

Appendix 10-A Air Quality Significance Criteria

10-A.1 Overview

10-A.1.1 Generic significance criteria for emissions to air and air quality have been derived for different development projects including roads and industry. These criteria have been developed using separate indices for receptor sensitivity/acceptability and magnitude, with reference to applicable air quality standards and limit values where available.

10-A.1.2 The definitions for significance criteria are presented below for:

- Construction Dust (nuisance);
- Construction Dust (human health);
- Operational Air Quality (human health);
- Operational Air Quality (ecosystems);
- Operational Air Quality (critical load); and,
- Greenhouse Gases.

Please refer to Chapter 10 of the Environmental Statement for how these criteria definitions have been applied.

Table 10-A.1 Air Quality Objectives and Limit Values for England (excluding Ozone)

Pollutant	Threshold	Measured as	To be achieved by	Legislative Status		
				Air Quality Objective ¹	Air Quality Objective ²	Air Quality Limit Value ³
Benzene	16.25 µg/m ³	Running Annual Mean	31-Dec-2003	□		
	5 µg/m ³	Annual Mean	31-Dec-2010		□	□
1,3-Butadiene	2.25 µg/m ³	Running Annual Mean	31-Dec-2003	□		
Carbon monoxide	11.6 mg/m ³	Maximum daily running 8 Hour Mean	31-Dec-2003	□		
	10.0 mg/m ³	Maximum daily running 8 Hour Mean	31-Dec-2003		□	□
Polycyclic Aromatic Hydrocarbons (as B[a]P)	0.25 ng/m ³	Annual Mean	31-Dec-2010		□ (provisional and excluded from LAQM)	
	1 ng/m ³	Annual Mean	1-Jan 2012			□ (target value)

Pollutant	Threshold	Measured as	To be achieved by	Legislative Status		
				Air Quality Objective ¹	Air Quality Objective ²	Air Quality Limit Value ³
Lead	0.5 µg/m ³	Annual Mean	31-Dec-2004	□		□ (to be achieved by 01-Jan-2005)
	0.25 µg/m ³	Annual Mean	31-Dec-2008	□		
Nitrogen dioxide	200 µg/m ³	1 Hour Mean Not to be exceeded more than 18 times per year	31-Dec-2005	□ (provisional)		□ (to be achieved by 01-Jan-2010)
	40 µg/m ³	Annual Mean	31-Dec-2005	□ (provisional)		□ (to be achieved by 01-Jan-2010)
Nitrogen Oxides*	30 µg/m ³ (V)	Annual Mean	19-Jul-2001			□

Pollutant	Threshold	Measured as	To be achieved by	Legislative Status		
				Air Quality Objective ¹	Air Quality Objective ²	Air Quality Limit Value ³
Particles (PM ₁₀) (gravimetric)	50 µg/m ³	24 Hour Mean Not to be exceeded more than 35 times per year	31-Dec-2004	□		□ (to be achieved by 01-Jan-2005)
	40 µg/m ³	Annual Mean	31-Dec-2004	□		□ (to be achieved by 01-Jan-2005)
	50 µg/m ³	24 Hour Mean Not to be exceeded more than 7 times per year	31-Dec-2010		□ (provisional)	□ (indicative)
	20 µg/m ³	Annual Mean	31-Dec-2010		□ (provisional)	□ (indicative)

Pollutant	Threshold	Measured as	To be achieved by	Legislative Status		
				Air Quality Objective ¹	Air Quality Objective ²	Air Quality Limit Value ³
Sulphur dioxide	350 µg/m ³	1 Hour Mean Not to be exceeded more than 24 times per year	31-Dec-2004	□		□ (to be achieved by 01-Jan-2005)
	125 µg/m ³	24 Hour Mean Not to be exceeded more than 3 times per year	31-Dec-2004	□		□ (to be achieved by 01-Jan-2005)
	266 µg/m ³	15 Minute Mean Not to be exceeded more than 35 times per year	31-Dec-2005	□		
	20 µg/m ³ (V)	Annual and Winter (01 Oct to 31 Mar) Mean	19-July-2001			□

Notes:

¹ Defined as an Air Quality Objective in the Air Quality (England) Regulations 2000 SI 2000 No. 928 for the purposes of Local Air Quality Management (LAQM) in accordance with Part IV of the Environment Act 1995

² Included in the Air Quality Strategy for England, Scotland, Wales and Northern Ireland: Addendum, Department for Environment, Food and Rural Affairs in partnership with the Scottish Executive, The Welsh Assembly Government and the Department of the Environment in Northern Ireland, published by the Department for Environment, Food and Rural Affairs. Printed in the UK, February 2003. The air quality objectives presented are for England (apart from London) and Wales only

