Appendix 7.4: Assessment of Baseline Air Quality Condition

Appendix 7.4: Assessment of Baseline Air Quality Conditions

7.4.1 Horsham District Council (HDC) has designated the following two Air Quality Management Areas (AQMAs) due to high levels of NO_2 attributable to road traffic emissions:

- Horsham AQMA – West Street, the High Street and part of School Hill and Manleys Hill, Storrington; and
- Cowfold AQMA – incorporating The Street, part of Station Road and Bolney Road.

7.4.2 The Horsham AQMA is located 21 km to the south-west of the Application Site. The Cowfold AQMA is designated 12 km to the south-east of the Application Site. The Application Site is not located within an AQMA and air quality at the site is generally very good.

Nitrogen Dioxide

Local Monitoring Data

7.4.3 HDC does not continuously monitor NO_2 or particulate matter concentrations with automatic analysers in any urban background location. HDC manually monitors NO_2 concentrations at a number of urban background locations using passive diffusion tubes and the most measured annual-mean concentrations are presented in Table 7.4.1.

7.4.4 Table 7.4.1 Measured Annual-mean NO_2 Concentrations ($\mu g.m^{-3}$)

Monitor Name	Approximate Distance to Site (km)	x	y	Concentration ($\mu g.m^{-3}$)						
				2010	2011	2012	2013	2014	2015	2016
Horsham 3N	3.9	516000	130600	15.5	12.8	12.4	13.6	11.6	10.3	13.0
Horsham 4N	3.7	517600	130100	15.3	12.9	12.4	12.9	9.4	11.0	12.9

Defra Mapped Concentration Background Estimates

7.4.5 The Department for Environment, Food and Rural Affairs (Defra) total-mean NO_2 concentration estimates have been collected for the 1 km grid squares of the monitoring sites and are summarised in Table 7.4.2.

Table 7.4.2 Defra Mapped Annual-Mean Background NO_2 Concentration Estimates ($\mu g.m^{-3}$)

Monitor Name	Distance to Site (km)	Concentration ($\mu g.m^{-3}$)	
		Range of Monitored	Estimated Defra Mapped
Horsham 3N	3.9	11.6 – 15.5	12.3
Horsham 4N	3.7	9.4 – 15.3	13.8

7.4.6 The Defra mapped concentration estimate is within the range of the results at Horsham 3N and above the range at Horsham 4N. This suggests that the use of the estimated Defra mapped concentration is representative of the locally measured concentrations.

7.4.7 The Defra mapped concentration estimate of 11.9 $\mu g.m^{-3}$ for the grid square of the proposed development has been used within the assessment.

Particulate Matter

Local Monitoring Data

7.4.8 There is limited urban background PM_{10} monitoring in the vicinity of the Application Site. The Air Quality Expert Group (AQEG) study of Particulate Matter in the UK [i] provides a comparison of NO_2 and PM_{10} monitoring undertaken in the UK at roadside, urban background and rural locations. A much larger variation in monitored NO_2 concentrations is reported compared to PM_{10} concentrations. The lower variation in monitored PM_{10} concentrations reflects the more even distribution of particulate matter across the UK due to the wide range of sources and the contribution of secondary particulate matter. On this basis, the results of continuous automatic PM_{10} roadside monitoring at Horsham Park Way have been used to inform background concentrations.

7.4.9 The most recent monitored annual-mean PM_{10} concentrations are presented in Table 7.4.3.

Table 7.4.3 Measured Annual-mean PM_{10} Concentrations ($\mu g.m^{-3}$)

Monitor Name	Approximate Distance to Site (km)	x	y	Concentration ($\mu g.m^{-3}$)						
				2010	2011	2012	2013	2014	2015	2016
Horsham Park Way	4.0	517486	130586	18.3	24.0	23.2	22.3	20.9	18.6	19.3

7.4.10 No $PM_{2.5}$ monitoring is undertaken by HDC.

Defra Mapped Concentration Estimates

7.4.11 Defra's total annual-mean PM_{10} concentration estimates have been collected for the 1 km grid squares of the monitoring site and are summarised in Table 7.4.4.

