Barratt London

NIMR, Mill Hill

Air Quality Monitoring Report

Issue 12

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Issue	Date	Status
1	2nd March 2018	First Issue – Month 1 of Monitoring
2	6th April 2018	Second Issue – Month 2 of Monitoring
3	9th April 2018	Third Issue – Month 2 of Monitoring Update
4	4th May 2018	Fourth Issue – Month 3 of Monitoring
5	5th June 2018	Fifth Issue – Month 4 of Monitoring
6	3rd July 2018	Sixth Issue – Month 5 of Monitoring
7	2nd August 2018	Seventh Issue – Month 6 of Monitoring
8	3rd August 2018	Eighth Issue – Updated Discussion, Month 6 of Monitoring
9	6th September 2018	Ninth Issue – Month 7 of Monitoring
10	4th October 2018	Tenth Issue – Month 8 of Monitoring
11	1st November 2018	Eleventh Issue – Month 9 of Monitoring
12	12th November 2018	Twelfth Issue – Updated Urban Background Data, Month 9 of Monitoring

Contents

1.0 Introduction

An air quality monitoring survey is being undertaken to determine levels of PM_{10}, $PM_{2.5}$ and PM_1 experienced as a result of the works undertaken at two locations at the former NIMR site, Mill Hill, Barnet: Phase 1 Monitoring Location 1A and Phase 1 Monitoring Location 1B. The monitoring locations are displayed in Figure 1. The purpose of this report is to review these levels against criteria determined from appropriate guidance to minimise disruption to nearby sensitive receptors as a result of the works.

Since the previous October issue of this monitoring report, the IAQM have issued an updated document for '*Guidance on Air Quality Monitoring in the Vicinity of Demolition and Construction Sites*' in October 2018. This guidance supersedes the previously issued 2012 document. The new IAQM 2018 guidance outlines lower on-site 'red' criteria action levels for PM_{10} of 190 µg/m^3 per hour. This value is not comparable to the previously specified 15-minute 'red' criteria average of 250 µg/m^3. However, to present a worst-case assessment, all future reports will comply with the IAQM 190 µg/m^3 action level over a 15-minute period.

This report relates to measurements made between 1st and 31st October 2018.

This twelfth issue of the report has been updated to include the London Air Urban Background Data which was previously unavailable from the 19th October.

2.0 Policy and Legislative Context

2.1 Documents Consulted

The following documents were consulted during the undertaking of this assessment:

Legislation and Best Practice Guidance

- The Air Quality Standards (Amendment) Regulations 2016;
- The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, 2007;
- The Environment Act, 1995;
- Local Air Quality Management Technical Guidance LAQM.TG(16), DEFRA, 2018;
- Guidance on Air Quality Monitoring in the Vicinity of Demolition and Construction Sites, IAQM, 2018.

2.2 Air Quality Legislative Framework

European Legislation

European air quality legislation is consolidated under Directive 2008/50/EC, which came into force on 11th June 2008. This Directive consolidates previous legislation which was designed to deal with specific pollutants in a consistent manner and provides new air quality objectives for fine particulates, and includes:

- **Directive 1999/30/EC** – the First Air Quality "Daughter" Directive – sets ambient air limit values for nitrogen dioxide and oxides of nitrogen, sulphur dioxide, lead and particulate matter;
- **Directive 2000/69/EC** – the Second Air Quality "Daughter" Directive – sets ambient air limit values for benzene and carbon monoxide; and,
- **Directive 2002/3/EC** – the Third Air Quality "Daughter" Directive – seeks to establish long-term objectives, target values, an alert threshold and an information threshold for concentrations of ozone in ambient air.

The fourth daughter Directive was not included within the consolidation and is described as:

- **Directive 2004/107/EC** – sets health-based limits on polycyclic aromatic hydrocarbons, cadmium, arsenic, nickel and mercury, for which there is a requirement to reduce exposure to as low as reasonably achievable.

UK Legislation

The Air Quality Standards (Amendments) Regulations 2016 seek to simplify air quality regulation and provide a new transposition of the Air Quality Framework Directive, First, Second and Third Daughter Directives and also transpose the Fourth Daughter Directive within the UK. The Air Quality Limit Values are transposed into the updated Regulations as Air Quality Standards, with attainment dates in line with the European Directives. SI 2010 No. 1001, Part 7 Regulation 31 extends powers, under Section 85(5) of the Environment Act (1995), for the Secretary of State to give directions to Local Authorities (LAs) for the implementation of these Directives.

The UK Air Quality Strategy is the method for implementation of the air quality limit values in England, Scotland, Wales and Northern Ireland and provides a framework for improving air quality and protecting human health from the effects of pollution.

For each nominated pollutant, the Air Quality Strategy sets clear, measurable, outdoor air quality standards and target dates by which these must be achieved; the combined standard and target date is referred to as the Air Quality Objective (AQO) for that pollutant. Adopted national standards are based on the recommendations of the Expert Panel on Air Quality Standards (EPAQS) and have been translated into a set of Statutory Objectives within the Air Quality (England) Regulations (2000) SI 928, and subsequent amendments.

The AQOs for pollutants included within the Air Quality Strategy and assessed as part of the scope of this report are presented in Table 2.1 along with European Commission (EC) Directive Limits and World Health Organisation (WHO) Guidelines.

Table 2.1 Air Quality Standards, Objectives, Limit and Target Values

Pollutant	Applies	Objective	Concentration Measured as[10]	Date to be achieved and maintained thereafter	European Obligations	Date to be achieved and maintained thereafter	New or existing
PM_{10}	UK	50 µg/m^3 by end of 2004 (max 35 exceedances a year)	24-hour mean	1st January 2005	50µg/m^3 by end of 2004 (max 35 exceedances a year)	1st January 2005	Retain Existing
	UK	40 µg/m^3 by end of 2004	Annual mean	1st January 2005	40 µg/m^3	1st January 2005	
$PM_{2.5}$	UK	25 µg/m^3	Annual Mean	31st December 2010	25 µg/m^3	1st January 2010	Retain Existing

There are currently no UK or EU objectives for PM_1.

3.0 Assessment Criteria

3.1 Background Concentrations

Background concentrations as used within the prediction calculations were referenced from the UK National Air Quality Information Archive database based on the National Grid Co-ordinates of 1 x 1 km grid squares nearest to the development site. In November 2017, DEFRA issued revised 2015 based background maps for PM_{10} and $PM_{2.5}$ which incorporate updates to the input data used for modelling. 2018 background maps have been utilised to assess the significance of monitored levels. The updated mapped background concentrations used in the assessment are summarised in Table 3.1.

Table 3.1 Published Background Air Quality Levels (µg/m³)

UK NGR(m)		2018	
X	Y	PM_{10}	$PM_{2.5}$
522500	192500	14.4	9.5
523500	192500	14.3	9.4
522500	193500	14.1	9.3
523500	193500	13.9	9.2

London Air's annual mean pollution map uses a detailed model to show a prediction of PM_{10} and $PM_{2.5}$ annual averages across the whole of Greater London. The latest accurate model is available for the year of 2013. The detailed annual mean pollution maps are displayed in Figures 3.1 and Figure 3.2.

