C.1 Appendix C.1 - Construction Phase Assessment

C.1.1 The criteria developed by the Institute of Air Quality Management for the assessment of air quality impacts arising from construction activities was used as the basis for the assessment methodology discussed in the following sections. The assessment is comprised of five steps as discussed below.

Step 1: Identify the need for a detailed assessment

C.1.2 An assessment would normally be required where there is:

- A human receptor within 250 metres of the proposed scheme; and/or within 50 metres of the access route(s) used by the construction vehicles on the public highway up to 250 metres from the study area site entrance(s); and / or
- An ecological receptor within 50 metres of the proposed scheme and/or within 50 metres of the access route(s) used by construction vehicles on the public highway up to 250 metres from the site entrance(s).

C.1.3 A human receptor refers to any location where a person or property may experience the adverse effects of airborne dust or dust-soiling, or exposure to particulate matter (PM_{10}) over a period relevant to the ambient air quality objectives.

C.1.4 An ecological receptor refers to any sensitive habitat affected by dust soiling. For locations with a statutory designation, such as a National Nature Reserve (NNR), Ramsar site, Site of Special Scientific Interest (SSSI), Special Area of Conservation (SAC) or Special Protection Areas (SPA), consideration should be given as to whether the particular site is sensitive to dust. Some non-statutory sites may also be considered if appropriate, such as a Site of Importance for Nature Conservation (SINC).

C.1.5 Where the need for a more detailed assessment is screened out, it can be concluded that the level of risk is 'negligible' and any effects would be 'not significant'.

Step 2: Assess the risk of dust impacts

C.1.6 A site is allocated a risk category on the basis of the scale and nature of the works (Step 2A) and the sensitivity of the area to dust impacts (Step 2B). These two factors are combined in Step 2C to determine the risk of dust impacts before the allocation of mitigation measures. Risks are described as low, medium or high for each of the four separate activities (demolition, construction, earthworks and trackout). Site-specific mitigation is required, proportionate to the level of risk.

Step 2A: Define the potential dust emission magnitude

C.1.7 The potential dust emission magnitude is based on the scale of the anticipated works and should be classified as small, medium or large. **Table C.1** presents the dust emission criteria outlined for each construction activity.

Table C.1: Potential dust emission magnitude criteria

Construction activity	Large	Medium	Small
Demolition	Total building volume >75,000 m^3, potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities >12 m above ground level.	Total building volume 12,000 m^3 – 75,000 m^3, potentially dusty construction material, demolition activities 6-12 m above ground level.	Total building volume <12,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <6 m above ground, demolition during wetter months.
Earthworks	Total site area >110,000 m^2, potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >6 m in height.	Total site area 18,000 m^2 – 110,000 m^2, moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 3 m – 6 m in height.	Total site area <18,000 m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4 m in height, total material moved.
Construction	Total building volume >75,000 m^3, on site concrete batching, sandblasting.	Total building volume 75,000 m^3 – 12,000 m^3, potentially dusty construction material (e.g. concrete), on site concrete batching.	Total building volume <12,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber).
Trackout	>50 HDV (>3.5 t) outward movements[a] in any one day[b], potentially dusty surface material (e.g. high clay content), unpaved road length >100 m.	10-50 HDV (>3.5 t) outward movements[a] in any one day[b], moderately dusty surface material (e.g. high clay content), unpaved road length 50 m – 100 m.	<10 HDV (>3.5 t) outward movements[a] in any one day[b], surface material with low potential for dust release, unpaved road length <50 m.

A vehicle movement is a one way journey. i.e. from A to B and excludes the return journey.

HDV movements during a construction project vary over its lifetime, and the number of movements is the maximum not the average.

Step 2B: Define the sensitivity of the area

C.1.8 The sensitivity of the area is described as low, medium or high. It takes into account a number of factors:

- The specific sensitivities of the receptors in the area;
- The proximity and number of those receptors;

- The local background PM_{10} concentrations; and
- Site-specific factors, such as whether there are natural shelters, such as trees, to reduce the risk of wind-blown dust.

C.1.9 **Table C.2** presents indicative examples of classification groups for the varying sensitivities of people to dust soiling effects and to the health effects of PM_{10}; and the sensitivities of receptors to ecological effects. A judgement is made at the site-specific level where sensitivities may be higher or lower, for example a soft fruit business may be more sensitive to soiling than an alternative industry in the same location. Box 6, Box 7 and Box 8 within the IAQM guidance outlines more detailed information on defining sensitivity.

