospital Llandough	12035	1.5%	48.3	12529	1.5%	48.3
B4267 Penlan Road, south of University Hospital Llandough	12309	2.5%	48.3	12818	2.5%	48.3
University Hospital Llandough	11271	2.1%	48.3	11738	2.1%	48.3
B4267 Penlan Road, north of Merrie Harrier	13691	2.7%	48.3	14259	2.7%	48.3
A4055 Barry Road, east of Merrie Harrier	27051	2.5%	48.3	28172	2.5%	48.3
Andrew Road	44	33.3%	48.3	46	33.3%	48.3
B4267 Redlands Road, south of Merrie Harrier	20297	1.8%	48.3	21142	1.8%	48.3
A4055 Cardiff Road, south of Merrie Harrier	18665	3.3%	48.3	19440	3.3%	48.3
Corbett Road	65	0.0%	48.3	68	0.0%	48.3
A4055, northeast of Barons Court	43677	1.9%	48.3	45484	1.9%	48.3
A4160 Cogan Hill, southeast of Barons Court	34182	1.6%	48.3	35598	1.6%	48.3
A4055, southwest of Barons Court	26935	2.5%	48.3	28051	2.5%	48.3
A4160 Penarth Road, northwest of Barons Court	16985	3.2%	48.3	17687	3.2%	48.3

Table A11.5: Do Something 2025 and 2030 Traffic Data

Road Name	AADT	HDV%	Speed (kph)	AADT	HDV%	Speed (kph)
B4267 Leckwith Road, northeast of Sloper Road/Broad Street	28798	2.7%	48.3	29988	2.7%	48.3
Sloper Road	16445	3.0%	48.3	17106	3.0%	48.3
B4267 Leckwith Road, southwest of Sloper Road/Broad Street	32179	1.9%	48.3	33471	1.9%	48.3
Broad Street	16914	1.5%	48.3	17544	1.5%	48.3
B4267 Leckwith Road, northeast of Ffordd Fred Keenor	30118	2.1%	48.3	31329	2.1%	48.3
Ffordd Fred Keenor	2849	8.4%	48.3	2967	8.4%	48.3
B4267 Leckwith Road, southwest of Ffordd Fred Keenor	30821	2.0%	48.3	32062	2.0%	48.3
P&R/Other Parking Areas	1780	5.3%	48.3	1854	5.3%	48.3
CCFC Stadium Exit	310	2.3%	48.3	323	2.3%	48.3
Ffordd Fred Keenor	2587	6.8%	48.3	2694	6.8%	48.3
B4267 Leckwith Road, northeast of Brian Clarke Way	30355	1.9%	48.3	31577	1.9%	48.3
Brian Clarke Way	15476	1.1%	48.3	16119	1.1%	48.3
B4267 Leckwith Road, southwest of Brian Clarke Way	33388	1.9%	48.3	34745	1.9%	48.3
CISC	1561	4.7%	48.3	1626	4.7%	48.3
B4267 Leckwith Road, northeast of Leckwith Interchange	33395	2.1%	48.3	34753	2.1%	48.3
Hadfield Road	19862	5.8%	48.3	20684	5.8%	48.3
A4232 Southbound On-Slip	6200	3.8%	48.3	6453	3.8%	48.3
A4232 Northbound Off-Slip	6321	2.2%	48.3	6578	2.2%	48.3
B4267 Leckwith Road, southwest of Leckwith Interchange	25114	1.2%	48.3	26106	1.2%	48.3
A4232 Northbound On-Slip	14348	3.5%	48.3	14938	3.5%	48.3
A4232 Southbound Off-Slip	16326	2.9%	48.3	17000	2.9%	48.3
B4267, northeast of existing access to existing site land uses	24976	1.3%	48.3	25962	1.3%	48.3
Existing access to existing site land uses	0	-	48.3	0	-	48.3
B4267, southwest of existing access to existing site land uses	24976	1.3%	48.3	25962	1.3%	48.3