Figure 3.1 Modelled Annual Mean PM_{10} Air Pollution (based on measurements made during 2013)

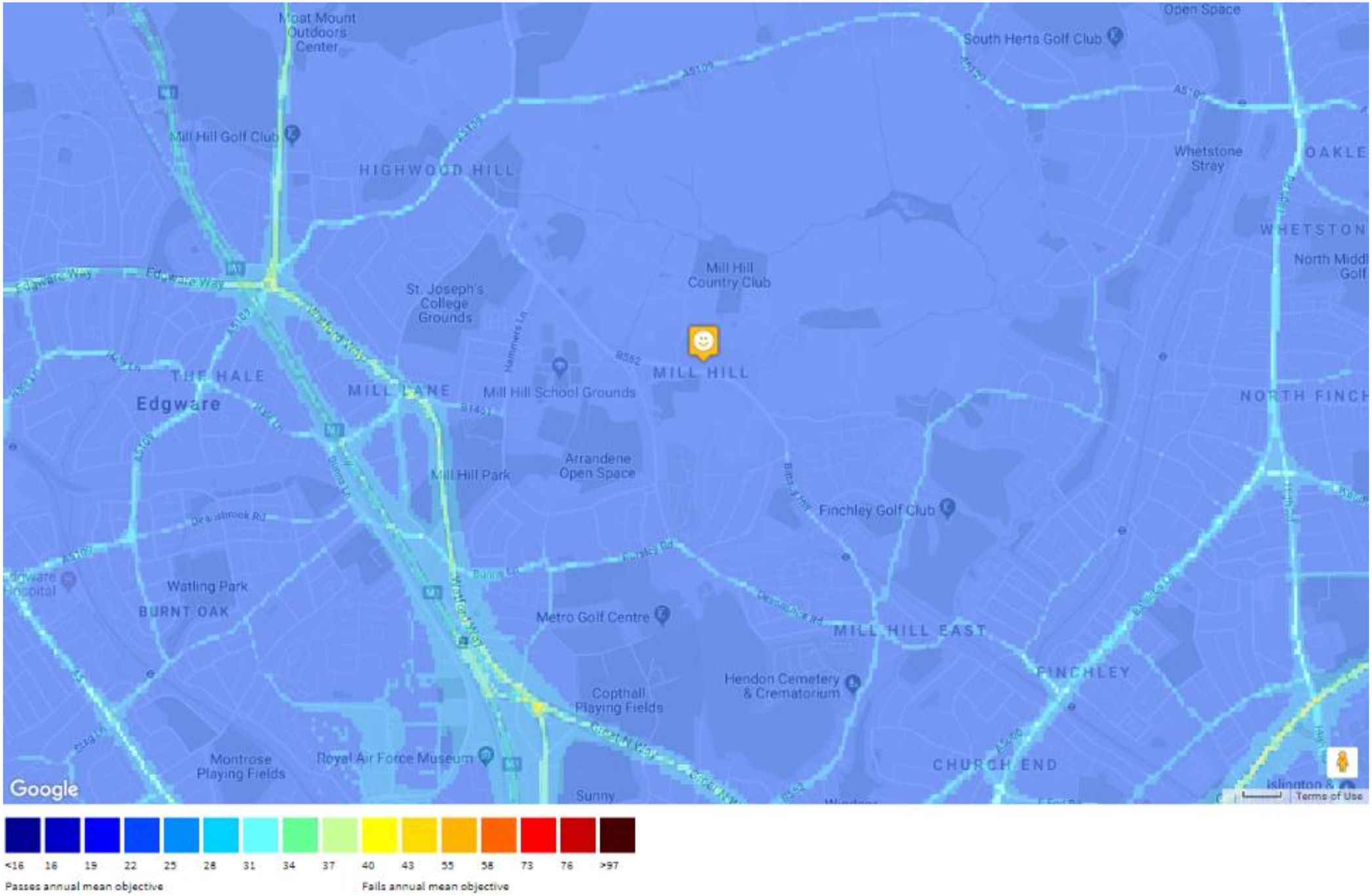
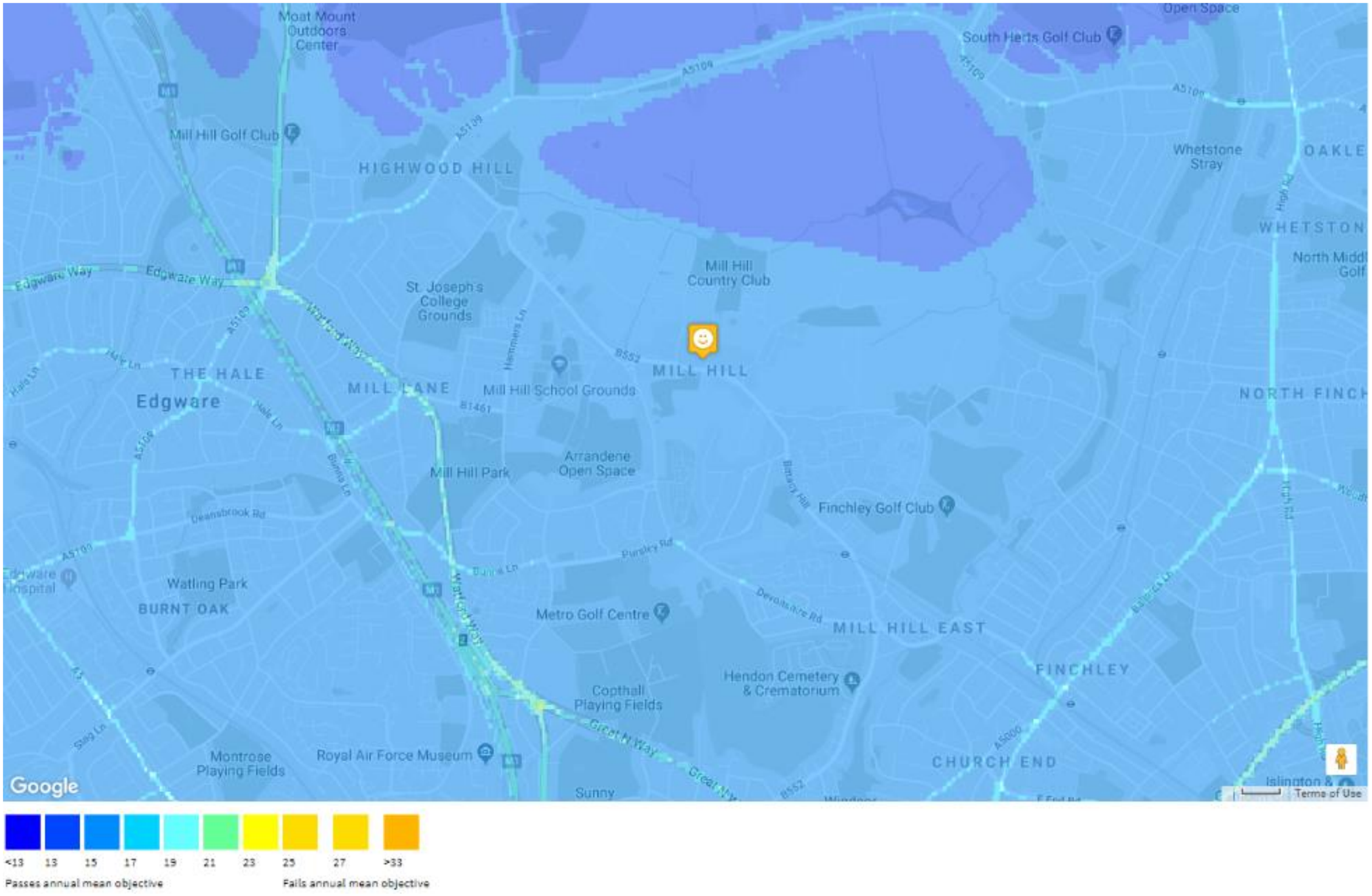