Table C.2: Indicative examples of the sensitivity of different types of receptors

Sensitivity of receptor	Sensitivities of people and ecological receptors		
	Dust soiling effects [a]	Health effects of PM_{10} [b]	Ecological effects [c]
High	Dwellings, museums and other culturally important collections, medium and long-term car parks and car showrooms.	Residential properties, hospitals, schools and residential care homes.	Locations with an international or national designation and the designated features may be affected by dust soiling (e.g. SAC/SPA/Ramsar). Locations where there is a community of a species particularly sensitive to dust such as vascular species included in the Red Data list for Great Britain.
Medium	Parks, places of work.	Office and shop workers not occupationally exposed to PM_{10}.	Locations where there is a particularly important plant species, where dust sensitivity is uncertain or unknown. Locations with a national designation where the features may be affected by dust deposition (e.g. SSSIs).
Low	Playing fields, farmland, footpaths, short-term car parks and roads.	Public footpaths, playing fields, parks and shopping streets.	Locations with a local designation where the features may be affected by dust deposition (e.g. Local Nature Reserves).

People's expectations would vary depending on the existing dust deposition in the area.

This follows the Department for Environment, Food and Rural Affairs (Defra, 2022) guidance as set out in Local Air Quality Management Technical Guidance (LAQM.TG (22)). Notwithstanding the fact that the ambient air quality objectives and limit values do not apply to people in the workplace, such people can be affected to exposure of PM_{10}. However, they are considered to be less sensitive than the general public as a whole because those most sensitive to the effects of air pollution, such as young children are not normally workers. For this reason workers have been included in the medium sensitivity category.

Only if there are habitats that might be sensitive to dust. A Habitat Regulation Assessment of the site may be required as part of the planning process if the site lies close to an internationally designated site i.e. Special Conservation Areas (SACs), Special Protection Areas (SPAs) designated under the Habitats Directive (92/43/EEC) and Ramsar sites.

C.1.10 The IAQM guidance advises consideration of the risk associated with the nearest receptors to construction activities.

C.1.11 Where there are multiple receptors in a single location, a worst-case representative receptor location is considered and the highest risk applicable is allocated.

C.1.12 The receptor sensitivity and distance are then used to determine the potential dust risk for each dust effect for each construction activity as shown in **Table C.3**, **Table C.4** and **Table C.5**. It is noted that distances are to the dust source and so a different area may be affected by trackout than by on-site works.

Table C.3: Sensitivity of the area to dust soiling effects on people and property [a]

Receptor sensitivity	Number of Receptors[b]	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

a. Estimate the total number of receptors within the stated distance. Only the highest level of area sensitivity from the table needs to be considered. For example, if there are 7 high sensitivity receptors <20 metres of the source and 95 high sensitivity receptors between 20 and 50 m, then the total of number of receptors <50 metres is 102. The sensitivity of the area in this case would be high.

b. Estimate the number of receptors within each distance band. For example, a residential unit is one receptor. For receptors which are not dwellings, professional judgement should be used to determine the number of human receptors. For **example,** a school or hospital is likely to be within the >100 receptor category.

Table C.4: Sensitivity of the area to human health impacts [a b c]

Receptor sensitivity	Annual Mean PM_{10} Concentrations	Number of Receptors	Distance from the Source (m)				
			<20	<50	<100	<200	<350
High	>32 μg/m³	>100	High	High	High	Mediu m	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32 μg/m³	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28 μg/m³	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24 μg/m³	>100	Medium	Low	Low	Low	Low

Receptor sensitivity	Annual Mean PM_{10} Concentrations	Number of Receptors	Distance from the Source (m)				
			<20	<50	<100	<200	<350
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	>32 µg/m^3	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	28-32 µg/m^3	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	24-28 µg/m^3	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	<24 µg/m^3	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Low	-	≥1	Low	Low	Low	Low	Low

Estimate the total within the stated distance (e.g. the total within 350 metres and not the number between 200 and 350 m), noting that only the highest level of area sensitivity from the table needs to be considered. For example, if there are 7 high sensitivity receptors <20 metres of the source and 95 high sensitivity receptors between 20 and 50 m, then the total of number of receptors <50 metres is 102. If the annual mean PM_{10} concentration is 29 µg/m^3, the sensitivity of the area would be high.

Annual mean PM_{10} concentrations are most straightforwardly taken from the national background maps but should also take account of local sources. The values are based on 32 µg/m^3 being the annual mean concentration at which an exceedance of the 24-hour objective is likely in England, Wales and Northern Ireland.

In the case of high sensitivity receptors with high occupancy (such as schools or hospitals) approximate the number of people likely to be present. In the case of residential dwellings, simply include the number of properties.

Table C.5: Sensitivity of the area to ecological impacts

Receptor Sensitivity	Distance from the Source (m)[a]	
	<20	<50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

Only the highest level of area sensitivity from the table needs to be considered.

Step 2C: Define the risk of impacts

C.1.13 The dust emission magnitude is then combined with the sensitivity of the area to determine the overall risk of impacts with no mitigation measures applied. The matrices in **Table C.6** provide a method of assigning the level of risk for each activity. These can then be used to determine the level of mitigation that is required.