Table 7.4.4 Defra Mapped Annual-Mean Background PM_{10} Concentration Estimates ($\mu g.m^{-3}$)

Monitor Name	Distance to Site (km)	Concentration ($\mu g.m^{-3}$)	
		Range of Monitored	Estimated Defra Mapped
Horsham Park Way	4.0	18.3 – 24.0	13.8

7.4.12 The Defra mapped concentration estimate is below the range of the results at Horsham Park Way suggesting that the Defra mapped concentration estimate is not representative in this area. To ensure the results of the assessment are conservative, an ambient concentration of 24 $\mu g.m^{-3}$ has been used within the assessment.

7.4.13 In the absence of any locally monitored $PM_{2.5}$ concentrations, the Defra mapped concentration estimate of 11.0 $\mu g.m^{-3}$ has been used within the assessment.

Carbon Monoxide

7.4.14 CO is not monitored in an urban background location in Horsham. In the absence of any locally monitored CO concentrations, the Defra mapped concentration estimate of 0.25 $mg.m^{-3}$ has been used within the assessment.

Sulphur Dioxide

7.4.15 The Lullington Heath Automatic Rural and Urban Network (AURN) monitoring station measures SO_2 using an automatic instrument. The latest Review and Assessment report published by Horsham District Council, the *2016 Annual Status Report for Horsham District Council*, refers to the Lullington Heath monitor stating that *"Automatic sulphur dioxide monitoring was undertaken at one permanent station in Sussex, located at Lullington Heath (rural). The 2015 data from the Lullington Heath AURN air quality station did not show any exceedance of the national objectives. This is in line with previous years data. Given that no large scale industrial combustion processes or significant areas of domestic solid-fuel burning have been identified within Horsham District it is unlikely that the objectives for sulphur dioxide would have been exceeded within the district during 2015."* As Horsham District Council considers that this monitor is indicative of concentrations within the district and as there is no other monitoring closer to the Application site, the concentrations at Lullington Heath have been used to inform the background concentration used within the model.

7.4.16 The annual mean SO_2 concentrations monitored between 2010 and 2016 are provided in Table 7.4.5.

Table 7.4.5: Annual Mean SO_2 Concentrations ($\mu g.m^{-3}$)

Monitoring Location	x	y	2010	2011	2012	2013	2014	2015	2016
Lullington Heath	553829	101616	1.34	1.57	1.36	1.08	1.29	1.18	0.84

7.4.17 The maximum concentration of 1.57 $\mu g.m^{-3}$ monitored in 2011 is well below the AQS objective of 20 $\mu g.m^{-3}$; concentrations monitored in the last five years are below the 2011 measured concentration. The background SO_2 concentration used within this assessment of 1.57 $\mu g.m^{-3}$ is therefore considered to be representative but conservative.

Heavy Metals

7.4.18 The Heavy Metals Network monitors the concentrations in air, and the deposition rates of a range of metallic elements at urban, industrial and rural sites.

7.4.19 The monitored data for 2016 at the nearest urban background site, Chadwell St Mary has been compared with data collated at London Westminster in 2010. The results are compared in Table 7.4.6.

Table 7.4.6: Measured Metals Concentrations ($ng.m^{-3}$)

Metal	Chadwell St Mary	London Westminster	Maximum
As	0.99	0.86	0.99
Cd	0.25	0.14	0.25
Co	0.12	0.12	0.12
Cr	3.15	4.30	4.30
Cu	10.59	15.53	15.53
Fe	330.12	467.56	467.56
Hg	0.03 (2010)	2.47	2.47
Mn	5.42	5.69	5.69
Ni	0.88	0.86	0.88
Pb	11.24	8.50	11.24

Metal	Chadwell St Mary	London Westminster	Maximum
V	1.0	0.73	1.00
Zn	20.3	19.9	20.30

Hydrogen Chloride

7.4.20 HCl is monitored as part of the UK Eutrophying and Acidifying Network, which forms part of the Acid Gas and Aerosol Network. The closest site to the proposed development site is Barcombe Mills. Table 7.4.7 presents data for Barcombe Mills between 2010 and 2015.