Figure 3.2 Modelled Annual Mean $PM_{2.5}$ Air Pollution (based on measurements made during 2013)



3.2 Pollutant Sources

The main emissions during demolition are likely to be dust and particulate matter generated during earth moving (particularly during dry months) or from demolition materials. The main potential effects of dust and particulate matter are:

- Visual - dust plume, reduced visibility, coating and soiling of surfaces leading to annoyance, loss of amenity, the need to clean surfaces;
- Physical and/or chemical contamination and corrosion of artefacts;
- Coating of vegetation and soil contamination; and,
- Health effects due to inhalation e.g. asthma or irritation of the eyes.

A number of other factors such as the amount of precipitation and other meteorological conditions will also greatly influence the amount of particulate matter generated.

Demolition activities can give rise to short-term elevated dust/PM_{10} concentrations in neighbouring areas. This may arise from vehicle movements, soiling of the public highway, demolition or windblown stockpiles.

3.3 Particulate Matter

The UK Air Quality Standards seek to control the health implications of respirable PM_{10} and $PM_{2.5}$. However, the majority of particles released from construction will be greater than this in size.

Demolition works on site have the potential to elevate localised PM_{10} and $PM_{2.5}$ concentrations in the area. On this basis, mitigation measures should still be taken to minimise these emissions as part of good site practice.

Particulate matter is made up of a collection of solid and/or liquids materials of various sizes. The particles are released into the atmosphere by numerous sources with the major sources being created by road transport. Emissions of dust can also generate high concentrations of particulate matter.

Particulate matter requires monitoring due to the impacts on human health that large amount of exposure can cause.

3.4 Criteria

3.4.1 15-Minute Monitoring Criteria

Since the previous issue of this monitoring report, the IAQM have issued an updated document for '*Guidance on Air Quality Monitoring in the Vicinity of Demolition and Construction Sites*'. This guidance

supersedes the previously issued 2012 document. The new IAQM 2018 guidance outlines lower on-site 'red' criteria action levels for PM_{10} of 190 µg/m^3 per hour. This value is not comparable to the previously specified 15-minute 'red' criteria average of 250 µg/m^3. However, to present a worst-case assessment, all future reports will comply with the IAQM 190 µg/m^3 action level over a 15-minute period.

An assessment using the traffic light approach based on sections 4.41 of the IAQM document 'Guidance on Air Quality Monitoring in the Vicinity of Demolition and Construction Sites (2018) is considered appropriate and is proposed in Table 3.2 below. Given the proximity (within 7m) of nearby receptors and the possibility for exposure to PM_{10} the following criteria is proposed.

Table 3.2 Traffic Light Criteria

Alert level	Time Period	Maximum Permissible 15-minute average (µg/m^3)
Red (*at this level all works to cease immediately, investigate cause of exceedance and use alternative methods where appropriate*)	15-minute average	>190 µg/m^3
Amber (*continual monitoring and investigation of alternative methods where appropriate*)	Two consecutive 15-minute averages	>80 µg/m^3
Green (*early warning/ no action required*)	15-minute average	>80 µg/m^3

The below criteria have been adopted for $PM_{2.5}$ levels at the boundary of the site.

Table 3.3 $PM_{2.5}$ Level Criteria – Levels at Boundary

Monitoring Levels	Time Period	$PM_{2.5}$ exceedance limits at monitoring locations
Red (*at this level all works to cease immediately, investigate cause of exceedance and use alternative methods*)	15-minute average	>48 µg/m^3
Amber (*continual monitoring and investigation of alternative methods where appropriate*)	Two consecutive 15-minute averages	>38 µg/m^3
Green (*no action required*)	15-minute average	>38 µg/m^3

3.4.2 24hr Monitoring Criteria

In addition to the above detailed 15-minute traffic light criteria, WYG have devised an additional 24-hour criterion to determine whether particulate matter onsite is being distributed in the same pattern as particulate matter monitored at the nearest urban background site. This criterion is non-statutory and has been devised to be utilised as a general guidance to inform overall dust management at the site to identify peak episodes with regards to particulate matter.

Table 3.3 24-hour Traffic Light Criteria

Alert level	Time Period	Percentage Difference from Monitored Background Concentration (%)
Red	24-hours	>+100
Amber	24-hours	+50 to +100
Green	24-hours	< +50

4.0 Particulate Matter Survey

4.1 Air Quality Monitoring Methodology

Particulate Matter monitoring was undertaken at each of the monitoring locations as identified in Figure 1. Particulate Matter monitoring was undertaken using two AQ Mesh Pods which are small battery-operated monitoring devices. These devices record levels of PM_{10}, $PM_{2.5}$ and PM_1 constantly in 15-minute intervals.

The monitored results were compared to both urban background monitored values of PM_{10} and $PM_{2.5}$ monitored by London Air (www.londonair.org.uk). The urban background values were monitored at the Kensington & Chelsea – North Ken (FIDAS) AURN from months February to May. Camden – Bloomsbury AURN has been used in the month of June. A different urban background monitoring site has been used for the month of June due to data from the previous site, Kensington & Chelsea – North Ken (FIDAS) AURN, being inaccessible. Data at monitoring site Kensington & Chelsea – North Ken (FIDAS) AURN is now accessible and has been used for the month of July onwards.

Detailed results of exceedances of the 'red' limit are outlined in Appendix A.

4.1.1 Particulate Matter Results

The results of the Particulate Matter Monitoring Survey are presented in the tables below.

Phase 1 Monitoring Location 1A Results

15-Minute Criteria Analysis

The on-site monitoring results have been further analysed to determine any exceedances of the 15-minute traffic criteria outlined in Section 3. These have been split into the number of exceedances within and outside of site working hours as highlighted below in Table 4.1.