Table C.6: Risks of dust impacts

Receptor Sensitivity	Dust Emission Magnitude		
	Large	Medium	Small
Demolition			
High	High Risk	Medium Risk	Medium Risk

Receptor Sensitivity	Dust Emission Magnitude		
	Large	Medium	Small
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible
Earthworks			
High	High risk	Medium risk	Low risk
Medium	Medium risk	Medium risk	Low risk
Low	Low risk	Low risk	Negligible
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

C.1.14 Step three of the IAQM guidance identifies appropriate site-specific mitigation. These measures are related to whether the site is a low-, medium- or high-risk site. The highest risk category of a site (of all activities being undertaken) is recommended when considering appropriate mitigation measures for the site. Where risk is assigned as 'negligible', no mitigation measures beyond those required by legislation are required. However, additional mitigation measures may be applied as good practice.

C.1.15 A selection of these measures is specified as suitable to mitigate dust emissions from activities, based on professional judgement.

C.1.16 Step 4: Determine significant effects

C.1.17 Following Step 2 (definition of the proposed scheme and the surroundings and identification of the risk of dust effects occurring for each activity), and Step 3 (identification of appropriate site-specific mitigation), the significance of the potential dust effects can be determined. The recommended mitigation measures should normally be sufficient to reduce construction dust impacts to a not significant effect.

C.1.18 The approach in Step 4 of the IAQM dust assessment guidance has been adopted to determine the significance of effects with regard to dust emissions. The guidance states the following:

C.1.19 "For almost all construction activity, the aim should be to prevent significant effects on receptors through the use of effective mitigation. Experience shows that this is normally possible. Hence the residual effect will normally be 'not significant'."

C.1.20 IAQM guidance also states that:

C.1.21 "Even with a rigorous DMP [Dust Management Plan] in place, it is not possible to guarantee that the dust mitigation measures will be effective all the time, and if, for example, dust emissions occur under adverse weather conditions, or there is an interruption to the water supply used for dust suppression, the local community may experience occasional, short-term dust annoyance. The likely scale of this would not normally be considered sufficient to change the conclusion that with mitigation the effects will be 'not significant'."

C.1.22 Step 4 of IAQM guidance recognises that the key to the above approach is that it assumes that the regulators ensure that the proposed mitigation measures are implemented. The management plan would include the necessary systems and procedures to facilitate on-going checking by the regulators to ensure that mitigation is being delivered, and that it is effective in reducing any residual effect to 'not significant' in line with the guidance.

C.2 Appendix C.2 - Detailed Dispersion Modelling Assessment Method

Modelling Software

C.2.1 The ADMS-Roads detailed dispersion model was used to assess direct effects from the additional traffic on local air quality.

C.2.2 The ADMS-Roads model considers the key variables that influence pollutant emission and dispersion (meteorology, surface roughness, predicted future traffic mixes and predicted future engine emission standard mixes).

Assessment Scenarios

C.2.3 Detailed dispersion modelling has been used to determine the impact associated with the Proposed Development on air quality. These impacts were anticipated to arise from additional vehicle movements associated with the operation of the Proposed Development. The energy provision for the Proposed Development is proposed to be via air source heat pumps (ASHP), therefore there are no emissions associated with energy. The ADMS-Roads (Atmospheric Dispersion Model System- Roads) model (version 5) was used.

C.2.4 To summarise, predictions of NO_2, PM_{10} and $PM_{2.5}$ were made for the following scenarios:

- **Scenario 1 (S1):** Baseline 2023: Base year for model verification, using 2024 traffic data and 2023 background pollutant concentrations and emissions factors;

- **Scenario 2 (S2):** Future Operational Baseline (2030): Traffic data comprised of 2030 future baseline without development flows; and,
- **Scenario 3 (S3):** Future Operational Baseline + Development (2030): Traffic data comprised of 2030 future baseline including additional vehicle movements associated with the Proposed Development.

C.2.5 The ADMS-Roads model assesses the volume of pollutants generated along each stretch of modelled road based on inputted 'emissions factors' (g/km/s). Defra's emissions factors toolkit (2023 baseline year for model verification and 2030 for earliest expected operational year of the Proposed Development) was used to determine the emissions of oxides of nitrogen (NO_X), PM_{10} and $PM_{2.5}$ from operational traffic along the affected links. The 'Urban (Not London)' setting was selected for the majority of modelled road links, and the 'Rural' setting for some applicable road links with reference to the 'Emissions Factors Toolkit v12.1 User Guide.'

C.2.6 Emissions factors are projected to fall with time, as newer, cleaner vehicles gradually replace older, more polluting vehicles. This drives reductions in the UK-AIR background maps. As the Proposed Development is expected to open during 2030, 2030 emissions factors have been used to assess impacts from the Proposed Development in the operational year for the Proposed Development (S2 and S3).

Traffic Data

C.2.7 The AADT and percentage of heavy-duty vehicles (%HDVs) for the local roads of interest were obtained from the Transport Consultant, Pell Frischman Ltd. Vehicle speeds were provide by the Transport Consultant on each road link applicable in S1, but sometimes adjusted with reference to the advice on modelling junctions and congestion provided within TG22, professional judgement and with regard for the speeds surveyed in connection with this assessment. **Table C.7** and **Table C.8** summarise the information used within the assessment (AADT and %HDVs). The roads and receptors included in the dispersion modelling assessment are also presented in **Figure C.1** below.

