



APPENDIX 6.1 TERMINOLOGY

Term	Definition
Accuracy	A measure of how well a set of data fits the true value.
Air quality objective	Policy target generally expressed as a maximum ambient concentration to be achieved, either without exception or with a permitted number of exceedences within a specific timescale (see also air quality standard).
Air quality standard	The concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards are based on the assessment of the effects of each pollutant on human health including the effects on sensitive sub groups (see also air quality objective).
Ambient air	Outdoor air in the troposphere, excluding workplace air.
Annual mean	The average (mean) of the concentrations measured for each pollutant for one year. Usually this is for a calendar year, but some species are reported for the period April to March, known as a pollution year. This period avoids splitting winter season between 2 years, which is useful for pollutants that have higher concentrations during the winter months.
AQMA	Air Quality Management Area.
DEFRA	Department for Environment, Food and Rural Affairs.
Exceedence	A period of time where the concentrations of a pollutant is greater than, or equal to, the appropriate air quality standard.
Fugitive emissions	Emissions arising from the passage of vehicles that do not arise from the exhaust system.
LAQM	Local Air Quality Management.
NO	Nitrogen monoxide, a.k.a. nitric oxide.
NO₂	Nitrogen dioxide.
NO_x	Nitrogen oxides.
O₃	Ozone.
Percentile	The percentage of results below a given value.
PM₁₀	Particulate matter with an aerodynamic diameter of less than 10 micrometres.



Term	Definition
ppb parts per billion	The concentration of a pollutant in the air in terms of volume ratio. A concentration of 1 ppb means that for every billion (10^9) units of air, there is one unit of pollutant present.
ppm parts per million	The concentration of a pollutant in the air in terms of volume ratio. A concentration of 1 ppm means that for every billion (10^6) units of air, there is one unit of pollutant present.
Ratification (Monitoring)	Involves a critical review of all information relating to a data set, in order to amend or reject the data. When the data have been ratified they represent the final data to be used (see also validation).
$\mu\text{g}/\text{m}^3$ micrograms per cubic metre	A measure of concentration in terms of mass per unit volume. A concentration of $1\mu\text{g}/\text{m}^3$ means that one cubic metre of air contains one microgram (millionth of a gram) of pollutant.
UKAS	United Kingdom Accreditation Service.
Uncertainty	A measure, associated with the result of a measurement, which characterizes the range of values within which the true value is expected to lie. Uncertainty is usually expressed as the range within which the true value is expected to lie with a 95% probability, where standard statistical and other procedures have been used to evaluate this figure. Uncertainty is more clearly defined than the closely related parameter 'accuracy', and has replaced it on recent European legislation.
USA	Updating and Screening Assessment.
Validation (modelling)	Refers to the general comparison of modelled results against monitoring data carried out by model developers.
Validation (monitoring)	Screening monitoring data by visual examination to check for spurious and unusual measurements (see also ratification).
Verification (modelling)	Comparison of modelled results versus any local monitoring data at relevant locations.