Table 4.1 Exceedances of 15-minute Absolute Level Criteria for PM_{10}

Date	Exceedances of 'Green' Criteria	Exceedances of 'Amber' Criteria	Exceedances of 'Red' Criteria
October 2018			
01/10/2018	0	0	0
02/10/2018	0	0	0
03/10/2018	0	0	0
04/10/2018	0	0	0
05/10/2018	1	0	1
06/10/2018	0	0	0
07/10/2018	0	0	0
08/10/2018	0	0	0
09/10/2018	0	0	0
10/10/2018	0	0	0
11/10/2018	0	0	0
12/10/2018	0	0	0
13/10/2018	0	0	0
14/10/2018	0	0	0
15/10/2018	0	0	0
16/10/2018	0	0	0
17/10/2018	0	0	0
18/10/2018	0	0	0
19/10/2018	0	0	0
20/10/2018	0	0	0
21/10/2018	0	0	0
22/10/2018	0	0	0
23/10/2018	0	0	0
24/10/2018	0	0	0
25/10/2018	0	0	0
26/10/2018	0	0	0
27/10/2018	0	0	0
28/10/2018	0	0	0
29/10/2018	0	0	0
30/10/2018	0	0	0
31/10/2018	0	0	0
*recorded outside working hours			

The on-site monitoring results have been further analysed to determine any exceedances of the 15-minute traffic criteria outlined in Section 3. These have been split into the number of exceedances within and outside of site working hours as highlighted below in Table 4.2.

Table 4.2 Exceedances of 15-minute Absolute Level Criteria for $PM_{2.5}$

Date	Exceedance of 'Green' Criteria	Exceedance of 'Amber' Criteria	Exceedance of 'Red' Criteria
October 2018			
01/10/2018	0	0	0
02/10/2018	0	0	0
03/10/2018	0	0	0
04/10/2018	0	0	0
05/10/2018	0	0	0
06/10/2018	0	0	0
07/10/2018	0	0	0
08/10/2018	0	0	0
09/10/2018	0	0	0
10/10/2018	0	0	0
11/10/2018	0	0	0
12/10/2018	0	0	0
13/10/2018	0	0	0
14/10/2018	0	0	0
15/10/2018	0	0	0
16/10/2018	0	0	0
17/10/2018	0	0	0
18/10/2018	0	0	0
19/10/2018	0	0	0
20/10/2018	0	0	0
21/10/2018	0	0	0
22/10/2018	0	0	0
23/10/2018	0	0	0
24/10/2018	0	0	0
25/10/2018	0	0	0
26/10/2018	0	0	0
27/10/2018	0	0	0
28/10/2018	0	0	0
29/10/2018	0	0	0
30/10/2018	0	0	0
31/10/2018	0	0	0

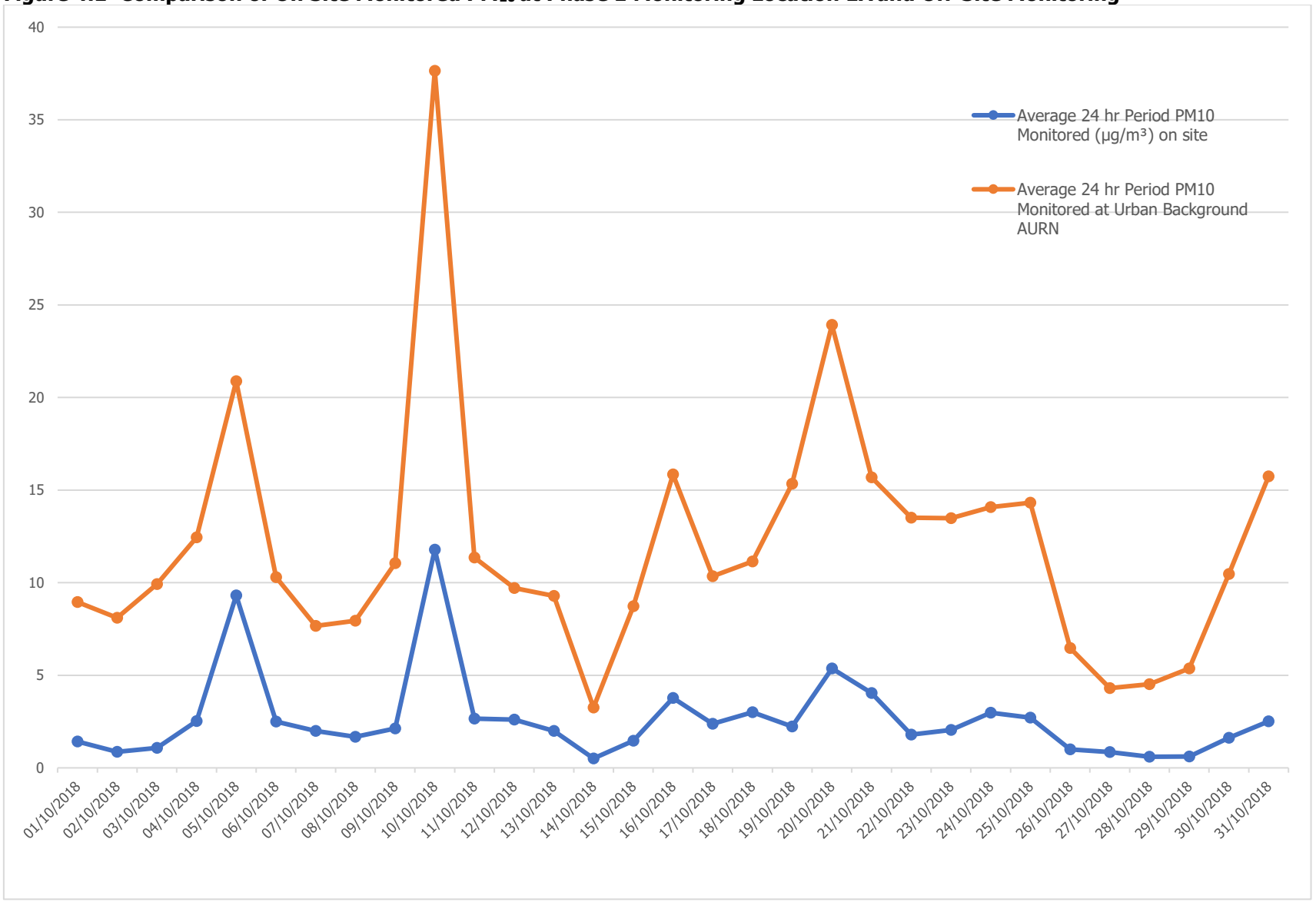
Daily Average Analysis

Table 4.3 below shows the monitored PM_{10} on the site compared to the closest Urban Background monitoring stations operated by the council to assess whether the PM_{10} on site is being distributed in a pattern similar to the local area and to identify any anomalous results.