Table 7.4.7: Measured HCl Concentrations (µg.m^{-3}) at Barcombe Mills

2010	2011	2012	2013	2014	2015	Maximum
0.30	0.29	0.28	0.39	0.32	0.22	0.39

7.4.21 The maximum measured concentration of 0.39 µg.m^{-3} has been used within the assessment.

Hydrogen Fluoride

7.4.22 The Expert Panel on Air Quality Standards (EPAQS) was set up in 1991 to provide independent advice on air quality issues. In 2005 it published a draft report entitled 'Guidelines for halogen and hydrogen halides in ambient air for protecting human health against acute irritancy effects' [ii]. The report noted that only a small number of measurements of ambient concentrations of hydrogen fluoride have been made in the UK. All of these have been made in the vicinity of three industrial plants. Many samples were below the limit of detection; however, measurable values were in the range 0.05 to 3.5 µg.m^{-3} as approximate monthly averages. The report concluded that it would be reasonable to expect maximum 1 hour mean hydrogen fluoride concentrations to reach about 2.46 µg.m^{-3} at rural sites exposed to coal-fired power station plumes.

7.4.23 The range of expected short-term background HF levels is well below the short-term EAL guideline of 250 µg.m^{-3}.

Polycyclic Aromatic Hydrocarbons

7.4.24 The polycyclic aromatic hydrocarbon (PAH) network monitors ambient concentrations of PAHs at 31 sites in the UK. At the majority of sites, only solid PAHs are monitored; both gaseous and solid PAHs are only monitored at two locations.

7.4.25 The nearest site monitoring solid PAHs is at Hove whereas the nearest site monitoring both gaseous and solid PAHs is at Harwell.

7.4.26 Measurements at Hove and Harwell are compared in Table 7.4.8

Table 7.4.8: Annual-mean PAHs Concentrations (ng.m^{-3})

Site Name	2010	2011	2012	2013	2014	2015	Maximum
Hove (solid)	0.23	0.16	0.16	0.19	0.12	0.13	0.23
Harwell (solid and gas)	0.11	0.05	0.08	0.09	-	-	0.11

7.4.27 Although only PAHs in the solid phase are measured at Hove, the measurements are higher than the measurements at Harwell which include the gaseous phase. The maximum concentration monitored of 0.23 µg.m^{-3} at Hove has therefore been used within the assessment.

Polychlorinated Biphenyls

7.4.28 PCB concentration data are currently available from five sites in the UK that form the Toxic Organic Micro pollutants (TOMPs) network. The closest site urban background site is in London. Table 7.4.9 present the last three available years of monitoring data at London for PCBs [iii]

Table 7.4.9: Annual-Mean Concentrations (pg.m^{-3}) of Polychlorinated Biphenyls

Site Name	2010	2011	2012	Average
Nobel House	16.2	93.9	83.2	64.4

7.4.29 The average annual-mean concentration of PCBs measured at London site is 64.4 pg.m^{-3}. This concentration has been used within the assessment.

Dioxins and Furans

7.4.30 Dioxins and Furans concentration data from the TOMPS network London site are provided in Table 7.4.10.

Table 7.4.10: Annual-Mean Concentrations (fg.m^{-3}) of Dioxins and Furans

Site Name	2009	2010	2011	2012	Average
Nobel House	39.3	48.4	3.7	15.4	26.7

7.4.31 The average annual-mean concentration of PCBs measured at London site is 26.7 fg.m^{-3}. This concentration has been used within the assessment.

i AQEG(2005). Particulate Matter in the UK: Defra, London

ii Expert Panel on Air Quality Standards: guidelines for halogen and hydrogen halides in ambient air for protecting human health against acute irritancy effects. Draft consultation document. Defra 2005 Available at http://www.defra.gov.uk/corporate/consult/airqual-halogen/index.htm

iii http://www.defra.gov.uk/evidence/statistics/environment/airqual/download/xls/aqtb29.xls