Proposed Energy from Waste Facility, Heysham - Diffusion Tube and Automatic Monitoring Update

Introduction

A programme of Passive Monitoring and Continuous Active Sampling of ambient air quality is currently being undertaken in the vicinity of the proposed Energy from Waste (EfW) facility, Imperial Road, Heysham. The aim of the project is to quantify existing pollutant concentrations in the area around the development, so that if required an assessment of potential future changes to air quality can be undertaken.

Passive Monitoring

Passive Monitoring is currently being undertaken at a total of ten separate locations. The following pollutant species are being assessed at each position.

- Ammonia (NH_3); and,
- Nitrogen dioxide (NO_2).

A summary of the sampling locations is provided in Table 1. Reference should be made to Figure 1 for a visual representation of the monitoring positions.

Table 1 Passive Monitoring Locations

Location Number	Location Description
1a	AQ Mesh - Co-Location 1, North-east boundary of the development site
1b	AQ Mesh - Co-Location 2, North-east boundary of the development site
2	Middleton Road to Carr Lane Junction
3	Main Avenue to Stalls Road Junction
4	Layby on Natterjack Lane
5	The Globe Pub, Main Street
6	Main Road to Lancaster Road Junction
7	Lancaster Road to Heaton Bottom Road Junction
8	Heaton Bottom Road
9	Fulmar Crescent

Location Number	Location Description
10	Layby on Warton Avenue

Figure 1 Passive Monitoring Locations

A summary of the Passive Monitoring schedule is provided in Table 2.

Table 2 Monitoring Schedule

Monitoring Period	Start Date	End Date
1	11/07/2018	08/08/2018
2	08/08/2018	06/09/2018
3	06/09/2018	17/10/2018
4	17/10/2018	16/11/2018
5	16/11/2018	14/12/2018
6	14/12/2018	15/01/2019
7	15/01/2019	15/02/2019

Monitoring Period	Start Date	End Date
8	15/02/2019	TBC

Continuous Active Sampling

Continuous Active Sampling of ambient pollutant concentrations is currently being undertaken at a single position on the north-east boundary of the development site, as shown in Table 1 and Figure 1.

The following species are being assessed at the position:

- NO_2;
- Particulate matter with an aerodynamic diameter of less than 10µm (PM_{10}); and,
- Particulate matter with an aerodynamic diameter of less than 2.5µm ($PM_{2.5}$).

Passive Monitoring Results - NH_3

A summary of the NH_3 monitoring results is summarised in Table 3.

Table 3 Ammonia Monitoring Results

Location Number	NH_3 Concentration (µg/m³)						
	11/07/2018 - 08/08/2018	08/08/2018 - 06/09/2018	06/09/2018 - 17/10/2018	17/10/2018 - 16/11/2018	16/11/2018 - 14/12/2018	14/12/2018 - 15/01/2019	15/01/2019 - 15/02/2019
1	6.13	4.01	3.40	6.31	4.81	4.53	6.13
2	8.97	5.13	4.35	6.64	5.17	5.95	5.53
3	6.36	3.34	2.81	4.80	3.89	4.27	3.38
4	6.77	3.66	7.81	6.15	4.02	4.14	5.35
5	8.39	5.00	6.04	5.68	5.01	5.72	4.86
6	7.84	7.99	4.76	7.06	4.67	6.93	4.78
7	9.25	6.32	4.12	10.44	8.06	7.94	5.91
8	11.09	8.48	6.40	9.02	5.06	8.91	5.41
9	5.30	3.19	3.21	4.50	3.52	3.10	4.10
10	5.97	3.59	3.47	5.49	4.99	5.06	4.91

Passive Monitoring Results - NO_2

The following Section provides a summary of the NO_2 results recorded to date and associated annualised/ bias adjusted data.

Unadjusted Results

A summary of the unadjusted NO_2 monitoring results is provided in Table 4.