³ The Air Quality (England) Regulations 2000 SI 2000 No. 928 implementing 96/62/EC and 99/30/EC for NO₂, NO_x, SO₂ and PM₁₀, and the Air Quality (England) (Amendment) Regulations 2002 SI 2002 No. 3043 implementing 96/62/EC and 99/30/EC for C₆H₆ and CO. Note that these Limit Values are to be achieved by Central Government (see the Air Quality Limit Values Regulations 2003 SI 2003 No. 2121 and the Air Quality Limit Values (Amendment) (England) Regulations 2004 SI 2004 No. 2888), and not by local authorities for the purposes of local air quality management. Refer to separate legislation for Wales, Scotland and Northern Ireland

(V) This limit is adopted for the protection of vegetation and ecosystems. Other limits and objectives in the Table are for the protection of human health.

Assuming NO_x is taken as NO₂

Table 10-A.1 Definition of Significance for Construction Dust Nuisance

Receptor Sensitivity / Acceptability	High	Medium	Low	Negligible			
	Hospitals and clinics, retirement homes, hi-technology industries, paintings and furnishings, food processing	Schools, residential areas (including gardens), food retailers, greenhouses and nurseries, horticultural land, offices	Farms, light and heavy industry, outside storage	-			
Magnitude							
	High	Medium	Low	Negligible			
Duration	> 12 months	3 – 12 months	< 3 months	-			
Spatial Extent	< 50 m	50 – 150 m	150 – 200 m	> 200 m			
Reversibility	Irreversible	-	-	-			
Likelihood	See Table 10-A.2						
Standards / Criteria							
	High +ve	Medium +ve	Low +ve	Negligible	Low -ve	Medium -ve	High -ve
Dust nuisance	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Notes:

There are no formal assessment criteria for dust nuisance. This technique has been used to develop a risk based approach to determining the need for additional mitigation.

Table 10-A.2 Likelihood of Dust Nuisance

Distance from Source to Receptor	Natural Screening by Trees		
	No screening	Limited screening (<10m depth)	Extensive screening (>10m depth)
<50m	High	Medium	Low
50 - 150m	Medium	Low	Negligible
150 - 200m	Low	Negligible	Negligible
>200m	Negligible	Negligible	Negligible

Table 10-A.3 Definition of Significance for Construction Dust Health Impacts

	<i>High</i>		<i>Medium</i>		<i>Low</i>		<i>Negligible</i>	
Receptor Sensitivity / Acceptability	Hospitals and clinics, retirement homes, schools, residential areas		-		-		-	
Magnitude	<i>High</i>		<i>Medium</i>		<i>Low</i>		<i>Negligible</i>	
Duration	> 36 months		12 – 36 months		< 12 months		-	
Spatial Extent	< 50 m		50 – 150 m		150 – 200 m		> 200 m	
Reversibility	Irreversible		-		-		-	
Likelihood	If Duration and Spatial Extent is <i>high</i> and receptors are present		If either Duration or Spatial Extent is <i>high</i> and receptors are present		If either Duration or Spatial Extent is <i>medium</i> and/or <i>low</i> and receptors are present		Receptors not present	
Standards/Criteria	<i>High +ve</i>	<i>Medium +ve</i>	<i>Low +ve</i>	<i>Negligible</i>	<i>Low -ve</i>	<i>Medium -ve</i>	<i>High –ve</i>	
PM₁₀ : 50 µg/m³ as a daily mean, not to be exceeded >35 times in a calendar year (see note below)	n/a	n/a	n/a	No. of times the daily mean exceeds 50µg/m ³ is increased /reduced by <5 times	No. of times the daily mean exceeds 50µg/m ³ is increased by 5-10 times	No. of times the daily mean exceeds 50µg/m ³ is increased by 10 times or less	No. of times the daily mean exceeds 50µg/m ³ is increased by >10 times to a total >35	

Notes

The assessment criteria are provided for monitoring purposes only as no sufficiently robust assessment technique is available to predict PM₁₀ concentrations near to construction sites.