Table 4.3 PM_{10} 24-hour monitoring results compared with background levels

Date	Average 24 hr Period PM_{10} Monitored (µg/m³) on site	Average 24 hr Period PM_{10} Monitored at Urban Background AURN	Difference Between 24 hr Monitored Background and On Site PM_{10} (%)
October 2018			
01/10/2018	1.42	8.95	-84
02/10/2018	0.86	8.11	-89
03/10/2018	1.08	9.93	-89
04/10/2018	2.53	12.45	-80
05/10/2018	9.31	20.88	-55
06/10/2018	2.50	10.29	-76
07/10/2018	1.99	7.67	-74
08/10/2018	1.68	7.94	-79
09/10/2018	2.13	11.05	-81
10/10/2018	11.79	37.64	-69
11/10/2018	2.66	11.36	-77
12/10/2018	2.61	9.71	-73
13/10/2018	2.00	9.29	-78
14/10/2018	0.51	3.26	-84
15/10/2018	1.46	8.73	-83
16/10/2018	3.78	15.85	-76
17/10/2018	2.38	10.35	-77
18/10/2018	3.01	11.14	-73
19/10/2018	2.24	9.32	-85
20/10/2018	5.37	15.34	-78
21/10/2018	4.04	23.92	-74
22/10/2018	1.80	15.69	-87
23/10/2018	2.05	13.51	-85
24/10/2018	2.98	13.48	-79
25/10/2018	2.71	14.08	-81
26/10/2018	1.00	14.31	-85
27/10/2018	0.85	6.47	-80
28/10/2018	0.60	4.31	-87
29/10/2018	0.62	4.52	-88
30/10/2018	1.62	5.37	-85
31/10/2018	2.51	10.47	-84

Figure 4.1 Comparison of On Site Monitored PM_{10} at Phase 1 Monitoring Location 1A and Off-Site Monitoring



As shown above, monitoring trends on site generally match trends at surrounding background monitoring sites.

Table 4.4 below shows the monitored $PM_{2.5}$ on the site compared to the closest Urban Background and Roadside monitoring stations operated by the council to assess whether the $PM_{2.5}$ on site is being distributed in a pattern similar to the local area and to identify any anomalous results.

Table 4.4 $PM_{2.5}$ Results 24-hour monitoring results compared with background levels

Date	Average 24 hr Period $PM_{2.5}$ Monitored (µg/m³) on site	Average 24 hr Period $PM_{2.5}$ Monitored at Urban Background AURN	Difference Between 24 hr Monitored Background and On Site PM_{10} (%)
October 2018			
01/10/2018	0.38	3.95	-90
02/10/2018	0.35	3.17	-89
03/10/2018	0.62	4.38	-86
04/10/2018	1.56	8.09	-81
05/10/2018	3.57	13.76	-74
06/10/2018	1.48	7.26	-80
07/10/2018	0.71	4.52	-84
08/10/2018	0.88	4.42	-80
09/10/2018	1.28	7.03	-82
10/10/2018	7.82	27.60	-72
11/10/2018	1.66	6.37	-74
12/10/2018	0.57	4.72	-88
13/10/2018	0.82	5.21	-84
14/10/2018	0.24	2.05	-88
15/10/2018	0.87	6.19	-86
16/10/2018	2.46	11.54	-79
17/10/2018	1.54	6.74	-77
18/10/2018	1.65	7.11	-77
19/10/2018	1.33	10.27	-87
20/10/2018	3.65	18.01	-80
21/10/2018	2.70	12.39	-78
22/10/2018	0.76	7.05	-89
23/10/2018	0.85	7.18	-88
24/10/2018	1.51	8.45	-82
25/10/2018	1.84	9.64	-81
26/10/2018	0.48	3.34	-86
27/10/2018	0.33	2.54	-87
28/10/2018	0.26	2.61	-90
29/10/2018	0.34	2.82	-88
30/10/2018	1.02	6.32	-84
31/10/2018	1.63	9.50	-83

Table 4.5 Comparison of Weather Conditions and average levels of PM_{10} and $PM_{2.5}$

Date	Wind Directions	Wind Speed (mph)	Weather Conditions	Average 24 hr Period PM_{10} Monitored (µg/m³) on site	Average 24 hr Period $PM_{2.5}$ Monitored (µg/m³) on site
October 2018					
01/10/2018	North West	15	Fair	1.42	0.38
02/10/2018	West North West	18	Mostly Cloudy	0.86	0.35
03/10/2018	West	12	Fair	1.08	0.62
04/10/2018	South West	13	Mostly Cloudy	2.53	1.56
05/10/2018	South West	8	Fair	9.31	3.57
06/10/2018	North	13	Light Rain	2.50	1.48
07/10/2018	North	11	Fair	1.99	0.71
08/10/2018	South West	14	Fair	1.68	0.88
09/10/2018	South South West	12	Fair	2.13	1.28
10/10/2018	East	13	Fair	11.79	7.82
11/10/2018	South	18	Fair	2.66	1.66
12/10/2018	South	29	Fair	2.61	0.57
13/10/2018	South	24	Fair	2.00	0.82
14/10/2018	North	13	Light Rain	0.51	0.24
15/10/2018	North East	9	Cloudy	1.46	0.87
16/10/2018	South	13	Mostly Cloudy	3.78	2.46
17/10/2018	Variable	7	Cloudy	2.38	1.54
18/10/2018	North East	10	Fair	3.01	1.65
19/10/2018	Variable	5	Fair	2.24	1.33
20/10/2018	West	8	Fair	5.37	3.65
21/10/2018	West	8	Fair	4.04	2.70
22/10/2018	North	10	Fair	1.80	0.76
23/10/2018	West North West	16	Fair	2.05	0.85
24/10/2018	West North West	9	Fair	2.98	1.51
25/10/2018	West	10	Cloudy	2.71	1.84
26/10/2018	West	15	Cloudy	1.00	0.48
27/10/2018	North	15	Cloudy	0.85	0.33
28/10/2018	North East	13	Light Rain	0.60	0.26
29/10/2018	North East	12	Partly Cloudy	0.62	0.34
30/10/2018	North West	15	Cloudy	1.62	1.02
31/10/2018	East	16	Fair	2.51	1.63

Phase 1 Monitoring Location 1B Results

The on-site monitoring results have been further analysed to determine any exceedances of the 15-minute traffic criteria outlined in Section 3. These have been split into the number of exceedances within and outside of site working hours as highlighted below in Table 4.6.

Table 4.6 Exceedances of 15-minute Absolute Level Criteria for PM_{10}

Date	Exceedance of 'Green' Criteria	Exceedance of 'Amber' Criteria	Exceedance of 'Red' Criteria
October 2018			
01/10/2018	0	0	0
02/10/2018	0	0	0
03/10/2018	0	0	0
04/10/2018	0	0	0
05/10/2018	0	0	0
06/10/2018	0	0	0
07/10/2018	0	0	0
08/10/2018	0	0	0
09/10/2018	0	0	0
10/10/2018	4*	2*	0
11/10/2018	0	0	0
12/10/2018	0	0	0
13/10/2018	0	0	0
14/10/2018	0	0	0
15/10/2018	0	0	0
16/10/2018	0	0	0
17/10/2018	0	0	0
18/10/2018	0	0	0
19/10/2018	0	0	0
20/10/2018	0	0	0
21/10/2018	0	0	0
22/10/2018	0	0	0
23/10/2018	0	0	0
24/10/2018	1	0	0
25/10/2018	0	0	0
26/10/2018	0	0	0
27/10/2018	0	0	0
28/10/2018	0	0	0
29/10/2018	0	0	0
30/10/2018	0	0	0
31/10/2018	0	0	0
*recorded outside working hours			

The on-site monitoring results have been further analysed to determine any exceedances of the 15-minute traffic criteria outlined in Section 3. These have been split into the number of exceedances within and outside of site working hours as highlighted below in Table 4.7.