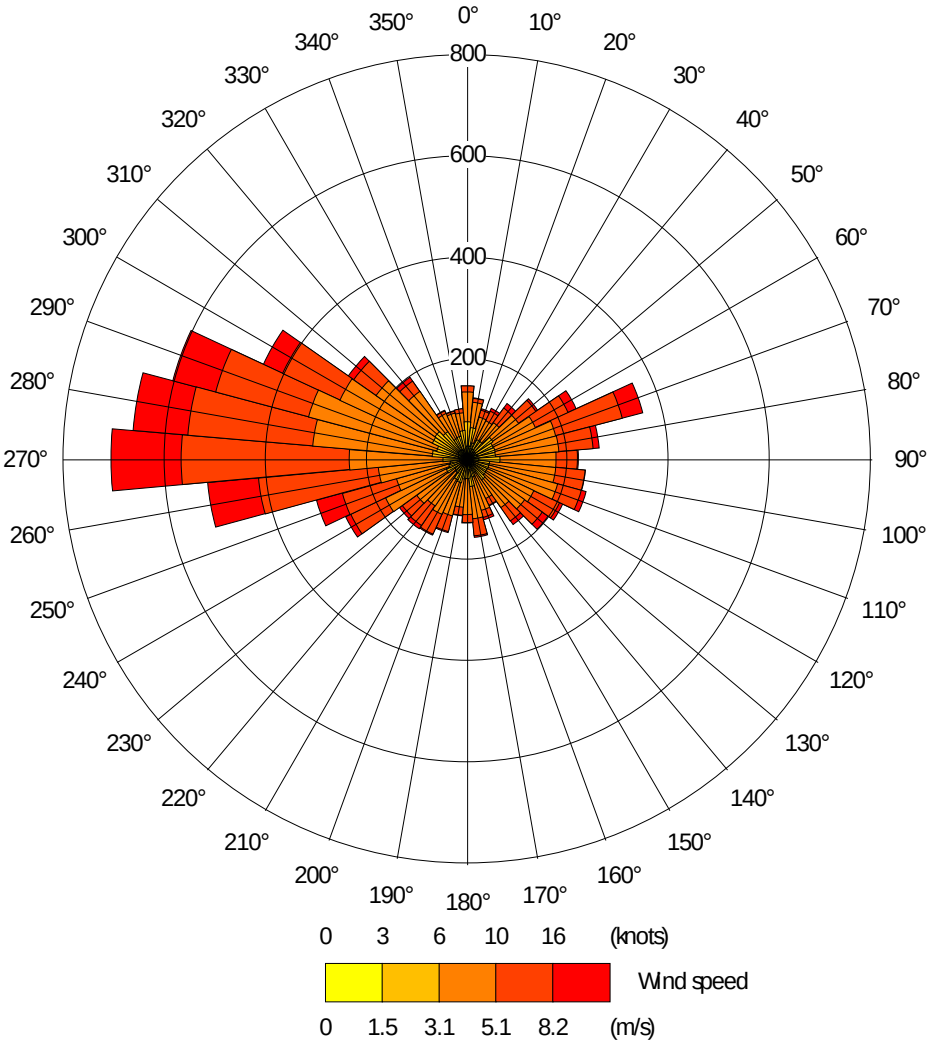
Road Name	AADT	HDV%	Speed (kph)	AADT	HDV%	Speed (kph)
B4267, northeast of proposed site access	24976	1.3%	48.3	25962	1.3%	48.3
Proposed site access (southeast)	1084	0.0%	48.3	1084	0.0%	48.3
B4267, southwest of proposed site access	23758	1.1%	48.3	24735	1.1%	48.3
Proposed site access (northwest)	1048	6.9%	48.3	1071	7.1%	48.3
B4267 Leckwith Road, northwest of Pen-y-Turnpike Road	22645	0.9%	64.4	23574	0.9%	64.4
Pen-y-Turnpike Road	14468	0.3%	64.4	15065	0.3%	64.4
B4267 Leckwith Road, southeast of Pen-y-Turnpike Road	11873	1.4%	64.4	12361	1.4%	64.4
B4267 Penlan Road, north of University Hospital Llandough	12019	1.5%	48.3	12513	1.5%	48.3
B4267 Penlan Road, south of University Hospital Llandough	12299	2.5%	48.3	12808	2.5%	48.3
University Hospital Llandough	11265	2.1%	48.3	11732	2.1%	48.3
B4267 Penlan Road, north of Merrie Harrier	13682	2.7%	48.3	14249	2.7%	48.3
A4055 Barry Road, east of Merrie Harrier	27049	2.5%	48.3	28170	2.5%	48.3
Andrew Road	44	33.3%	48.3	46	33.3%	48.3
B4267 Redlands Road, south of Merrie Harrier	20289	1.8%	48.3	21134	1.8%	48.3
A4055 Cardiff Road, south of Merrie Harrier	18665	3.3%	48.3	19440	3.3%	48.3
Corbett Road	65	0.0%	48.3	68	0.0%	48.3
A4055, northeast of Barons Court	43677	1.9%	48.3	45484	1.9%	48.3
A4160 Cogan Hill, southeast of Barons Court	34174	1.6%	48.3	35590	1.6%	48.3
A4055, southwest of Barons Court	26933	2.5%	48.3	28049	2.5%	48.3
A4160 Penarth Road, northwest of Barons Court	16978	3.2%	48.3	17681	3.2%	48.3