35 times in a calendar year is equivalent to the 90.4th percentile

Table 10-A.4 Definition of Significance for Operational Air Quality Impacts on Human Health (PM₁₀)

Receptor Sensitivity / Acceptability	High	Medium	Low	Negligible			
	Hospitals and clinics, retirement homes, schools, residential areas	-	-	-	-		
Magnitude	High	Medium	Low	Negligible			
Duration	Permanent	-	-	-			
Spatial Extent	-	-	-	-			
Reversibility	Irreversible	-	-	-			
Likelihood	-	-	-	-			
Standards / Criteria	High +ve	Medium +ve	Low +ve	Negligible	Low -ve	Medium -ve	High -ve
PM₁₀ : 90.4th percentile of daily means not to breach 50µg/m³ in a calendar year	90.4 th percentile increases by >4µg/m ³	90.4 th percentile increases by 2-4µg/m ³	90.4 th percentile increases by 1-2µg/m ³	90.4 th percentile changes by <1µg/m ³	90.4 th percentile reduces by 1-2µg/m ³	90.4 th percentile reduces by 2-4µg/m ³	90.4 th percentile reduces by >4µg/m ³
PM₁₀ : %change in the annual average population weighted exposure	Reduced by > 1%	Reduced by 0.5–1%	Reduced by 0.25–0.5%	Reduced / increased by < 0.25%	Increased by 0.25 – 0.5%	Increased by 0.5 – 1%	Increased by > 1%

Notes:

The spatial extent is determined by modelling. For road schemes this is typically 200m either side of roads with Annual Average Daytime Flows (AADTF) > 5000 extending out to include all roads expected to have a >5% change in AADT as a result of the scheme. For large industrial sources this may extend to a radius of 10km (15km for coal fired power plant).

35 times in a calendar year is equivalent to the 90.4th percentile.

Table 10-A.5 Definition of Significance for Operational Air Quality Impacts on Human Health (NO₂)

	High	Medium	Low	Negligible			
Receptor Sensitivity / Acceptability	Hospitals and clinics, retirement homes, schools, residential areas	-	-	-			
Magnitude	High	Medium	Low	Negligible			
Duration	Permanent	-	-	-			
Spatial Extent	-	-	-	-			
Reversibility	Irreversible	-	-	-			
Likelihood	-	-	-	-			
Standards / Criteria	High +ve	Medium +ve	Low +ve	Negligible	Low -ve	Medium -ve	High -ve
NO₂ : 40µg/m³ as an annual mean	Annual mean is reduced by >4µg/m ³ to below 40µg/m ³	Annual mean is reduced by >4µg/m ³	Annual mean is reduced by 2-4µg/m ³	Annual mean is increased / reduced by <2µg/m ³	Annual mean is increased by 2–4µg/m ³ but remains below 40µg/m ³	Annual mean is increased by >4µg/m ³ but remains below 40µg/m ³	Annual mean is increased by >4µg/m ³ to above 40µg/m ³

Notes:

The spatial extent is determined by modelling. For road schemes this is typically 200m either side of roads with Annual Average Daytime Flows (AADTF) > 5000 extending out to include all roads expected to have a >5% change in AADT as a result of the scheme. For large industrial sources this may extend to a radius of 10km (15km for coal fired power plant).

Assessment criteria for all relevant pollutants should be included. For road schemes, all other pollutants can be scoped out. For industrial sources, attention should be given to process specific pollutants (e.g. sulphur dioxide from coal fired power plant, dioxins/furans from waste incinerators, or hydrogen fluoride from aluminium smelters).

Table 10-A.6 Definition of Significance for Operational Air Quality Impacts on Ecosystems (NO_x)

Receptor Sensitivity / Acceptability	<i>High</i>	<i>Medium</i>	<i>Low</i>	<i>Negligible</i>			
	Nationally designated nature reserves	Locally designated nature reserves	-	-	-	-	-
Magnitude	<i>High</i>	<i>Medium</i>	<i>Low</i>	<i>Negligible</i>			
Duration	Permanent	-	-	-	-	-	-
Spatial Extent	-	-	-	-	-	-	-
Reversibility	Irreversible	-	-	-	-	-	-
Likelihood	-	-	-	-	-	-	-
Standards / Criteria	<i>High +ve</i>	<i>Medium +ve</i>	<i>Low +ve</i>	<i>Negligible</i>	<i>Low -ve</i>	<i>Medium -ve</i>	<i>High -ve</i>
	NO _x : 30 µg/m ³ as an annual mean	Annual mean is reduced by >2µg/m ³ to below 30µg/m ³	Annual mean is reduced by >2µg/m ³	Annual mean is reduced by 1-2µg/m ³	Annual mean is increased / reduced by <1µg/m ³	Annual mean is increased by 1–2µg/m ³ but remains below 30µg/m ³	Annual mean is increased by >2µg/m ³ but remains below 30µg/m ³

Notes:

The spatial extent is determined by modelling. For road schemes this is typically 200 m either side of roads with Annual Average Daytime Flows (AADTF) > 5000 extending out to include all roads expected to have a >5% change in AADT as a result of the scheme. For large industrial sources this may extend to a radius of 10 km.