Table 4.7 Exceedances of 15-minute Absolute Level Criteria for $PM_{2.5}$

Date	Exceedance of 'Green' Criteria	Exceedance of 'Amber' Criteria	Exceedance of 'Red' Criteria
October 2018			
01/10/2018	0	0	0
02/10/2018	0	0	0
03/10/2018	0	0	0
04/10/2018	0	0	0
05/10/2018	0	0	0
06/10/2018	0	0	0
07/10/2018	0	0	0
08/10/2018	0	0	0
09/10/2018	0	0	0
10/10/2018	30(28*)	29 (28*)	18*
11/10/2018	2*	1*	0
12/10/2018	0	0	0
13/10/2018	0	0	0
14/10/2018	0	0	0
15/10/2018	1	0	0
16/10/2018	0	0	0
17/10/2018	0	0	0
18/10/2018	0	0	0
19/10/2018	0	0	0
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21/10/2018	0	0	0
22/10/2018	0	0	0
23/10/2018	0	0	0
24/10/2018	2	0	2
25/10/2018	0	0	0
26/10/2018	0	0	0
27/10/2018	0	0	0
28/10/2018	0	0	0
29/10/2018	0	0	0
30/10/2018	0	0	0
31/10/2018	0	0	0
*recorded outside working hours			

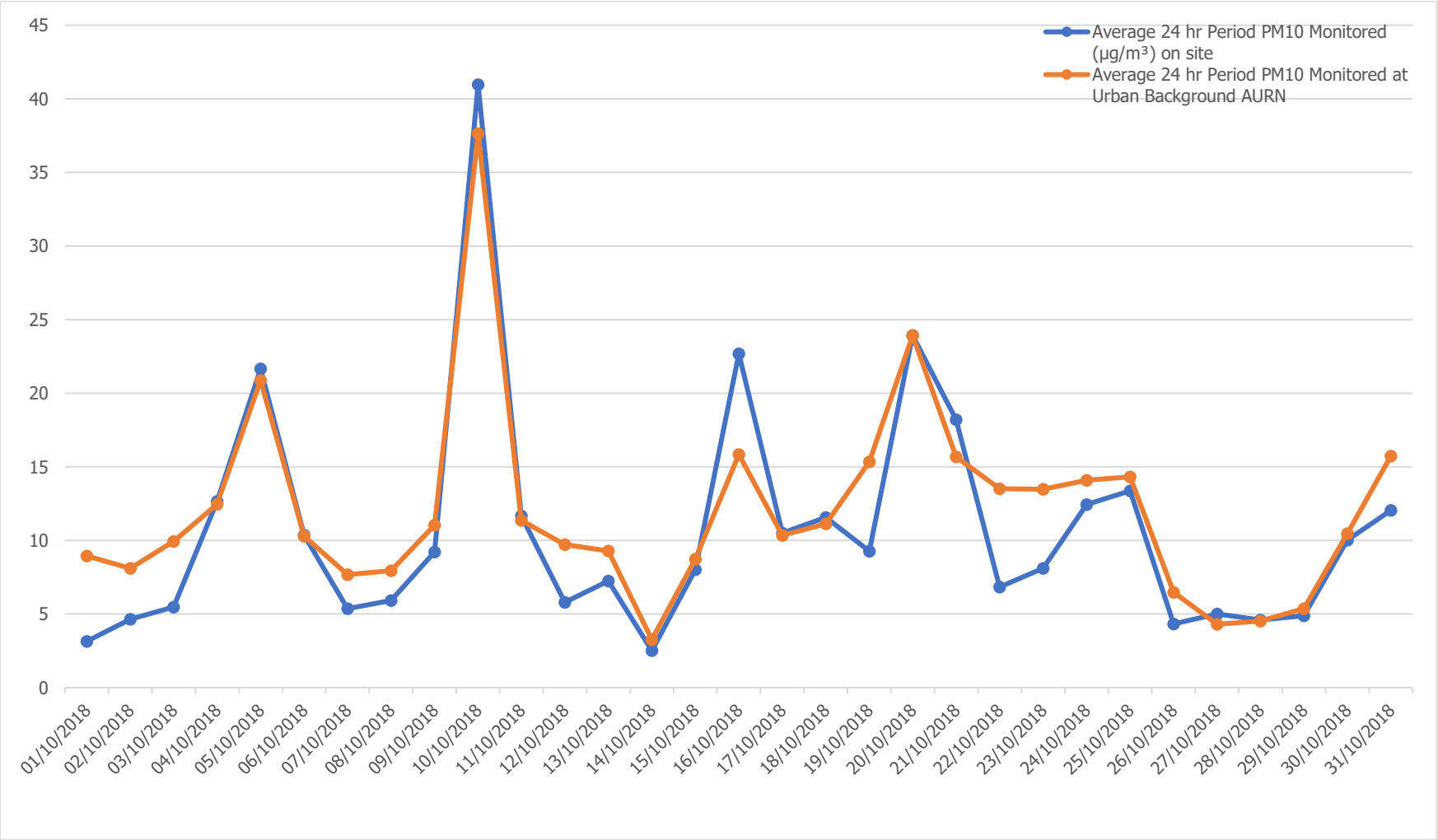
Daily Average Analysis

Table 4.8 below shows the monitored PM_{10} on the site compared to the closest Urban Background monitoring stations operated by the council to assess whether the PM_{10} on site is being distributed in a pattern similar to the local area and to identify any anomalous results.

Table 4.8 PM_{10} 24-hour monitoring results compared with background levels

Date	Average 24 hr Period PM_{10} Monitored (µg/m³) on site	Average 24 hr Period PM_{10} Monitored at Urban Background AURN	Difference Between 24 hr Monitored Background and On Site PM_{10} (%)
October 2018			
01/10/2018	3.14	8.95	-65
02/10/2018	4.65	8.11	-43
03/10/2018	5.48	9.93	-45
04/10/2018	12.65	12.45	2
05/10/2018	21.66	20.88	4
06/10/2018	10.37	10.29	1
07/10/2018	5.36	7.67	-30
08/10/2018	5.92	7.94	-25
09/10/2018	9.21	11.05	-17
10/10/2018	40.98	37.64	9
11/10/2018	11.67	11.36	3
12/10/2018	5.80	9.71	-40
13/10/2018	7.24	9.29	-22
14/10/2018	2.51	3.26	-23
15/10/2018	8.02	8.73	-8
16/10/2018	22.68	15.85	43
17/10/2018	10.50	10.35	1
18/10/2018	11.56	11.14	4
19/10/2018	9.27	15.34	-40
20/10/2018	23.94	23.92	0
21/10/2018	18.20	15.69	16
22/10/2018	6.83	13.51	-49
23/10/2018	8.11	13.48	-40
24/10/2018	12.44	14.08	-12
25/10/2018	13.37	14.31	-7
26/10/2018	4.32	6.47	-33
27/10/2018	5.00	4.31	16
28/10/2018	4.60	4.52	2
29/10/2018	4.88	5.37	-9
30/10/2018	10.02	10.47	-4
31/10/2018	12.05	15.74	-23

Figure 4.2 Comparison of On Site Monitored PM_{10} at Phase 1 Monitoring Location 1B Results and Off-Site Monitoring



As shown above, monitoring trends on site generally match trends at surrounding background monitoring sites.