Appendix 11.4 – Modelled Receptor Details

Receptor ID	Address	Easting	Northing	Height (m)
Eco_000	Cwm Cydfin (SSSI)	316654.69	173780.19	0
Eco_010	Cwm Cydfin (SSSI)	316645.41	173776.45	0
Eco_020	Cwm Cydfin (SSSI)	316636.12	173772.7	0
Eco_030	Cwm Cydfin (SSSI)	316626.84	173768.97	0
Eco_040	Cwm Cydfin (SSSI)	316617.59	173765.23	0
Eco_050	Cwm Cydfin (SSSI)	316608.31	173761.5	0
Eco_060	Cwm Cydfin (SSSI)	316599.03	173757.75	0
Eco_070	Cwm Cydfin (SSSI)	316589.78	173754.02	0
Eco_080	Cwm Cydfin (SSSI)	316580.5	173750.28	0
Eco_090	Cwm Cydfin (SSSI)	316571.22	173746.55	0
Eco_100	Cwm Cydfin (SSSI)	316561.97	173742.8	0
Eco_120	Cwm Cydfin (SSSI)	316543.41	173735.33	0
Eco_140	Cwm Cydfin (SSSI)	316524.88	173727.84	0
Eco_160	Cwm Cydfin (SSSI)	316506.31	173720.38	0
Eco_180	Cwm Cydfin (SSSI)	316487.78	173712.89	0
Eco_200	Cwm Cydfin (SSSI)	316469.25	173705.42	0
R01	Broad Street	316391.5	176046.25	1.5
R02	Leckwith Road	316612.66	176044.36	1.5
R03	Broad Street	316410.84	176018.14	1.5
R04	Leckwith Road	316531.25	175958.16	4.5
R05	Sloper Road	316597.44	175945.39	1.5
R06	Leckwith Road	316395.22	175815.16	1.5
R07	New Receptor	315795.88	175377.31	0
R08	New Receptor	315818.09	175351.8	0
R09	New Receptor	315837	175326.75	0
R10	New Receptor	315863.47	175289.89	0
R11	New Receptor	315880	175266.25	0
R12	New Receptor	315841.5	175239.31	0
R13	New Receptor	315895.84	175238.38	0
R14	New Receptor	315861.81	175216.16	0
R15	New Receptor	315927.75	175195.38	0
R16	New Receptor	315955.62	175157.09	0
R17	New Receptor	315982.56	175130.62	0
R18	New Receptor	316018.47	175083.36	0
R19	New Receptor	316047.31	175055.95	0
R20	Leckwith Road	315857.62	174526.95	1.5
R21	Leckwith Road	315747.69	174349.7	1.5
R22	Leckwith Road	316150.72	173650.34	1.5