Vehicle Emissions Factors

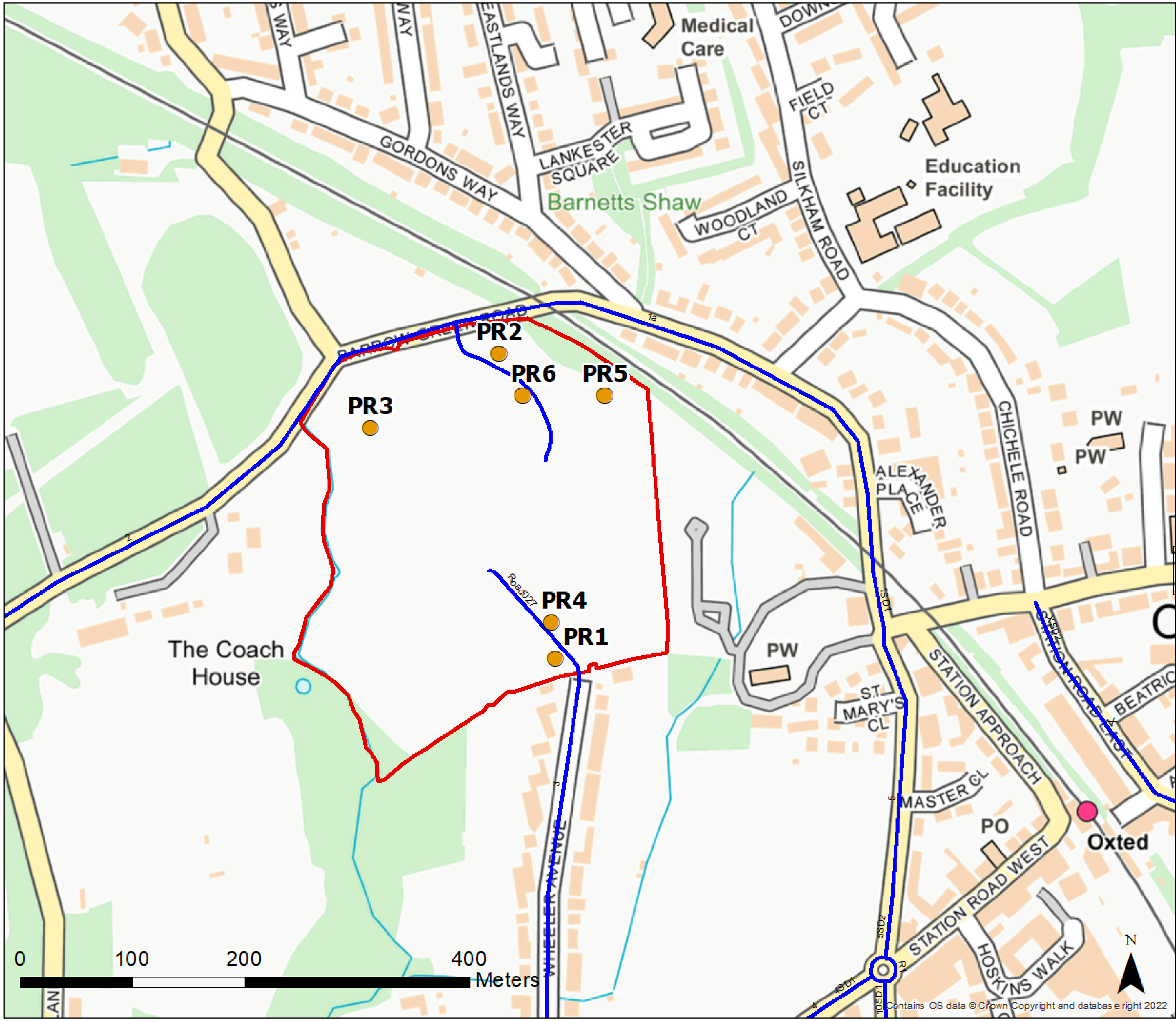
C.2.8 The ADMS-Roads model assesses the volume of pollutants generated along each stretch of modelled road based on inputted 'emissions factors' (g/km/s). Defra's emissions factors toolkit (2023 baseline year for model verification and 2030 for earliest expected operational year of the Proposed Development) was used to determine the emissions of NO_x, PM_{10} and $PM_{2.5}$ from operational traffic along the affected links.