Table 4.9 below shows the monitored $PM_{2.5}$ on the site compared to the closest Urban Background monitoring stations operated by the council so as to assess whether the $PM_{2.5}$ on site is being distributed in a pattern similar to the local area and to identify any anomalous results.

Table 4.9 $PM_{2.5}$ Results 24-hour monitoring results compared with background levels

Date	Average 24 hr Period $PM_{2.5}$ Monitored (µg/m³) on site	Average 24 hr Period $PM_{2.5}$ Monitored at Urban Background AURN (µg/m³)	Difference Between 24 hr Monitored Background and On Site PM_{10} (%)
October 2018			
01/10/2018	1.82	3.95	-54
02/10/2018	3.57	3.17	13
03/10/2018	3.98	4.38	-9
04/10/2018	10.03	8.09	24
05/10/2018	16.89	13.76	23
06/10/2018	8.14	7.26	12
07/10/2018	3.98	4.52	-12
08/10/2018	4.57	4.42	3
09/10/2018	6.59	7.03	-6
10/10/2018	32.73	27.60	19
11/10/2018	9.27	6.37	45
12/10/2018	4.14	4.72	-12
13/10/2018	5.70	5.21	9
14/10/2018	1.91	2.05	-7
15/10/2018	5.10	6.19	-18
16/10/2018	16.50	11.54	43
17/10/2018	8.59	6.74	27
18/10/2018	8.59	7.11	21
19/10/2018	7.28	10.27	-29
20/10/2018	19.62	18.01	9
21/10/2018	14.60	12.39	18
22/10/2018	3.92	7.05	-44
23/10/2018	5.32	7.18	-26
24/10/2018	8.65	8.45	2
25/10/2018	11.09	9.64	15
26/10/2018	3.43	3.34	3
27/10/2018	4.13	2.54	63
28/10/2018	3.76	2.61	44
29/10/2018	3.79	2.82	34
30/10/2018	8.45	6.32	34
31/10/2018	9.97	9.50	5

Table 4.10 Comparison of Weather Conditions and average levels of PM_{10} and $PM_{2.5}$

Date	Wind Directions	Wind Speed (mph)	Weather Conditions	Average 24 hr Period PM_{10} Monitored (µg/m³) on site	Average 24 hr Period $PM_{2.5}$ Monitored (µg/m³) on site
October 2018					
01/10/2018	North West	15	Fair	3.14	1.82
02/10/2018	West North West	18	Mostly Cloudy	4.65	3.57
03/10/2018	West	12	Fair	5.48	3.98
04/10/2018	South West	13	Mostly Cloudy	12.65	10.03
05/10/2018	South West	8	Fair	21.66	16.89
06/10/2018	North	13	Light Rain	10.37	8.14
07/10/2018	North	11	Fair	5.36	3.98
08/10/2018	South West	14	Fair	5.92	4.57
09/10/2018	South South West	12	Fair	9.21	6.59
10/10/2018	East	13	Fair	40.98	32.73
11/10/2018	South	18	Fair	11.67	9.27
12/10/2018	South	29	Fair	5.80	4.14
13/10/2018	South	24	Fair	7.24	5.70
14/10/2018	North	13	Light Rain	2.51	1.91
15/10/2018	North East	9	Cloudy	8.02	5.10
16/10/2018	South	13	Mostly Cloudy	22.68	16.50
17/10/2018	Variable	7	Cloudy	10.50	8.59
18/10/2018	North East	10	Fair	11.56	8.59
19/10/2018	Variable	5	Fair	9.27	7.28
20/10/2018	West	8	Fair	23.94	19.62
21/10/2018	West	8	Fair	18.20	14.60
22/10/2018	North	10	Fair	6.83	3.92
23/10/2018	West North West	16	Fair	8.11	5.32
24/10/2018	West North West	9	Fair	12.44	8.65
25/10/2018	West	10	Cloudy	13.37	11.09
26/10/2018	West	15	Cloudy	4.32	3.43
27/10/2018	North	15	Cloudy	5.00	4.13
28/10/2018	North East	13	Light Rain	4.60	3.76
29/10/2018	North East	12	Partly Cloudy	4.88	3.79
30/10/2018	North West	15	Cloudy	10.02	8.45
31/10/2018	East	16	Fair	12.05	9.97

5.0 Discussion and Summary

Maintenance and Alerts

WYG technicians attended the site on the 23rd October to provide monthly servicing of both AQ Mesh pods. The immediate e-mail alerts to notify WYG and Barratts London when any exceedances of the PM_{10} and $PM_{2.5}$ criteria occur have continued throughout October.

The main demolition phase has now been completed, however to ensure the effects from the construction phase of the development are monitored sufficiently, WYG will continue to monitor the concentrations of PM_{10} and $PM_{2.5}$ on site. These will continue to be cross-checked with the construction schedule to identify appropriate dynamic locations of the air quality monitors, any issues and to inform any required future mitigation measures.

Monitoring Results

Monitoring Location 1A

PM_{10}

The data from the ninth month of monitoring at the former NIMR site, Mill Hill at Monitoring Location 1A showed one exceedance of the 'red' criteria, no exceedances of the 'amber' criteria and one exceedance of the 'green' criteria for PM_{10}.

The one exceedance of the 'red' criteria occurred within working hours at 09:45 on 5th October. This exceedance was also the one recorded green exceedance. This 'red' exceedance did not occur during adverse weather conditions or elevated background PM_{10} concentrations, and therefore a review of site operations in this area at this time should be conducted.

$PM_{2.5}$

The data from the ninth month of monitoring at the former NIMR site, Mill Hill at Monitoring Location 1A show no exceedances of the $PM_{2.5}$ 'red', 'amber' or 'green' criteria.

Monitoring Location 1B

PM_{10}

The ninth month of monitoring at the former NIMR site, Mill Hill, at Monitoring Location 1B for PM_{10} showed no exceedances of the 'red' criteria, two exceedances of the 'amber' criteria and five exceedances of the 'green' criteria.

Two exceedances of the 'amber' criteria occurred outside working hours between 20:30 to 21:15 on the 10th October 2018. These exceedances did not coincide with elevated background concentrations or during a period of dry, hot or windy weather conditions and therefore a review of site storage and mitigation measures deployed on site during these times should be conducted.

Of the five exceedances of the 'green' criteria, four exceedances occurred on the 10th October outside of working hours, and one occurred on the 24th October during working hours at 14:00.