Receptor ID	Address	Easting	Northing	Height (m)
R23	Leckwith Road	316690.97	173324.02	1.5
R24	Leckwith Road	316702.06	173287.66	1.5
R25	Pen-Y-Turnpike Road	316090.38	173224.36	1.5
R26	Penlan Road	316753.12	173145.83	1.5
R27	Penlan Road	316791.44	173020.66	1.5
R28	Penlan Road	316820.69	173002.23	1.5
R29	A4055	317440.81	172762.28	1.5
R30	Penlan Road	316849.06	172731.94	1.5
R31	A4055	317357.03	172701.89	1.5
R32	Penlan Road	316842.28	172499.78	1.5
R33	Corbett Road	316794.69	172484.2	1.5
R34	A4055	316844.69	172442.05	1.5
R35	Andrew Road	316804.78	172436.55	1.5
R36	Cardiff Road	316729.84	172382.05	1.5

Appendix 11.5 – Meteorological Windrose



Appendix 11.6 – Model Results (Human Receptors)

Table A11.6 – 2025 NO_2 Modelled Concentrations (ug/m^3)

Receptor ID	Base 2019	DM 2025	DN 2025	Impact	Severity	DS 2025	Impact	Severity
R01	26.21	22.57	22.6	0	Negligible	22.6	0	Negligible
R02	26.48	21.97	22.08	0.1	Negligible	22.07	0.1	Negligible
R03	23.66	20.18	20.22	0	Negligible	20.21	0	Negligible
R04	20.99	17.58	17.65	0.1	Negligible	17.65	0.1	Negligible
R05	24.65	20.67	20.74	0	Negligible	20.73	0	Negligible
R06	20.03	16.65	16.74	0	Negligible	16.74	0	Negligible
R07	New Receptor	New Receptor	13.87	New Receptor	New Receptor	13.85	New Receptor	New Receptor
R08	New Receptor	New Receptor	14.25	New Receptor	New Receptor	14.23	New Receptor	New Receptor
R09	New Receptor	New Receptor	14.58	New Receptor	New Receptor	14.56	New Receptor	New Receptor
R10	New Receptor	New Receptor	15.69	New Receptor	New Receptor	15.66	New Receptor	New Receptor
R11	New Receptor	New Receptor	18.67	New Receptor	New Receptor	18.63	New Receptor	New Receptor
R12	New Receptor	New Receptor	16.72	New Receptor	New Receptor	16.7	New Receptor	New Receptor
R13	New Receptor	New Receptor	23.38	New Receptor	New Receptor	23.31	New Receptor	New Receptor
R14	New Receptor	New Receptor	23.08	New Receptor	New Receptor	23.04	New Receptor	New Receptor
R15	New Receptor	New Receptor	15.59	New Receptor	New Receptor	15.55	New Receptor	New Receptor
R16	New Receptor	New Receptor	14.84	New Receptor	New Receptor	14.8	New Receptor	New Receptor
R17	New Receptor	New Receptor	14.75	New Receptor	New Receptor	14.71	New Receptor	New Receptor
R18	New Receptor	New Receptor	16.12	New Receptor	New Receptor	16.08	New Receptor	New Receptor
R19	New Receptor	New Receptor	16.2	New Receptor	New Receptor	16.17	New Receptor	New Receptor
R20	19.95	16.55	16.67	0.1	Negligible	16.66	0.1	Negligible
R21	18.01	14.9	15	0.1	Negligible	14.99	0.1	Negligible
R22	15.45	12.82	12.88	0.1	Negligible	12.87	0.1	Negligible
R23	15.77	13.1	13.16	0.1	Negligible	13.15	0.1	Negligible