Table 4 Unadjusted Nitrogen Dioxide Monitoring Results

Location Number	NO_2 Concentration (µg/m³)						
	11/07/2018 - 08/08/2018	08/08/2018 - 06/09/2018	06/09/2018 - 17/10/2018	17/10/2018 - 16/11/2018	16/11/2018 - 14/12/2018	14/12/2018 - 15/01/2019	15/01/2019 - 15/02/2019
1a	9.94	7.13	9.44	16.23	16.66	14.66	18.51
1b	10.29	8.13	9.77	14.62	15.74	16.09	16.63
2	10.46	10.02	12.67	20.38	21.48	20.00	24.39
3	10.68	8.67	9.78	16.54	19.51	14.67	18.68
4	4.97	6.10	7.82	13.11	14.21	14.10	15.94
5	7.84	6.78	6.94	11.41	15.85	13.85	15.89
6	9.72	7.95	9.22	16.6	18.47	19.43	18.67
7	10.25	8.84	10.59	13.8	20.77	17.23	20.67
8	12.57	10.73	12.41	9.17	22.35	21.97	23.54
9	13.42	10.74	11.73	15.81	20.21	22.81	20.99
10	16.10	12.77	17.56	11.4	26.14	26.26	28.91

Adjusted Results

An overall period mean was calculated for each monitoring location using the unadjusted results presented in Table 4. Annualisation of the monitoring results was then undertaken in order to estimate annual mean NO_2 concentrations. This process was undertaken in accordance with Department for Environment, Food and Rural Affairs (DEFRA) guidance[1].

Annual mean NO_2 concentrations for use in the annualisation process were obtained from three background monitoring sites within a 50-mile radius of the development. These are summarised in Table 5.

Table 5 Monitoring Sites

Site Name	NGR (m)		Station Type
	X	Y	
Wigan Centre	357816	406024	Urban Background
Blackpool Marton	333768	434759	Urban Background
Preston	355250	430131	Urban Background

The period mean for each monitoring site was calculated for the corresponding monitoring interval at the development (11th July 2018 to 15th February 2019). The ratio of the 2018 annual mean to the period mean was then calculated and an average derived as the adjustment factor. This is summarised in Table 6.

Table 6 Annualisation Data

Site Name	NO_2 Concentration (µg/m³)		Ratio (Am/Pm)
	Annual Mean (Am)	Period Mean (Pm)	
Wigan Centre	17.35	20.85	0.83
Blackpool Marton	12.46	13.31	0.94
Preston	21.13	24.76	0.85
Average (R_a)			0.87

[1] Local Air Quality Management Technical Guidance (TG16), DEFRA, 2018.

An estimate of the annual mean NO_2 concentrations at the monitoring locations was then calculated by multiplying the measured period mean concentration by the adjustment factor.

Diffusion tubes are affected by several sources of interference which can cause under or overestimation of ambient pollutant concentrations. As such, a bias factor of 0.87 was applied to the annualised results in order to validate the data. This factor was obtained from the National Diffusion Tube Bias Adjustment spreadsheet (version 09/18).

A summary of the adjusted results is provided in Table 7.

Table 7 Adjusted Nitrogen Dioxide Monitoring Results

Location Number	Period Mean NO_2 Concentration (µg/m³)	Annualised NO_2 Concentration (µg/m³)	Bias Adjusted NO_2 Concentration (µg/m³)
1a	13.22	11.56	10.06
1b	13.04	11.40	9.91
2	17.06	14.91	12.97
3	14.08	12.30	10.70
4	10.89	9.52	8.28
5	11.22	9.81	8.53
6	14.29	12.49	10.87
7	14.59	12.75	11.10
8	16.11	14.08	12.25
9	16.53	14.45	12.57
10	19.88	17.37	15.11

Continuous Active Monitoring Results

A summary of the average pollutant concentrations measured at the continuous sampling location between 11th July 2018 and 15th February 2019 is provided in Table 8. It should be noted that the stated values may be subject to variation following completion of the monitoring and application of relevant adjustment factors.

Table 8 Continuous Active Monitoring Results - Average Pollutant Concentrations

Pollutant	Average Concentration (µg/m^3)
NO_2	21.39
PM_{10}	14.39
$PM_{2.5}$	5.58