$PM_{2.5}$

The ninth month of monitoring at the former NIMR site, Mill Hill, Barnet during Phase 1 at Monitoring Location 1B for $PM_{2.5}$ showed twenty exceedances of the 'red' criteria, thirty exceedances of the 'amber' criteria and thirty-five exceedances of the 'green' criteria.

Of the twenty exceedances of the 'red' criteria, eighteen exceedances occurred on the 10th October outside of working hours between the hours of 18:45 to 23:00. These exceedances did coincide with elevated background concentrations of $PM_{2.5,}$ however for consistency, a review of site storage and mitigation measures deployed on site during these periods should be conducted.

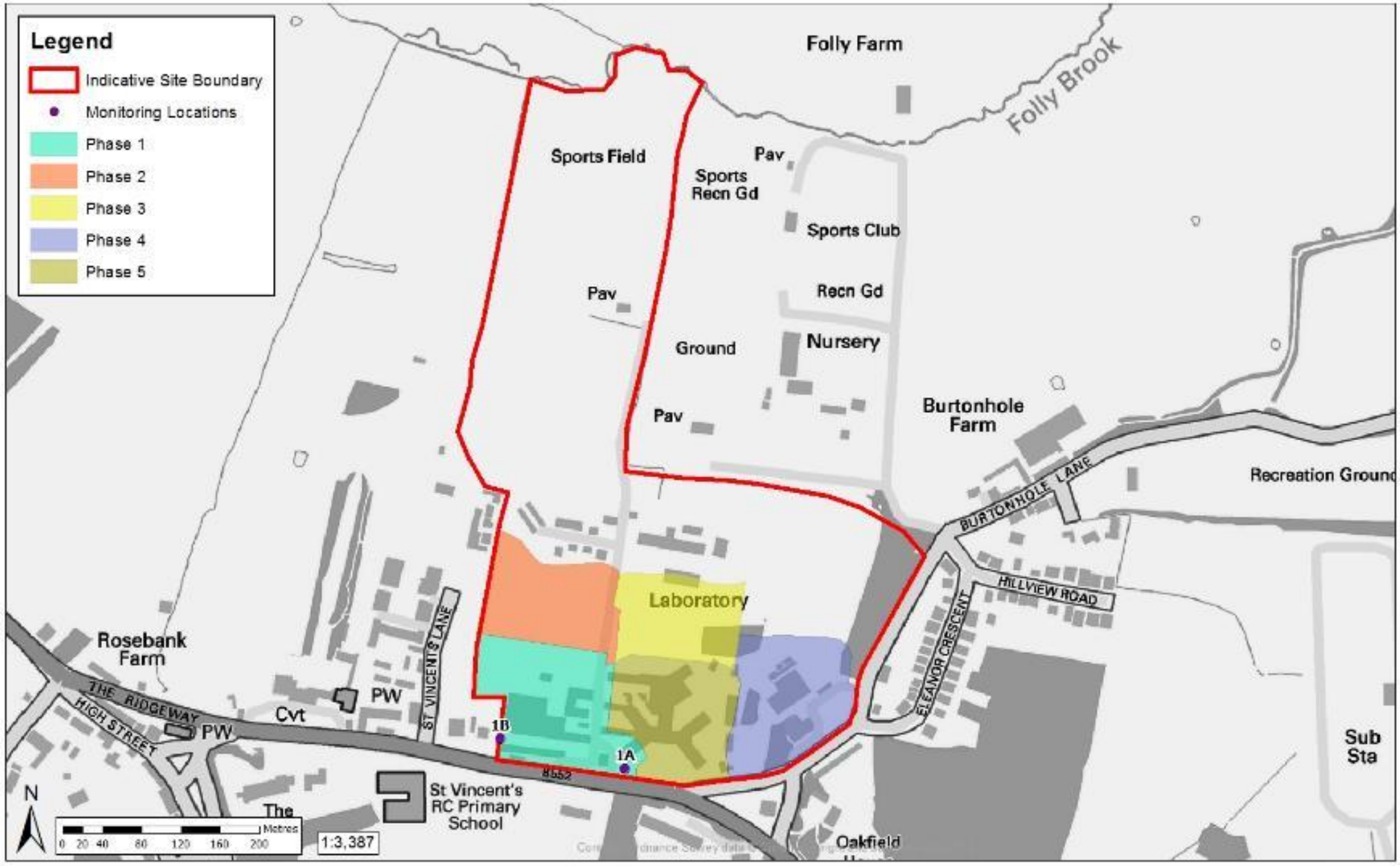
The other two exceedances of the 'red' criteria occurred on the 24th October within working hours at 14:00 and 15:45. Due to the unavailability of background monitoring data, it is unknown whether these exceedances coincided with elevated background concentrations of $PM_{2.5,}$ therefore a review of site operations in this area at this time should be conducted.

Twenty-nine exceedances of the 'amber' criteria occurred on the 10th October, with 28 occurring outside of working hours, and one within working hours. These exceedances did not coincide with elevated background concentrations of $PM_{2.5,}$ therefore a review of site operations in this area at this time should be conducted. Additionally, one exceedance of the amber criteria was recorded on the 11th October outside of working hours.

Thirty exceedances of the 'green' criteria occurred on the 10th October, with twenty-eight of these occurring outside of working hours. Two exceedances of the 'green' criteria occurred on the 11th October outside of working hours. One exceedance of the 'green' criteria occurred within working hours on the 15th October. Two exceedances of the 'green' criteria occurred on the 24th October within working hours.

Figures

Figure 1 Monitoring Locations



Appendix A Red Limit Exceedances

Red Limit Exceedances

An assessment using the traffic light approach based on sections 5.3.2 and the IAQM document 'Guidance on Air Quality Monitoring in the Vicinity of Demolition and Construction Sites (2018) was conducted for the site. The in-detail results with the date, time and recorded PM_{10} levels over 190 and $PM_{2.5}$ levels over 48 are outlined in Tables A1. These are regarded as "red" level.

Table A1 Date and Times of PM_{10} Red Limit Exceedances at Phase 1 Monitoring Location 1A

Date	Time	PM_{10} (µg/m³)	Recorded Weather Conditions
05/10/2018	09:45	281.668	Fair

Table A2 Date and Times of $PM_{2.5}$ Red Limit Exceedances at Phase 1 Monitoring Location 1B

Date	Time	$PM_{2.5}$ (µg/m³)	Recorded Weather Conditions
10/10/2018	18:45	48.818	Fair
	19:00	52.255	
	19:15	55.773	
	19:30	58.230	
	19:45	60.267	
	20:00	59.173	
	20:15	61.262	
	20:30	63.665	
	20:45	61.751	
	21:00	61.729	
	21:15	59.863	
	21:30	59.761	
	21:45	61.010	
	22:00	58.212	
	22:15	56.844	
	22:30	53.406	
	22:45	50.827	
	23:00	48.578	
	23:15	48.818	
24/10/2018	14:00	112.468	Mostly Cloudy
	15:45	54.900	