

REDCAR ENERGY CENTRE APPENDIX 11.2

Detailed Baseline Assessment

Redcar Energy Centre
Environmental Statement
July 2020

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1 INTRODUCTION

1.1 Assessment of Baseline Air Quality Conditions

1.1.1 Redcar and Cleveland Borough Council (RCBC) has not designated any Air Quality Management Areas (AQMAs) and air quality in the area is likely to be relatively good.

1.1.2 The closest AQMA is Scarborough AQMA approximately 23 km to the east.

Nitrogen Dioxide

Local Monitoring Data

1.1.3 There is one local monitoring station, Redcar Dormanstown, where NO₂ concentrations are measured using a continuous automatic instrument at a suburban location. In addition to this, RCBC manually monitors NO₂ at several roadside locations within 6 km of the site, using passive diffusion tubes. The most recently measured annual-mean concentrations are presented in Table 1.1

Table 1.1: Measured Annual-mean NO₂ Concentrations (µg.m⁻³)

Monitor Code	Monitor Name	Approximate Distance to Site (km)	x	y	Concentration (µg.m ⁻³)					
					2014	2015	2016	2017	2018	Average
Redcar Dormanstown		3.6	458379	523486	12.8	12.7	11	12	10	11.7
R26	Zetland Primary School	5.1	460818	524938	-	-	-	16.6	18.6	17.6
R27	South Bank, Trunk Road	5.4	453142	520836	23.1	21.9	20.5	19.8	24.7	22
R33	West Lane, Grangetown	5.1	454712	520678	30.6	30	26.4	25.5	29.8	28.5
R40	Keilder Close	5.0	459909	522873	-	-	-	-	16.5	16.5
R41	Mersey Road	4.1	459695	524553	-	-	-	-	20.2	20.2

Defra Mapped Concentration Background Estimates

1.1.4 Defra's total annual-mean NO₂ concentration estimates have been collected for the 1 km grid squares of the monitoring sites and the Application Site and are summarised in Table 1.2.

Table 1.2: Defra Mapped Annual-Mean Background NO₂ Concentration Estimates (µg.m⁻³)

Monitor Code	Monitor Name	Distance to Site (km)	Concentration (µg.m ⁻³)	
			Range of Monitored	Estimated Defra Mapped
Redcar Dormanstown		3.6	10 – 12.8	15.2
R26	Zetland Primary School	5.1	16.6 – 18.6	15.6
R27	South Bank, Trunk Road	5.4	19.8 – 24.7	17.5
R33	West Lane, Grangetown	5.1	25.5 – 30.6	16.0
R40	Keilder Close	5.0	16.5	16.4
R41	Mersey Road	4.1	20.2	15.4
Application Site		-	-	20.2

1.1.5 The Defra mapped concentration estimates are typically below the range of results from monitoring suggesting that the Defra mapped concentration estimates are not representative in this area. To ensure the assessment is conservative, the background annual-mean NO₂

concentration has been derived from the average monitored at West Lane, Grangetown, 28.5 $\mu\text{g.m}^{-3}$.

Particulate Matter

Local Monitoring Data

- 1.1.6 PM_{10} concentrations are also measured using the automatic instrument at Redcar Dormanstown and the most recently measured annual-mean concentrations are presented in Table 1.3.

Table 1.3: Measured Annual-mean PM_{10} Concentrations ($\mu\text{g.m}^{-3}$)

Monitor Code	Monitor Name	Approximate Distance to Site (km)	x	y	Concentration ($\mu\text{g.m}^{-3}$)					
					2014	2015	2016	2017	2018	Average
Redcar Dormanstown		3.6	458379	523486	15.7	15.7	12.7	12	12	13.6

Defra Mapped Concentration Estimates

- 1.1.7 Defra's total annual-mean PM_{10} concentration estimates have been collected for the 1 km grid squares of the monitoring site and the Application Site and are summarised in Table 1.4.

Table 1.4: Defra Mapped Annual-Mean Background PM_{10} Concentration Estimates ($\mu\text{g.m}^{-3}$)

Monitor Code	Monitor Name	Distance to Site (km)	Concentration ($\mu\text{g.m}^{-3}$)	
			Range of Monitored	Estimated Defra Mapped
Redcar Dormanstown		3.6	12 – 15.7	11.3
Application Site		-	-	10.3

- 1.1.8 The Defra mapped concentration estimate is slightly below the range of the results at Redcar Dormanstown suggesting that the Defra mapped concentration estimate is not conservative. To ensure the assessment is conservative, the average monitored PM_{10} concentration at Redcar Dormanstown, $13.6 \mu\text{g.m}^{-3}$ has been used.
- 1.1.9 In the absence of $\text{PM}_{2.5}$ monitoring at this site, the background annual-mean concentration at the Application Site has been derived from the Defra mapped background concentration estimate.
- 1.1.10 Table 1.5 summarises the annual-mean background concentrations for PM_{10} and $\text{PM}_{2.5}$ used in this assessment.

Table 1.5: Summary of Particulate Matter Annual-Mean Concentrations used in the Assessment ($\mu\text{g.m}^{-3}$)

Pollutant	Data Source	Concentration ($\mu\text{g.m}^{-3}$)
PM_{10}	Average monitored at Redcar Dormanstown (2014 – 2018)	13.6
$\text{PM}_{2.5}$	Defra Mapped Estimate (2017)	7.0

Carbon Monoxide

- 1.1.11 The Leeds Centre AURN monitoring station measures CO using an automatic instrument. The annual-mean CO concentrations monitored between 2015 and 2019 are provided in Table 1.6.