Receptor ID	Base 2019	DM 2025	DN 2025	Impact	Severity	DS 2025	Impact	Severity
R24	17.42	14.53	14.6	0.1	Negligible	14.6	0.1	Negligible
R25	14.62	12.08	12.13	0	Negligible	12.12	0	Negligible
R26	16.77	13.97	14.04	0	Negligible	14.03	0	Negligible
R27	14.85	12.31	12.35	0.1	Negligible	12.35	0.1	Negligible
R28	16.43	13.68	13.74	0	Negligible	13.74	0	Negligible
R29	26.35	21.59	21.6	0	Negligible	21.6	0	Negligible
R30	17.79	14.64	14.68	0.1	Negligible	14.68	0.1	Negligible
R31	26.74	21.94	21.95	0.1	Negligible	21.95	0.1	Negligible
R32	19.29	15.81	15.84	0	Negligible	15.84	0	Negligible
R33	16.75	13.69	13.71	0	Negligible	13.71	0	Negligible
R34	24.76	20.25	20.27	0	Negligible	20.27	0	Negligible
R35	34.84	28.42	28.46	0.1	Negligible	28.46	0.1	Negligible
R36	21.35	17.33	17.34	0	Negligible	17.34	0	Negligible

Table A11.7 – 2030 NO_2 Modelled Concentrations (ug/m^3)

Receptor ID	DM 2030	DN 2030	Impact	Severity	DS 2030	Impact	Severity
R01	20.09	20.1	0	Negligible	20.1	0	Negligible
R02	19.56	19.65	0.1	Negligible	19.64	0	Negligible
R03	17.97	18.01	0	Negligible	18	0	Negligible
R04	15.56	15.62	0	Negligible	15.62	0	Negligible
R05	18.26	18.31	0	Negligible	18.31	0	Negligible
R06	14.76	14.84	0	Negligible	14.84	0	Negligible
R07	New Receptor	12.19	New Receptor	New Receptor	12.18	New Receptor	New Receptor
R08	New Receptor	12.53	New Receptor	New Receptor	12.51	New Receptor	New Receptor
R09	New Receptor	12.81	New Receptor	New Receptor	12.79	New Receptor	New Receptor
R10	New Receptor	13.79	New Receptor	New Receptor	13.76	New Receptor	New Receptor

Receptor ID	DM 2030	DN 2030	Impact	Severity	DS 2030	Impact	Severity
R11	New Receptor	16.41	New Receptor	New Receptor	16.37	New Receptor	New Receptor
R12	New Receptor	14.71	New Receptor	New Receptor	14.69	New Receptor	New Receptor
R13	New Receptor	20.56	New Receptor	New Receptor	20.5	New Receptor	New Receptor
R14	New Receptor	20.32	New Receptor	New Receptor	20.29	New Receptor	New Receptor
R15	New Receptor	13.7	New Receptor	New Receptor	13.67	New Receptor	New Receptor
R16	New Receptor	13.04	New Receptor	New Receptor	13	New Receptor	New Receptor
R17	New Receptor	12.96	New Receptor	New Receptor	12.93	New Receptor	New Receptor
R18	New Receptor	14.24	New Receptor	New Receptor	14.21	New Receptor	New Receptor
R19	New Receptor	14.31	New Receptor	New Receptor	14.28	New Receptor	New Receptor
R20	14.6	14.7	0.1	Negligible	14.69	0.1	Negligible
R21	13.13	13.22	0.1	Negligible	13.21	0.1	Negligible
R22	11.37	11.42	0	Negligible	11.41	0	Negligible
R23	11.61	11.66	0.1	Negligible	11.65	0.1	Negligible
R24	12.89	12.96	0.1	Negligible	12.95	0.1	Negligible
R25	10.71	10.75	0.1	Negligible	10.75	0.1	Negligible
R26	12.4	12.46	0.1	Negligible	12.45	0.1	Negligible
R27	10.91	10.95	0.1	Negligible	10.95	0.1	Negligible
R28	12.14	12.19	0.1	Negligible	12.19	0.1	Negligible
R29	19.08	19.09	0	Negligible	19.09	0	Negligible
R30	13.03	13.07	0.1	Negligible	13.07	0.1	Negligible
R31	19.42	19.43	0	Negligible	19.43	0	Negligible
R32	14.05	14.08	0	Negligible	14.08	0	Negligible
R33	12.17	12.19	0	Negligible	12.19	0	Negligible
R34	17.95	17.97	0	Negligible	17.97	0	Negligible
R35	25.12	25.15	0.1	Negligible	25.15	0.1	Negligible
R36	15.36	15.37	0	Negligible	15.37	0	Negligible