APPENDIX 6.2 – SUMMARY OF TRAFFIC DATA

Table 6.2.1: Traffic Data used in Modelling

Description	Average Speed (kph)		2024 Verification Study		2042 Future Base plus committed devs		2042 With Development	
	Freeflow	Congestion/ Junction	Total Vehicle Flow (24hr AADT)	% HDV	Total Vehicle Flow (24hr AADT)	% HDV	Total Vehicle Flow (24hr AADT)	% HDV
Camer Road (north of access)	96	30	7614	3.3	7851	4.5	9860	3.1
Sole Street	48/64	30	9107	3.0	9233	4.2	11522	2.9
Jeskyns Road	48/96	30	4005	1.2	6488	3.3	8427	1.9
Henhurst Road	64/96	30	4013	1.2	6677	3.2	8756	1.9
The Street	48	20	5102	4.4	2746	6.4	3095	5.6
Halfpence Lane	48/96	30	6028	4.1	3895	4.9	4317	4.4
Camer Road (south of access)	96	30	7614	3.3	7851	4.5	9283	3.3
Green Lane	96/48	30	5639	4.1	5861	5.5	7895	3.5
Wrotham Road (north of Longfield Road)	48	30	15212	3.6	16493	3.9	16151	3.7
Longfield Road	48	30	4074	0.8	4401	0.9	5364	0.7
Wrotham Road (south of Longfield Road)	48	30	17532	3.3	19363	3.5	19976	3.2
Wrotham Road (north of Green Lane)	48	30	11250	3.3	12497	3.0	13543	2.7
Norwood Lane (southern section)	96/48	30	780	1.7	645	1.6	0	0.0
Norwood Lane (northern section)	48	30	2526	0.9	2614	0.8	2976	1.0
Wrotham Road (south of Norwood Lane)	48	30	12621	2.9	13903	2.5	15082	2.3
Wrotham Road (north of Norwood Lane)	48/80	30	12676	2.9	14019	2.5	15227	2.3



Description	Average Speed (kph)		2024 Verification Study		2042 Future Base plus committed devs		2042 With Development	
	Freeflow	Congestion/ Junction	Total Vehicle Flow (24hr AADT)	% HDV	Total Vehicle Flow (24hr AADT)	% HDV	Total Vehicle Flow (24hr AADT)	% HDV
Wrotham Road (south of Lewis Road)	64/80	30	14005	2.8	15672	2.4	16913	2.2
Wrotham Road (Istead Rise to Lewis Road)	64	30	14978	2.8	16712	2.5	18018	2.3
Wrotham Road (north of Istead Rise)	64/80	30	18675	2.5	20547	2.2	22358	2.0
A2 (east of Halfpence Lane)	112	30	166846	11.2	178741	12.1	179453	12.1
A2 (east of Henhurst Road)	112	30	161028	11.6	182145	12.1	182594	12.1
A2 (east of Wrotham Road)	112	30	169385	10.8	148993	4.7	149430	4.7
A2 (west of Wrotham Road)	112	30	176954	10.4	163404	4.3	164110	4.3



APPENDIX 6.3 – VERIFICATION AND ADJUSTMENT OF MODELLED CONCENTRATIONS

Nitrogen Dioxide (NO₂)

Most nitrogen dioxide (NO₂) is produced in the atmosphere by reaction of nitric oxide (NO) with ozone. It is therefore most appropriate to verify the model in terms of primary pollutant emissions. Verification of concentrations predicted by the ADMS model has followed the methodology presented in LAQM.TG(22).

The model has been run to predict annual mean road-NO_x concentrations at two diffusion tube sites.

The model output of road-NO_x (i.e. the component of total NO_x coming from road traffic) has been compared to the 'measured' road-NO_x (Figure 6.3.1). The 'measured' road NO_x has been calculated from the measured NO₂ concentrations by using the Defra NO_x from NO₂ calculator available on the UK-AIR website.

Table 6.3.1: Comparison of Modelled and Monitored NO_x concentrations

Monitoring Location	Total Monitored NO ₂	Background NO ₂	Monitored Road NO _x	Modelled Road NO _x	Ratio
GR147	17.7	10.2	16.2	9.8	1.66
GR94	19.6	9.9	21.3	6.3	3.37