Table 1.6: Annual-Mean CO Concentrations ($\mu\text{g.m}^{-3}$)

Monitoring Location	x	y	2015	2016	2017	2018	2019	Average
Leeds Centre AURN	429967	434260	254.7	267.3	266.6	161.4	234.5	236.9

1.1.12 The average monitored concentration of $236.9 \mu\text{g.m}^{-3}$, well below the AQS objective of $10,000 \mu\text{g.m}^{-3}$ has been used in this assessment.

Sulphur Dioxide

1.1.13 The Middlesbrough Urban Industrial monitoring station measures SO_2 using an automatic instrument. The annual mean SO_2 concentrations monitored between 2015 and 2019 are provided in Table 1.7.

Table 1.7: Annual-Mean SO_2 Concentrations ($\mu\text{g.m}^{-3}$)

Monitoring Location	x	y	2015	2016	2017	2018	2019	Average
Middlesbrough	450471	519621	3.5	4.5	2.0	2.2	1.4	2.7

Heavy Metals

1.1.14 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.

1.1.15 The nearest monitoring sites to the Application Site are Cardiff Llandaff and Scunthorpe Town urban background sites. Monitored concentrations up to 2018 are provided in Table 1.8.

Table 1.8: Measured Metals Concentrations (ng.m^{-3})

Metal	Cardiff Llandaff		Scunthorpe Town			Maximum
	2012	2013	2016	2017	2018	
As			0.71	0.84	0.77	0.84
Cd			0.18	0.27	0.35	0.35
Co			0.11	0.11	0.13	0.13
Cr			3.23	3.07	2.82	3.23
Cu			4.91	5.66	6.13	6.13
Hg [total gaseous]	1.66	2.30				2.30
Mn			19.04	16.07	21.85	21.85
Ni			0.98	0.87	1.16	1.16
Pb			11.11	13.77	16.76	16.76
V			1.32	1.17	1.57	1.57

1.1.16 The maximum concentration of each heavy metal from the monitoring period has been used in this assessment.

Hydrogen Chloride

1.1.17 HCl is monitored as part of the UK Eutrophying and Acidifying Network, which forms part of the Acid Gas and Aerosol Network. The closest monitoring sites to the Proposed Development site are High Muffles and Moorhouse. Table 1.9 presents data for both monitoring sites between 2013 and 2015.

Table 1.9: Measured HCl Concentrations ($\mu\text{g.m}^{-3}$)

Site Name	2013	2014	2015	Average
High Muffles	0.29	0.26	0.16	0.23
Moorhouse	0.30	0.23	0.19	0.24
3-Year Average of both monitors				0.24

1.1.18 The 3-year average HCl concentration for each monitor has been estimated. The average measured concentration of $0.24 \mu\text{g.m}^{-3}$ has been used within the assessment.

Hydrogen Fluoride

1.1.19 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'¹. 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 $3.5 \mu\text{g.m}^{-3}$ as approximate monthly averages. The report concluded that it would be reasonable to expect maximum 1 hour mean hydrogen fluoride concentrations to reach about $2.46 \mu\text{g.m}^{-3}$ at rural sites exposed to coal-fired power station plumes.

1.1.20 The range of expected short-term background HF levels is well below the short-term EAL guideline of $250 \mu\text{g.m}^{-3}$.

Polycyclic Aromatic Hydrocarbons

1.1.21 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.

1.1.22 The nearest site monitoring solid PAHs is Middlesbrough. The nearest site monitoring both gaseous and solid PAHs is Auchencorth Moss, however the site has been closed since 2014. Measurements at both monitoring sites are compared in Table 1.10.

Table 1.10: Annual-mean PAHs Concentrations (ng.m^{-3})

Site Name	2015	2016	2017	2018	2019	Maximum
Middlesbrough (solid)	0.29	0.21	0.16	0.17	0.24	0.21
Auchencorth Moss (solid and vapour)	-	-	-	-	-	-

1.1.23 The average monitored concentration of 0.21ng.m^{-3} at Middlesbrough has therefore been used within the assessment.

¹ 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>

Polychlorinated Biphenyls

- 1.1.24 PCB concentration data are currently available from five sites in the UK that form the Toxic Organic Micropollutants (TOMPS) network. The nearest monitoring site is High Muffles AURN. Table 1.11 presents the last four available years of monitoring data at High Muffles for PCBs².

Table 1.11: Annual-Mean Concentrations (pg.m⁻³) of Polychlorinated Biphenyls

Site Name	2015	2016	2017	2018	Average
High Muffles	33.12	37.38	31.28	8.82	27.65

- 1.1.25 The average annual-mean concentration of PCBs measured at the Manchester site is 27.65 pg.m⁻³. This concentration has been used within the assessment.

Dioxins and Furans

- 1.1.26 Dioxins and Furans concentration data from the TOMPS network High Muffles site are provided in Table 1.12.

Table 1.12: Annual-Mean Concentrations (fg.m⁻³) of Dioxins and Furans

Site Name	2015	2016	2017	2018	Average
High Muffles	1.06	3.70	-	-	2.38

- 1.1.27 The average annual-mean concentration of dioxins and furans measured at the High Muffles site is 2.38 fg.m⁻³. This concentration has been used within the assessment.

² <http://www.defra.gov.uk/evidence/statistics/environment/airqual/download/xls/aqtb29.xls>