Table A11.8 – Modelled PM_{10} Concentrations (ug/m^3)

Receptor ID	Base 2019	DM 2025	DN 2025	Impact	DS 2025	Impact	DM 2030	DN 2030	Impact	DS 2030	Impact
R01	13.9	13.3	13.3	0.0	13.3	0.0	13.3	13.3	0.0	13.3	0.0
R02	13.9	13.3	13.3	0.0	13.3	0.0	13.2	13.2	0.0	13.2	0.0
R03	13.6	13.0	13.0	0.0	13.0	0.0	13.0	13.0	0.0	13.0	0.0
R04	12.7	12.1	12.1	0.0	12.1	0.0	12.1	12.1	0.0	12.1	0.0
R05	13.0	12.4	12.4	0.0	12.4	0.0	12.3	12.3	0.0	12.3	0.0
R06	12.7	12.1	12.1	0.0	12.1	0.0	12.0	12.1	0.1	12.1	0.1
R07	New Receptor	New Receptor	11.6	New Receptor	11.6	New Receptor	New Receptor	11.5	New Receptor	11.5	New Receptor
R08	New Receptor	New Receptor	11.6	New Receptor	11.6	New Receptor	New Receptor	11.6	New Receptor	11.6	New Receptor
R09	New Receptor	New Receptor	11.6	New Receptor	11.6	New Receptor	New Receptor	11.6	New Receptor	11.6	New Receptor
R10	New Receptor	New Receptor	11.7	New Receptor	11.7	New Receptor	New Receptor	11.7	New Receptor	11.7	New Receptor
R11	New Receptor	New Receptor	12.0	New Receptor	12.0	New Receptor	New Receptor	12.0	New Receptor	12.0	New Receptor
R12	New Receptor	New Receptor	11.8	New Receptor	11.8	New Receptor	New Receptor	11.8	New Receptor	11.8	New Receptor
R13	New Receptor	New Receptor	12.4	New Receptor	12.4	New Receptor	New Receptor	12.4	New Receptor	12.4	New Receptor
R14	New Receptor	New Receptor	12.4	New Receptor	12.4	New Receptor	New Receptor	12.4	New Receptor	12.4	New Receptor
R15	New Receptor	New Receptor	11.7	New Receptor	11.7	New Receptor	New Receptor	11.7	New Receptor	11.7	New Receptor
R16	New Receptor	New Receptor	11.7	New Receptor	11.7	New Receptor	New Receptor	11.6	New Receptor	11.6	New Receptor
R17	New Receptor	New Receptor	11.7	New Receptor	11.7	New Receptor	New Receptor	11.6	New Receptor	11.6	New Receptor
R18	New Receptor	New Receptor	12.0	New Receptor	12.0	New Receptor	New Receptor	11.9	New Receptor	11.9	New Receptor
R19	New	New	12.0	New	12.0	New	New	11.9	New	11.9	New