Assessment criteria for all relevant pollutants should be included. For road schemes, only NO_x is relevant. For industrial sources, attention should be given to process specific pollutants (e.g. sulphur dioxide from coal fired power plant, dioxins/furans from waste incinerators, or hydrogen fluoride from aluminium smelters).

Table 10-A.7 Definition of Significance for Operational Air Quality Impacts on Ecosystems (Critical Loads for Acid Deposition)

	<i>High</i>	<i>Medium</i>	<i>Low</i>	<i>Negligible</i>
Receptor Sensitivity / Acceptability	Nationally designated nature reserves	Locally designated nature reserves	-	-
Magnitude				
	<i>High</i>	<i>Medium</i>	<i>Low</i>	<i>Negligible</i>
Duration	Permanent	-	-	-
Spatial Extent	-	-	-	-
Reversibility	Irreversible	-	-	-
Likelihood	-	-	-	-
Standards / Criteria				
	+ve	<i>Negligible</i>	-ve	
	Statistically significant if the increase is >40% of the nationally mapped critical load	If the increase/reduction is <40% of the nationally mapped critical load	Statistically significant if the reduction is >40% of the nationally mapped critical load	

Notes:

The spatial extent is determined by modelling. For road schemes this is typically 200 m either side of roads with Annual Average Daytime Flows (AADTF) > 5000 extending out to include all roads expected to have a >5% change in AADT as a result of the scheme. For large industrial sources this may extend to a radius of 10 km.

Assessment criteria for all relevant pollutants should be included. For road schemes, only NO_x is relevant. For industrial sources, attention should be given to process specific pollutants (e.g. sulphur dioxide from coal fired power plant, dioxins/furans from waste incinerators, or hydrogen fluoride from aluminium smelters).

Refer to ecological assessment for interpretation of statistically significant changes in critical load

Table 10-A.8 Definition of Significance for Operational Air Quality Impacts on Ecosystems (Critical Loads for Nitrogen Deposition)

	High	Medium	Low	Negligible
Receptor Sensitivity / Acceptability	Nationally designated nature reserves	Locally designated nature reserves	-	-
Magnitude				
	High	Medium	Low	Negligible
Duration	Permanent	-	-	-
Spatial Extent	-	-	-	-
Reversibility	Irreversible	-	-	-
Likelihood	-	-	-	-
Standards / Criteria				
	+ve	Negligible	-ve	
	Statistically significant if the increase is >40% of the nationally mapped critical load	If the increase/reduction is <40% of the nationally mapped critical load	Statistically significant if the reduction is >40% of the nationally mapped critical load	

Notes:

The spatial extent is determined by modelling. For road schemes this is typically 200m either side of roads with Annual Average Daytime Flows (AADTF) > 5000 extending out to include all roads expected to have a >5% change in AADT as a result of the scheme. For large industrial sources this may extend to a radius of 10km.

Assessment criteria for all relevant pollutants should be included. For road schemes, only NO_x is relevant. For industrial sources, attention should be given to process specific pollutants (e.g. sulphur dioxide from coal fired power plant, dioxins/furans from waste incinerators, or hydrogen fluoride from aluminium smelters).

Refer to ecological assessment for interpretation of statistically significant changes in critical load

Table 10-A.9 Definition of Significance for Greenhouse Gas Emissions

Receptor Sensitivity / Acceptability	<i>High</i>	<i>Medium</i>	<i>Low</i>	<i>Negligible</i>			
	See notes	-	-	-			
Magnitude	<i>High</i>	<i>Medium</i>	<i>Low</i>	<i>Negligible</i>			
Duration	Construction Period + Operational Life (e.g. 15 years)	-	-	-			
Spatial Extent	-	-	-	-			
Reversibility	Irreversible	-	-	-			
Likelihood	-	-	-	-			
Standards / Criteria	<i>High +ve</i>	<i>Medium +ve</i>	<i>Low +ve</i>	<i>Negligible</i>	<i>Low -ve</i>	<i>Medium -ve</i>	<i>High -ve</i>
Net GHG emissions (see Notes)	Reduced by > 15%	Reduced by 10–15%	Reduced by 5-10%	Reduced / increased by < 5%	Increased by 5 – 10%	Increased by 10 – 15%	Increased by > 15%

Notes:

Given the global scale of this potential impact, it has been assigned 'highly sensitive' in terms of receptors.

This assessment considers the net balance in greenhouse gas emissions expended during construction and, if applicable, the greenhouse gas emissions saved during operation, compared to a 'do nothing' scenario. This requires summing the operational emissions for each year and attention should be given to the future assessment year. For road schemes this is typically 15 years after opening. For consistency, a similar period is used for other types of development.