Figure 6.3.1: Comparison of Modelled Road NO_x with measured Road NO_x

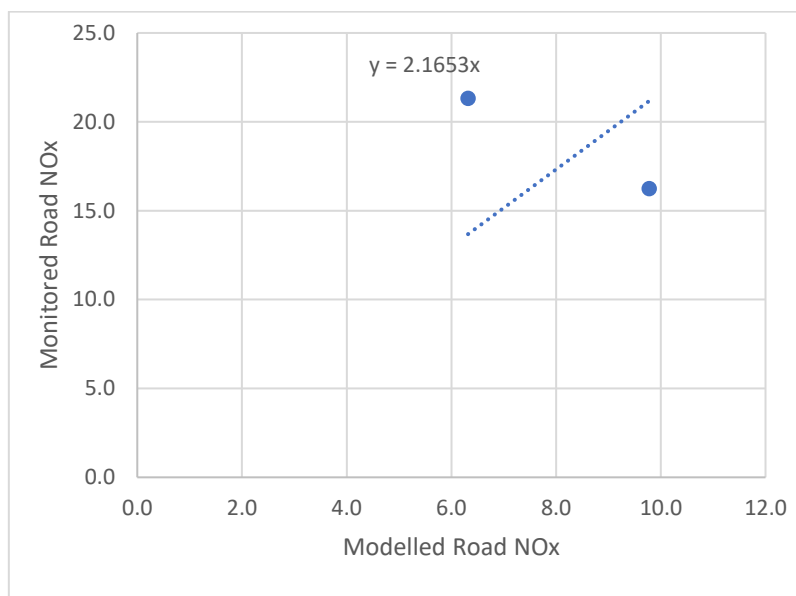


Figure 6.3.1 shows that the ADMS model slightly under-predicted the road NO_x concentrations at the selected monitoring sites. An adjustment factor was therefore determined as the ratio between the measured road-NO_x contribution and the modelled road-NO_x contribution, forced through zero (2.17). This factor has then been applied to the modelled road-NO_x concentration for each location to provide an adjusted modelled road-NO_x concentration.

The annual mean road-NO₂ concentration was determined using the Defra NO_x:NO₂ spreadsheet calculation tool and added to the background NO₂ concentration to produce a total adjusted NO₂ concentration.

Particulate Matter (PM₁₀ and PM_{2.5})

There was insufficient roadside monitoring data available against which the modelling could be verified. Consequently, the verification factor determined above for adjusting the road-NO_x contribution has been applied to the predicted road-PM₁₀ and road-PM_{2.5} contributions, consistent with guidance provided in LAQM.TG(22).

Model Uncertainty

An evaluation of model performance has been undertaken to establish confidence in model results. LAQM.TG(22) identifies a number of statistical procedures that are appropriate to evaluate model performance and assess the uncertainty. These include root mean square error



(RMSE); fractional bias (FB) and correlation coefficient (CC). These parameters estimate how the model results agree or diverge from the observations. The simplest parameter to calculate and to interpret is the RMSE, which has therefore been used in this assessment to understand the model uncertainty.

The RMSE value calculated after verification was 2.7. Guidance provided in LAQM.TG(22) indicates that for RMSE values higher than 25% of the objective level, that the model should be revisited. Ideally an RMSE value should be within 10% of the air quality objective level. For annual mean NO₂, which has an objective level of 40µg/m³, this equates to 4µg/m³. The RMSE value calculated for this assessment is therefore considered to fall within the acceptable limits, therefore the final predictions can be considered to be robust.



APPENDIX 6.4 - AIR QUALITY ASSESSMENT LEVELS

Table 6.4.1: Air Quality Assessment Levels

Pollutant	Standard (µg/m ³)	Averaging Period	No. of Permitted Exceedances	Notes
NO ₂	200 (a)	1-Hour	18 per annum (99.8 th percentile)	-
	40 (a)	Annual	-	-
PM ₁₀	50 (a)	24-Hour	35 per annum (90.4 th percentile)	-
	40 (a)	Annual	-	-
PM _{2.5}	20 (a)	Annual	-	-
	12 (b)	Annual	-	Interim Target to be achieved by end January 2028
	10 (c)	Annual	-	Target Level to be achieved by end December 2040
(a) Air Quality Standards Regulations (2010) and amendments (b) Environmental Improvement Plan 2023 (c) The Environmental Targets (Fine Particulate Matter) (England Regulations 2023)				

Table 6.4.2: Air Quality Objectives set for the Protection of Ecosystems

Pollutant	Applies to	Standard		Target Date
		Concentration	Measured as	
Nitrogen Oxides	All UK	30 µg/m ³	Annual mean	31 July 2001