Receptor ID	Base 2019	DM 2025	DN 2025	Impact	DS 2025	Impact	DM 2030	DN 2030	Impact	DS 2030	Impact
	Receptor	Receptor		Receptor		Receptor	Receptor		Receptor		Receptor
R20	11.3	10.7	10.7	0.0	10.7	0.0	10.6	10.7	0.1	10.7	0.1
R21	11.1	10.5	10.5	0.0	10.5	0.0	10.5	10.5	0.0	10.5	0.0
R22	11.3	10.7	10.7	0.0	10.7	0.0	10.7	10.7	0.0	10.7	0.0
R23	11.4	10.8	10.8	0.0	10.8	0.0	10.7	10.7	0.0	10.7	0.0
R24	11.5	10.9	10.9	0.0	10.9	0.0	10.9	10.9	0.0	10.9	0.0
R25	11.3	10.7	10.7	0.0	10.7	0.0	10.6	10.6	0.0	10.6	0.0
R26	11.5	10.9	10.9	0.0	10.9	0.0	10.8	10.8	0.0	10.8	0.0
R27	11.3	10.7	10.7	0.0	10.7	0.0	10.6	10.6	0.0	10.6	0.0
R28	11.4	10.8	10.8	0.0	10.8	0.0	10.8	10.8	0.0	10.8	0.0
R29	12.3	11.6	11.7	0.1	11.7	0.1	11.6	11.6	0.0	11.6	0.0
R30	11.2	10.6	10.6	0.0	10.6	0.0	10.5	10.5	0.0	10.5	0.0
R31	12.5	11.8	11.8	0.0	11.8	0.0	11.8	11.8	0.0	11.8	0.0
R32	11.3	10.7	10.7	0.0	10.7	0.0	10.6	10.6	0.0	10.6	0.0
R33	11.0	10.4	10.4	0.0	10.4	0.0	10.3	10.3	0.0	10.3	0.0
R34	11.7	11.0	11.0	0.0	11.0	0.0	11.0	11.0	0.0	11.0	0.0
R35	12.3	11.7	11.7	0.0	11.7	0.0	11.6	11.6	0.0	11.6	0.0
R36	11.3	10.7	10.7	0.0	10.7	0.0	10.7	10.7	0.0	10.7	0.0

Appendix 11.7 – Model Results (Ecological)

Table A11.9 – 2025 Modelled NO_2 Concentrations at Ecological Receptors (and Percentage Nitrogen Deposition Impact of the lowest Critical Load)

Name	Total NO2	Dry Dep Flux	kgN ha year	Total NO2	Dry Dep Flux	kgN ha year	Min Critical Load	% Impact of critical load	Total NO2	Dry Dep Flux	kgN ha year	Min Critical Load	% Impact of critical load
Eco_000	24.8	0.1	7.1	24.8	0.1	7.1	5.0	0.40	24.8	0.1	7.1	5.0	0.35
Eco_010	19.6	0.1	5.6	19.7	0.1	5.7	5.0	0.29	19.7	0.1	5.7	5.0	0.29
Eco_020	17.0	0.1	4.9	17.0	0.1	4.9	5.0	0.23	17.0	0.1	4.9	5.0	0.23
Eco_030	15.4	0.0	4.4	15.4	0.0	4.4	5.0	0.23	15.4	0.0	4.4	5.0	0.17
Eco_040	14.3	0.0	4.1	14.4	0.0	4.1	5.0	0.23	14.3	0.0	4.1	5.0	0.17
Eco_050	13.5	0.0	3.9	13.6	0.0	3.9	5.0	0.17	13.6	0.0	3.9	5.0	0.17
Eco_060	12.9	0.0	3.7	13.0	0.0	3.7	5.0	0.12	13.0	0.0	3.7	5.0	0.12
Eco_070	12.5	0.0	3.6	12.5	0.0	3.6	5.0	0.12	12.5	0.0	3.6	5.0	0.12
Eco_080	12.1	0.0	3.5	12.1	0.0	3.5	5.0	0.12	12.1	0.0	3.5	5.0	0.12
Eco_090	11.8	0.0	3.4	11.8	0.0	3.4	5.0	0.12	11.8	0.0	3.4	5.0	0.12
Eco_100	11.5	0.0	3.3	11.6	0.0	3.3	5.0	0.12	11.6	0.0	3.3	5.0	0.12
Eco_120	11.1	0.0	3.2	11.2	0.0	3.2	5.0	0.12	11.2	0.0	3.2	5.0	0.12
Eco_140	10.8	0.0	3.1	10.9	0.0	3.1	5.0	0.12	10.8	0.0	3.1	5.0	0.06
Eco_160	10.6	0.0	3.0	10.6	0.0	3.1	5.0	0.12	10.6	0.0	3.1	5.0	0.06
Eco_180	10.4	0.0	3.0	10.4	0.0	3.0	5.0	0.12	10.4	0.0	3.0	5.0	0.12
Eco_200	10.3	0.0	3.0	10.3	0.0	3.0	5.0	0.06	10.3	0.0	3.0	5.0	0.06

Table A11.10 - 2030 Modelled NO_2 Concentrations at Ecological Receptors (and Percentage Nitrogen Deposition Impact of the lowest Critical Load)

Name	Total NO2	Dry Dep Flux	kgN ha year	Total NO2	Dry Dep Flux	kgN ha year	Min Critical Load	% Impact of critical load	Total NO2	Dry Dep Flux	kgN ha year	Min Critical Load	% Impact of critical load
Eco_000	21.6	0.1	6.2	21.7	0.1	6.2	5.0	0.35	21.7	0.1	6.2	5.0	0.35
Eco_010	17.1	0.1	4.9	17.2	0.1	4.9	5.0	0.23	17.2	0.1	4.9	5.0	0.23
Eco_020	14.9	0.0	4.3	14.9	0.0	4.3	5.0	0.23	14.9	0.0	4.3	5.0	0.17
Eco_030	13.5	0.0	3.9	13.5	0.0	3.9	5.0	0.17	13.5	0.0	3.9	5.0	0.12
Eco_040	12.5	0.0	3.6	12.6	0.0	3.6	5.0	0.17	12.6	0.0	3.6	5.0	0.17
Eco_050	11.9	0.0	3.4	11.9	0.0	3.4	5.0	0.12	11.9	0.0	3.4	5.0	0.12
Eco_060	11.4	0.0	3.3	11.4	0.0	3.3	5.0	0.12	11.4	0.0	3.3	5.0	0.12
Eco_070	11.0	0.0	3.2	11.0	0.0	3.2	5.0	0.12	11.0	0.0	3.2	5.0	0.12
Eco_080	10.6	0.0	3.1	10.7	0.0	3.1	5.0	0.12	10.7	0.0	3.1	5.0	0.12
Eco_090	10.4	0.0	3.0	10.4	0.0	3.0	5.0	0.12	10.4	0.0	3.0	5.0	0.12
Eco_100	10.1	0.0	2.9	10.2	0.0	2.9	5.0	0.12	10.2	0.0	2.9	5.0	0.12
Eco_120	9.8	0.0	2.8	9.8	0.0	2.8	5.0	0.06	9.8	0.0	2.8	5.0	0.06
Eco_140	9.5	0.0	2.7	9.6	0.0	2.7	5.0	0.06	9.6	0.0	2.7	5.0	0.06
Eco_160	9.3	0.0	2.7	9.4	0.0	2.7	5.0	0.12	9.4	0.0	2.7	5.0	0.06
Eco_180	9.2	0.0	2.6	9.2	0.0	2.6	5.0	0.06	9.2	0.0	2.6	5.0	0.06
Eco_200	9.1	0.0	2.6	9.1	0.0	2.6	5.0	0.06	9.1	0.0	2.6	5.0	0.06