Table C.7: Traffic Data for S1-S3; and vehicle free-flowing speeds applied in all scenarios

Link Name	S1		S2		S3		Speed (km/h)
	AADT	%HDV	AADT	%HDV	AADT	%HDV	
A25 Westerham Road	14,363	3.6	15,124	3.6	15,504	3.54	64*
A25 East Hill	13,694	4.3	14,614	4.2	14,796	4.20	64*
Wheeler Avenue	601	0.4	633	0.40	1,108	0.61	48*
Church Lane (East of Wheeler Avenue)	4,107	0.4	4,324	0.40	4,547	0.46	48*
Church Lane (West of Wheeler Avenue)	3,967	0.4	4,177	0.40	4,429	0.46	48*
A25 West Hill (East of Church Ln)	12,361	4.3	13,230	4.24	13,230	4.24	48
A25 Godstone Road (West of Church Ln)	16189	4.3	17,260	4.20	17,512	4.20	48
Barrow Green Lane (to the east of proposed site access)	1,778	0.7	2,152	0.70	2,462	0.67	48*
Church Lane (N/S Alignment, north of Station Rd W)	5,108	0.5	5,454	0.50	5,735	0.52	48*
East Hill Road (N/S Alignment)	3,438	0.9	3,697	0.90	3,879	0.90	48*
"Barrow Green Lane (to the west of proposed site access)"	1,778	0.7	2,152	0.67	2,713	0.68	54
Site Access North	0	0	0	0	870	0.63	32*
Site Access South	0	0	0	0	475	0.88	32

* Speeds on certain sections of these road links have been reduced to reflect queuing traffic at junctions.

Figure C-1: Roads and proposed receptors included in the dispersion modelling assessment



Legend

- Proposed Receptor Location
- ADMS Road Source
- Site Boundary

Copyright information

Purpose of Issue:
FINAL

Client name
Croudace Homes Ltd

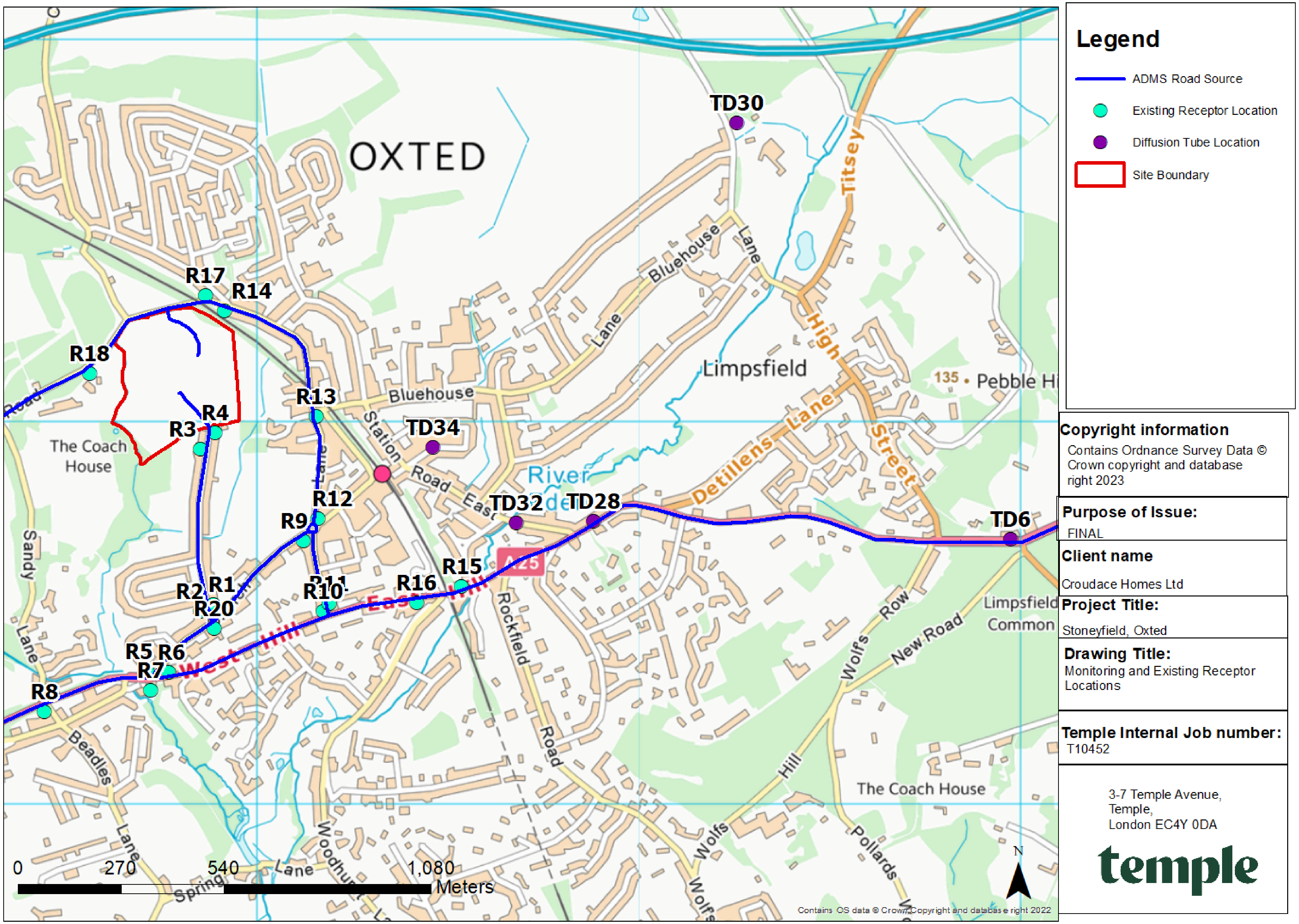
Project Title:
Stoneyfield, Oxted

Drawing Title:
Proposed Receptor Locations

Temple Internal Job number:
T10452

3-7 Temple Avenue,
Temple,
London EC4Y 0DA

Figure C-2: Roads, existing receptors and monitoring locations included in the dispersion modelling assessment



Modelled Receptors

C.2.9 Sensitive existing receptors were selected at a range of locations (including worst-case ones) where members of the public are expected to be present and potentially regularly exposed to air pollutants. In addition, receptors were selected within the Site to assess whether future users may be exposed to poor ambient air quality when the Proposed Development is operational. The existing receptors included are shown in **Table C.8** below.

C.2.10 The assessment has assumed that all receptors at ground floor level are elevated to 1.5m, to represent the average breathing height for a human, except where the floor was considered to be elevated at existing receptors.

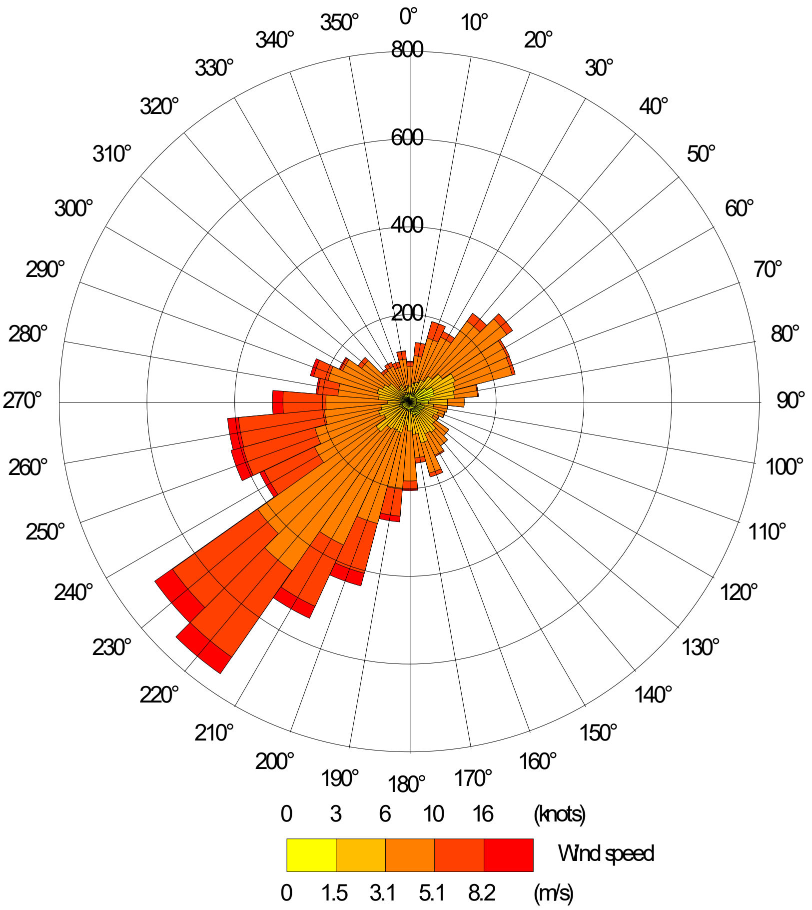
Table C.8: List of receptors modelled in all scenarios

Receptor ID	Receptor Type	X	Y	Z	Which AQOs apply at the receptor?
R1	Existing residential façade	538890	152523	1.5	Annual mean, 24-hour mean and hourly mean AQOs
R2	Existing residential façade	538856	152506	1.5	
R3	Existing residential façade	538857	152931	1.5	
R4	Existing residential façade	538893	152973	1.5	
R5	Existing residential façade	538716	152349	1.5	
R6	Existing residential façade	538773	152346	1.5	
R7	Existing residential façade	538726	152301	1.5	
R8	Existing residential façade	538448	152243	1.5	
R9	Existing residential façade	539126	152691	1.5	
R10	Existing residential façade	539178	152506	1.5	
R11	Existing residential façade	539193	152527	1.5	
R12	Existing residential façade	539163	152748	1.5	
R13	Existing residential façade	539159	153017	1.5	
R14	Existing residential façade	538919	153293	1.5	
R15	Existing residential façade	539538	152571	1.5	
R16	Existing residential façade	539422	152529	1.5	
R17	Existing residential façade	538870	153332	1.5	
R18	Existing residential façade	538566	153128	1.5	
R19	Existing residential façade	538130	152879	1.5	
R20	Existing residential façade	538891	152461	1.5	
R21	Existing residential façade	537971	152842	1.5	
PR1	Proposed residential façade	538857	153000	1.5	
PR2	Proposed residential façade	538807	153270	1.5	
PR3	Proposed residential façade	538692	153204	1.5	
PR4	Proposed residential façade	538853	153032	1.5	
PR5	Proposed residential façade	538901	153233	1.5	
PR6	Proposed residential façade	538828	153233	1.5	

Meteorological data

C.2.11 This study used 2023 meteorological data from Kenley Airfield, which is considered a suitable, representative site, as per advice provided by the Met Office. The wind rose for 2023 meteorological data used in our model is set out in **Figure C.3**.

Figure C-3: Wind rose from the Kenley Airfield meteorological station during 2023



Background Concentrations

C.2.12 The total concentration of a pollutant comprises those from the modelled local emission sources and background pollutant concentrations, which are transported into an area by the wind from further away.

C.2.13 The Defra UK-AIR concentration applicable to the assessed year and 1km^2 grid within which each receptor is located has been applied for NO_2, PM_{10} and $PM_{2.5}$.

C.2.14 The annual mean NO_2, PM_{10} and $PM_{2.5}$ background concentrations applied (following adjustment) at each of the receptor locations is shown in **Table C.9** (all receptors are located within the same grid). A worst-case assessment was undertaken where no improvement in background pollutant concentrations was assumed for the future year scenarios. Therefore, all assessment scenarios have utilised 2023 background pollutant concentrations.

Table C.9: Background annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations applied at each of the modelled receptor locations

Modelled Receptor	NO_2	PM_{10}	$PM_{2.5}$
R1	10.87	13.66	9.16
R2	10.87	13.66	9.16
R3	10.87	13.66	9.16
R4	10.87	13.66	9.16
R5	10.87	13.66	9.16
R6	10.87	13.66	9.16
R7	10.87	13.66	9.16
R8	10.87	13.66	9.16
R9	11.45	13.72	9.29
R10	11.45	13.72	9.29
R11	11.45	13.72	9.29
R12	11.45	13.72	9.29
R13	11.00	14.18	9.31
R14	12.60	15.39	9.96
R15	11.45	13.72	9.29
R16	11.45	13.72	9.29
R17	12.60	15.39	9.96
R18	12.60	15.39	9.96
R19	10.87	13.66	9.16
R20	10.87	13.66	9.16
R21	10.95	13.94	9.11
PR1	10.87	13.66	9.16
PR2	12.60	15.39	9.96
PR3	12.60	15.39	9.96
PR4	12.60	15.39	9.96
PR5	12.60	15.39	9.96
PR6	12.60	15.39	9.96

Summary of additional model inputs

C.2.15 A summary of the additional parameters considered in the dispersion modelling study are outlined in **Table C.10** below.

Table C.10: Summary of additional model input parameters

Parameter	Input into model
Road elevation	No terrain file used.
Road width	Road widths determined based on approximate measurement of roads using online measurement tools.
Canyon heights	The building configuration on both sides of the road did not lead to the formation of street canyons.
Surface roughness	A value of 0.5 at the dispersion site and 0.3 at the meteorological site.

Parameter	Input into model
Monin-Obukhov Length	A value of 10 metres at the dispersion site and meteorological site.

Model verification

C.2.16 Model verification refers to checks that are carried out on model performance in relation to roads modelling at a local level. Modelled concentrations are compared with the results of local monitoring and, where there is a disparity between modelled and monitored concentrations, an adjustment may be applied to the final model output.

C.2.17 Model verification for NO_2 was undertaken for this assessment using 2023 data monitored at the diffusion tubes TD28 (17 Westerham Road, Oxted), and 82 (1 Bakers Mead, Godstone). These monitoring locations were selected as they are the nearest 'roadside' monitoring sites to the Proposed Development site.

C.2.18 **Table C.11** below summarises the comparison of monitored versus modelled NO_x concentrations at the monitoring locations used for model verification and assessment purposes. The monitored road NOx was calculated by converting roadside NO_2 (i.e. monitored NO_2 – background NO_2) to NOx using the latest version of the NOx to NO_2 calculator.

C.2.19 The model was identified as underpredicting modelled pollutant concentrations by a factor of 3.62. This adjustment factor was applied to all modelled road concentrations before being combined with background concentrations.

C.2.20 Model verification for PM_{10} and $PM_{2.5}$ was undertaken using the NO_x verification factor, in the absence of any nearby model verification locations.

Table C.11: Verification Table for NOx in the study area

Site number	T28	T6
Monitored total NO_2 (µg/m^3)	19.3	27.2
Background NO_2 (µg/m^3)	11.45	10.54
Modelled road contribution NOx (µg/m^3)	5.73	7.75
Monitored road contribution NOx (µg/m^3)	14.75	32.45
Monitored NOx / Modelled NOx (Correction Factor)	3.62	

C.2.21 To determine whether the unadjusted modelled NO_x concentrations are suitable, the percentage difference between the total modelled NO_2 and total monitored NO_2 at each monitoring site is required to be within 25% or ideally within 10%. **Table C.12** below compares the percentage difference between the total monitored and modelled NO_2 concentrations, the latter calculated using the NOx to NO_2 calculator post-adjustment.

C.2.22 Following adjustment, the root mean square error was 1.17 µg/m³ and the average percentage difference between monitored and modelled total NO_2 concentration was 3.95%. The fractional bias was -1.34 and the correlation coefficient was 1.0. According to TG22, this percentage difference indicates that the model was performing acceptably following the adjustment of pollutant concentrations.

Figure C-4: Model Verification Graph

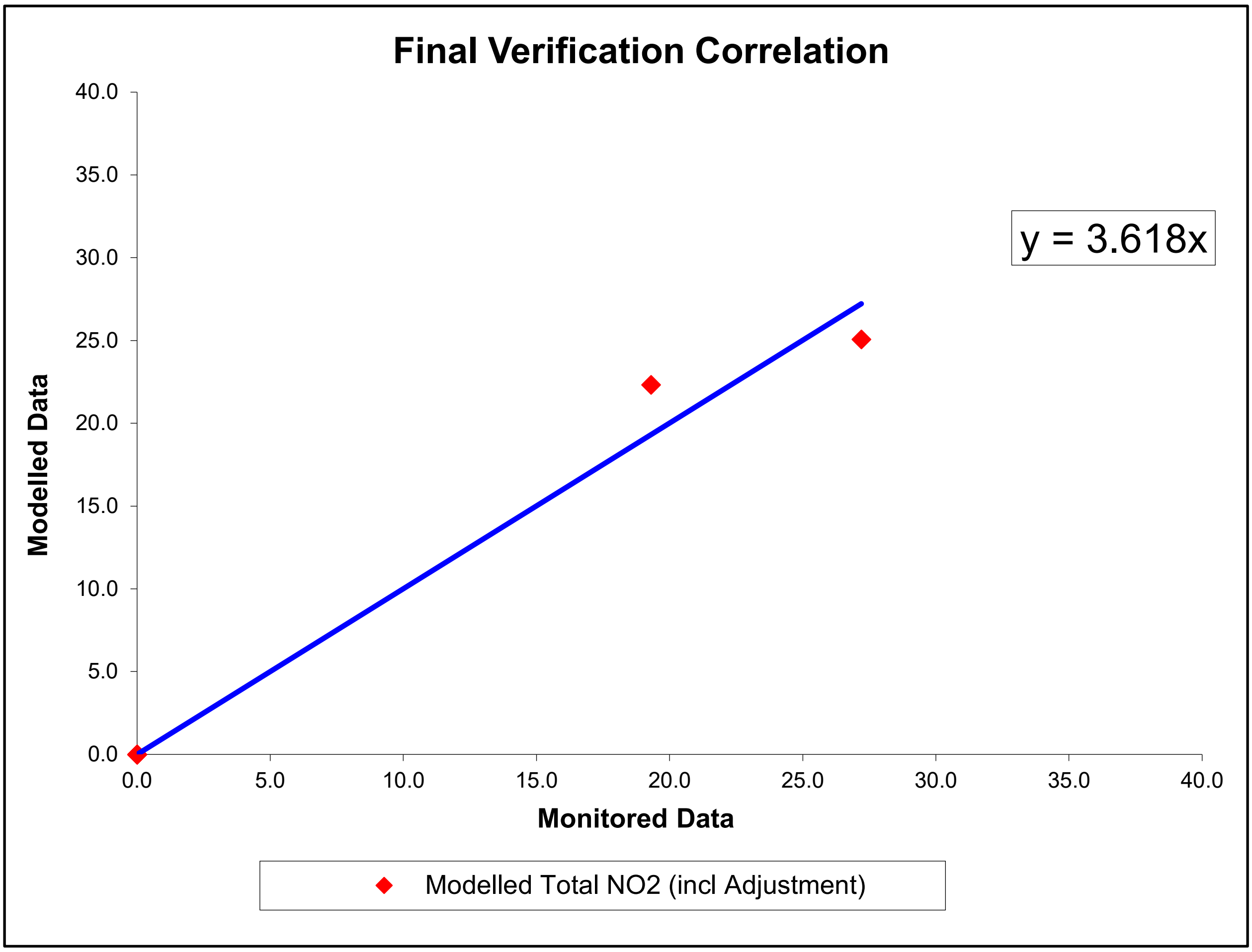


Table C.12: Comparison of the modelled and monitored annual mean NO_2 concentrations at the verification locations to determine whether model adjustment has improved model performance

Monitoring Location	Monitoring Result NO_2	Background NOx	Background NO_2	Modelled road NO_x post-adjustment	Total modelled NO_2	% difference in monitored vs modelled NO_2
TD28	19.3	15.2	11.5	10.9	22.3	15.71%
TD6	27.2	13.9	10.5	14.5	25.	-7.81%