Table 6.4.3: Relevant Nutrient Nitrogen (N-deposition) Critical Loads

Habitat Type	Critical Load (kgN/ha/yr)
Fraxinus Excelsior - Acer Campestre - Mercurialis Perennis Woodland	15-20
Quercus Robur - Pteridium Aquilinum - Rubus Fruticosus Woodland	15-20



APPENDIX 6.5 – CONSTRUCTION MITIGATION MEASURES

The following measures are detailed in the IAQM guidance as being ‘highly recommended’ for sites of the level of risk identified for the Proposed Development. It is therefore recommended that these measures incorporated into a DMP and approved by the local authority prior to the commencement of works on-Site:

- develop and implement a stakeholder communications plan that includes community engagement before work commences on site;
- display the name and contact details of the person accountable for air quality and dust issues on the Site boundary (i.e. the environment manager/engineer or site manager);
- display the head or regional office contact information;
- record all dust and air quality complaints, identify cause, take appropriate measures to reduce emissions in a timely manner and record the measures taken;
- make the complaints log available to the local authority when asked;
- record any exceptional incidents that cause dust and/or air emissions, either on- or off- Site and the action taken to resolve the situation in the log book;
- hold regular liaison meetings with other high risk construction sites within 250 m of the Site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-Site transport/deliveries which might be using the same strategic road network routes;
- undertake daily on-Site and off-Site inspections, where receptors (including roads) are nearby, to monitor dust, record inspections results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of Site boundary, with cleaning to be provided in necessary;
- carry out regular Site inspections to monitor compliance with the DMP, record inspection results and make inspection log available to GBC when asked;
- carry out regular Site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked;
- increase frequency of Site inspection by the person accountable for air quality and dust issues on-Site when activities with a high potential to produce dust are being carried out and during prolonged periods of dry or windy conditions;
- agree dust deposition, dust flux or real-time PM₁₀ continuous monitoring locations with the local authority. Where possible commence baseline monitoring at least three months before work commences on-Site.



- plan Site layout so that machinery and dust causing activities are located away from receptors, as far as is possible;
- erect solid screens or barriers around dusty activities or the Site boundary that are at least as high as any stockpiles;
- fully enclose Site or specific operations where there is a high potential for dust production and the activities are being undertaken for an extensive period;
- avoid Site runoff of water or mud;
- keep Site fencing, barriers and scaffolding clean using wet methods;
- remove materials that have a potential to produce dust from Site as soon as possible, unless being re-used on site. If being re-used on-Site, cover as detailed below;
- cover, seed or fence stockpiles to prevent wind whipping;
- ensure all vehicles switch off engines when stationary - no idling vehicles;
- avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable;
- impose and signpost a maximum-speed limit of 15mph on surfaced and 10 mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate);
- produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials;
- implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking and car-sharing);
- only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction e.g. suitable local exhaust ventilation systems;
- ensure an adequate water supply on-Site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate;
- use enclosed chutes and conveyors and covered skips;
- minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate;
- ensure equipment is readily available on-Site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods;
- avoid bonfires and burning of waste materials;
- re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable;



-
- use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable;
 - only remove the cover in small areas during work and not all at once;
 - avoid scabbling (roughening of concrete surfaces) if possible;
 - ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place;
 - ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery;
 - use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the Site;
 - avoid dry sweeping of large areas;
 - ensure vehicles entering and leaving the Site are covered to prevent the escape of materials during transport;
 - inspect on-Site haul routes for integrity and instigate necessary repairs to the surfaces as soon as reasonably practicable;
 - record all inspections of haul routes and any subsequent action in a Site log book;
 - install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned;
 - implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the Site where reasonably practicable);
 - ensure there is an adequate area of hard surfaced road between the wheel wash facility and the Site exit; and
 - access gates to be located at least 10 m from receptors where possible.

In addition to the 'recommended' measures, the IAQM guidance also sets the following 'desirable' measure which should also be considered for inclusion in the CEMP as follows:

- For smaller supplied of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust.