



SUMMARY MONITORING REPORT OCTOBER 2022

DATE:	25 November 2022	CONFIDENTIALITY:	Restricted
SUBJECT:	Monthly Air Quality Monitoring Report – October 2022		
PROJECT:	NVCC TCAR	AUTHOR:	Caroline Odbert
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INTRODUCTION

WSP has been commissioned by NHS Wales to undertake air quality monitoring to meet Cardiff Councils (CC) Pre-commencement planning condition 11 in relation to the Temporary Construction Access Route for the Construction of the Approved Velindre Cancer Centre, Whitchurch Hospital, Park Road, Whitchurch, Cardiff, CF14 7XB.

Condition 11 (CC Reference: 20/01110/MJR) states that:

“Prior to commencement of the development hereby approved details of an air monitoring unit and its location shall be submitted to and approved in writing with the Local Planning Authority. The monitoring unit shall be implemented in accordance with the approved details and remain operational until cessation of the development. Data from the air monitoring unit shall be provided to the Local Planning Authority on request.

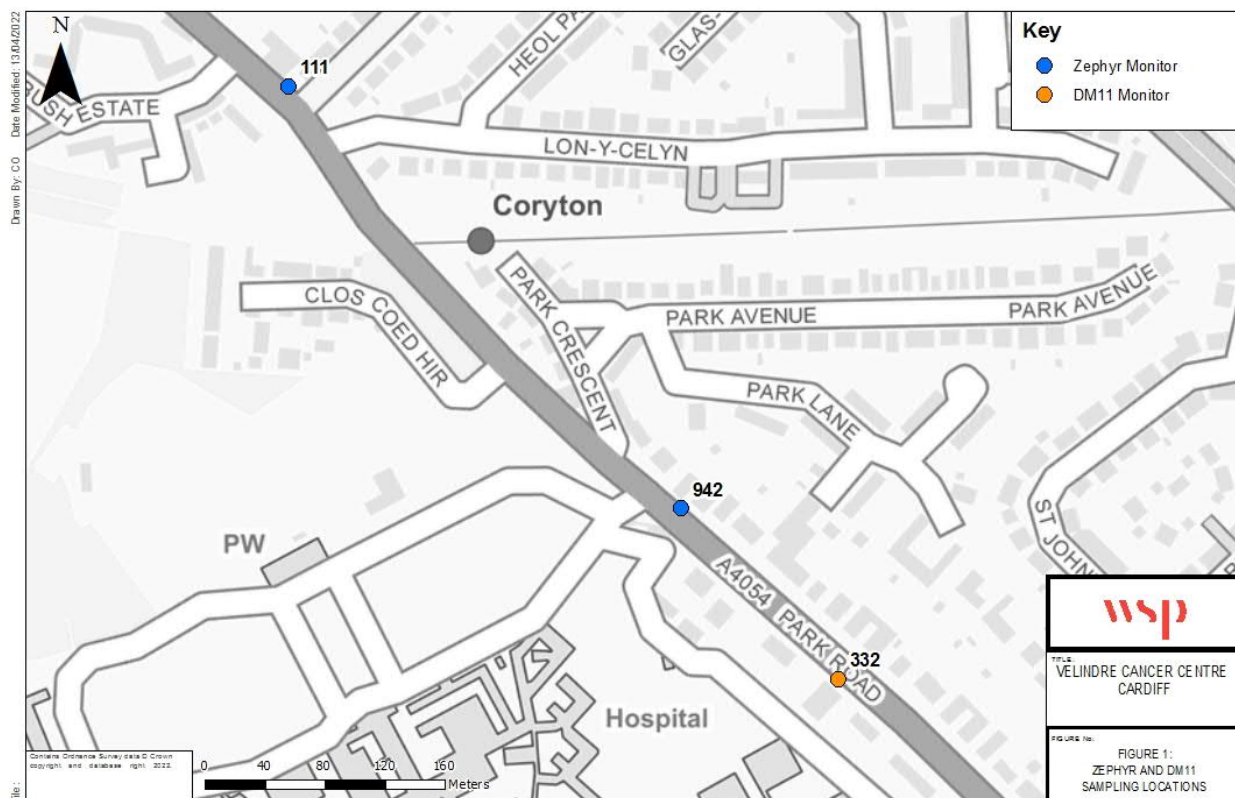
Reason: To monitor air quality in accordance with Policy EN13 of the adopted Cardiff Local Plan (2006-2026).’

During construction works there is the potential for air quality impacts from the generation of dust and particulate matter, which could lead to dust soiling and human health impacts at relevant sensitive receptors. There is also the potential for increases in pollutant emissions from construction vehicles using the local road network.

In order to discharge the pre-commencement planning condition 11, on behalf of NHS Wales, WSP is carrying out monitoring in the study area using Zephyr and DM11 Pro continuous monitors. The air quality monitoring within the study area is being undertaken to ensure that dust and vehicle exhaust emissions from construction traffic are monitored and effectively managed. This report provides a summary of the monitoring data for October 2022.

Concentrations of particulate matter (PM₁₀ and PM_{2.5}) and Nitrogen Dioxide (NO₂) are being continuously monitored at three locations within the study area (See Figure 1). There are two monitors continuously sampling for NO₂, PM₁₀ and PM_{2.5} (Zephyr monitors) located close to the Hollybush Estate site and close to the construction site entrance. There is also a dedicated PM₁₀ and PM_{2.5} monitor (DM11 Pro) located outside 19 Park Road.

Figure 1 Air Quality Monitoring Locations



The Zephyrs and DM11 Pro are able to detect localised pollution events and fluctuations in the concentrations and can send alerts to the project team when concentrations go above a certain threshold. The Zephyr continuous monitoring devices are supplied by Earthsense and the DM11 Pros by Air Quality Monitors, data from each of the monitors is uploaded onto a cloud system/website where it can be viewed and downloaded by specific individuals.

AIR QUALITY OBJECTIVES AND STANDARDS

The Government's policy on air quality within the UK is set out in the Air Quality Strategy for England, Scotland, Wales and Northern Ireland (AQS)¹. The AQS provides a framework for reducing air pollution in the UK with the aim of meeting the requirements of European Union legislation².

The air quality standards are levels recommended by the Expert Panel on Air Quality Standards (EPAQS) and the World Health Organisation (WHO) with regards to current scientific knowledge about the effects of each pollutant on health and the environment.

The air quality objectives are policy-based targets set by the Government, which take into account economic efficiency, practicability, technical feasibility and timescale. Some objectives are equal to the EPAQS recommended standards or WHO guideline limits, whereas others involve a margin of tolerance, i.e. a limited number of permitted exceedances of the standard over a given period.

The relevant standards and objectives for this monitoring programme are given in Table 1.

¹ Department for Environment, Food and Rural Affairs (Defra) and the Devolved Administrations (2007). The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (Volumes 1 and 2)

² The UK formally left the EU on 31st January 2020 and new air quality legislation for the UK will be brought forward in due course. The Air Quality (Miscellaneous Amendment and Revocation of Retained Direct EU Legislation) (EU Exit) Regulations 2018 (SI 2018/1407) (see Regulation 5) makes changes to retained direct EU legislation relating to air quality, to ensure that it continues to operate effectively.

Table 1 – Relevant Air Quality Objectives and Standards

Pollutant	Concentration ($\mu\text{g}/\text{m}^3$)	Duration	Exceedances permitted per 12 month period
Nitrogen Dioxide	200	1-hour mean	18
	40	Annual mean	-
Particulate matter (PM_{10})	40	Annual mean	-
	50	24-hour mean	35
Particulate matter ($\text{PM}_{2.5}$) *	20	Annual mean	-

* Local Authorities are required to work towards reducing emissions/concentrations of particulate matter within their administrative area, however, there is no statutory objective given in the AQS for $\text{PM}_{2.5}$ at this time, only a framework.

DEFRA AIR QUALITY INDEX

Defra's Air Quality Index³ provides a useful indication of the levels of air pollution. The index is divided into four bands (low, moderate, high, very high), and the index is numbered from 1 to 10 within these bands (Figure 2). The bandings are based on hourly/24-hour mean concentrations depending on the pollutant.

Nitrogen Dioxide Based on the hourly mean concentration.										
Index	1	2	3	4	5	6	7	8	9	10
Band	Low	Low	Low	Moderate	Moderate	Moderate	High	High	High	Very High
$\mu\text{g}/\text{m}^3$	0-67	68-134	135-200	201-267	268-334	335-400	401-467	468-534	535-600	601 or more

PM_{10} Particles Based on the daily mean concentration for historical data, latest 24 hour running mean for the current day.										
Index	1	2	3	4	5	6	7	8	9	10
Band	Low	Low	Low	Moderate	Moderate	Moderate	High	High	High	Very High
$\mu\text{g}/\text{m}^3$	0-16	17-33	34-50	51-58	59-66	67-75	76-83	84-91	92-100	101 or more

$\text{PM}_{2.5}$ Particles Based on the daily mean concentration for historical data, latest 24 hour running mean for the current day.										
Index	1	2	3	4	5	6	7	8	9	10
Band	Low	Low	Low	Moderate	Moderate	Moderate	High	High	High	Very High
$\mu\text{g}/\text{m}^3$	0-11	12-23	24-35	36-41	42-47	48-53	54-58	59-64	65-70	71 or more

Figure 2 – Defra Air Quality Index

³ <https://uk-air.defra.gov.uk/air-pollution/daq>

MONITORING RESULTS

Zephyr Continuous Monitors

Nitrogen Dioxide

Concentrations of NO₂ were monitored at both of the Zephyr continuous monitors over the period 1st to 31st October 2022 (Figure 3), a summary of the monitored concentrations is provided in Table 2. The Park Road monitor had 100% data capture over this period, however, the monitor at Hollybush Inn developed a fault and therefore only reported data from 1st to 23rd October 2022⁴.

Average hourly NO₂ concentrations across the monitoring period at both monitoring sites were well below the air quality objective of 40µg/m³. There were no exceedances of the one-hour objective (200µg/m³) at either of the sites, and NO₂ concentrations follow a similar trend in data at both monitoring locations.

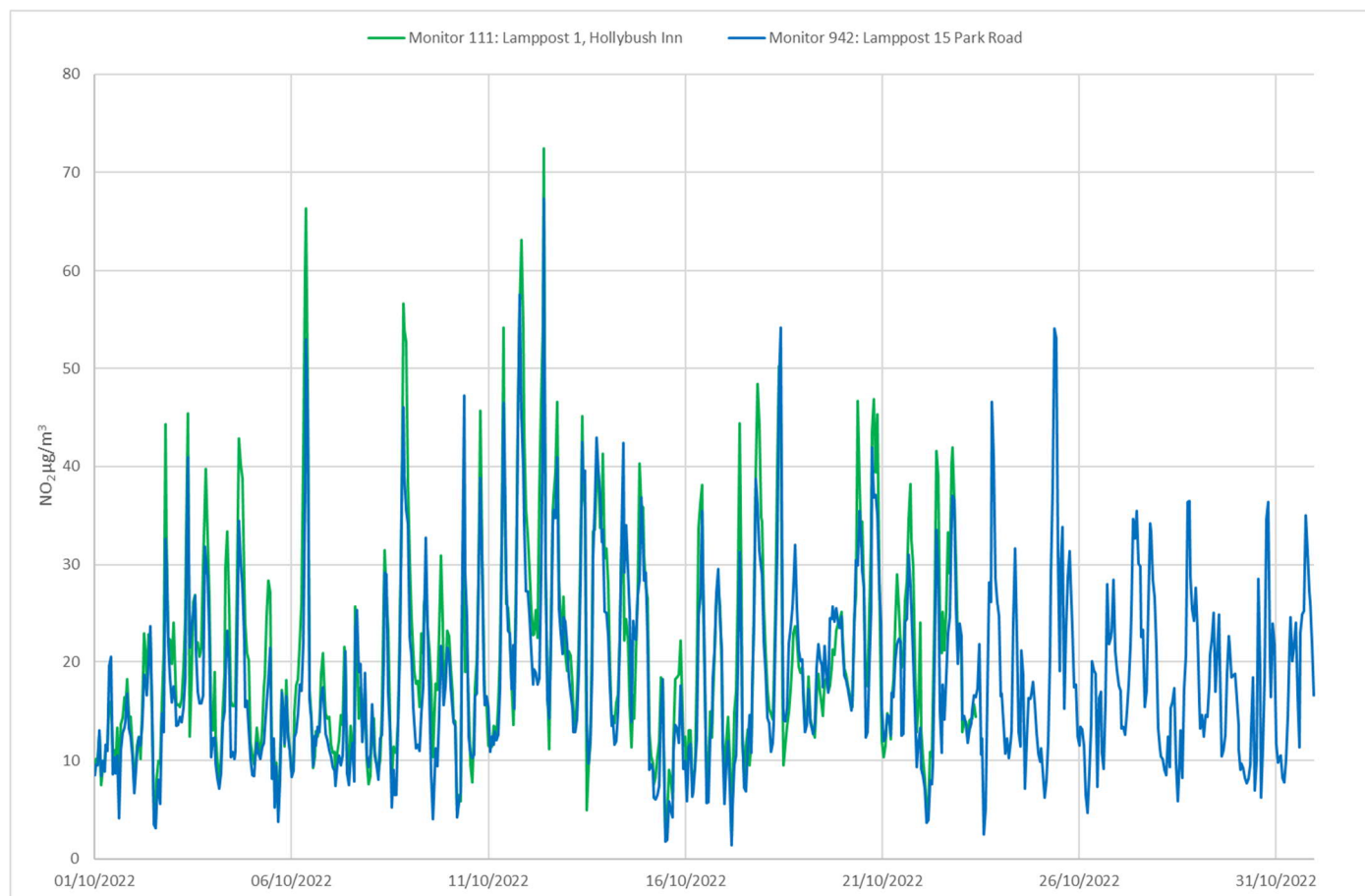


Figure 3 – Monitored Zephyr NO₂ Hourly Concentrations (µg/m³)

Table 2 – NO₂ Concentrations, October 2022

Monitor	Location	NO ₂ Concentration Summary (µg/m ³)	
		Average	Hourly Maximum
111	Lamppost 1, Hollybush Inn	20.7	72.5
942	Lamppost 15, Park Road	18.6	67.4

⁴ The cause of the fault is currently being investigated and will be rectified as soon as possible.

Particulate Matter (PM₁₀ and PM_{2.5})

Concentrations of both PM₁₀ and PM_{2.5} were monitored at both of the Zephyr continuous monitors over the period 1st to 31st October 2022 (Figure 4 and Figure 5), a summary of the monitored concentrations is provided in Table 3. Again, the Park Road monitor had 100% data capture, whereas the monitor at Hollybush Inn recorded data for 72.3% of the month.

Average hourly concentrations of PM₁₀ and PM_{2.5} at both the Zephyr continuous monitors were below the respective annual mean objectives of 40µg/m³ and 20µg/m³ during the monitoring period. In addition, there were no 24-hour mean concentrations above the 24-hour mean air quality objective of 50µg/m³. PM₁₀ as well as PM_{2.5} concentrations follow a similar trend at both monitor locations, there were slightly higher peaks in the data at the Hollybush Inn monitor between the 8th and 13th October 2022. There was also a peak in data (both PM₁₀ and PM_{2.5}) at the 15 Park Road monitor on the 28th October 2022 at 1pm, however, as no data is available from the Hollybush Inn monitor it is not possible to determine if this was just a localised event.

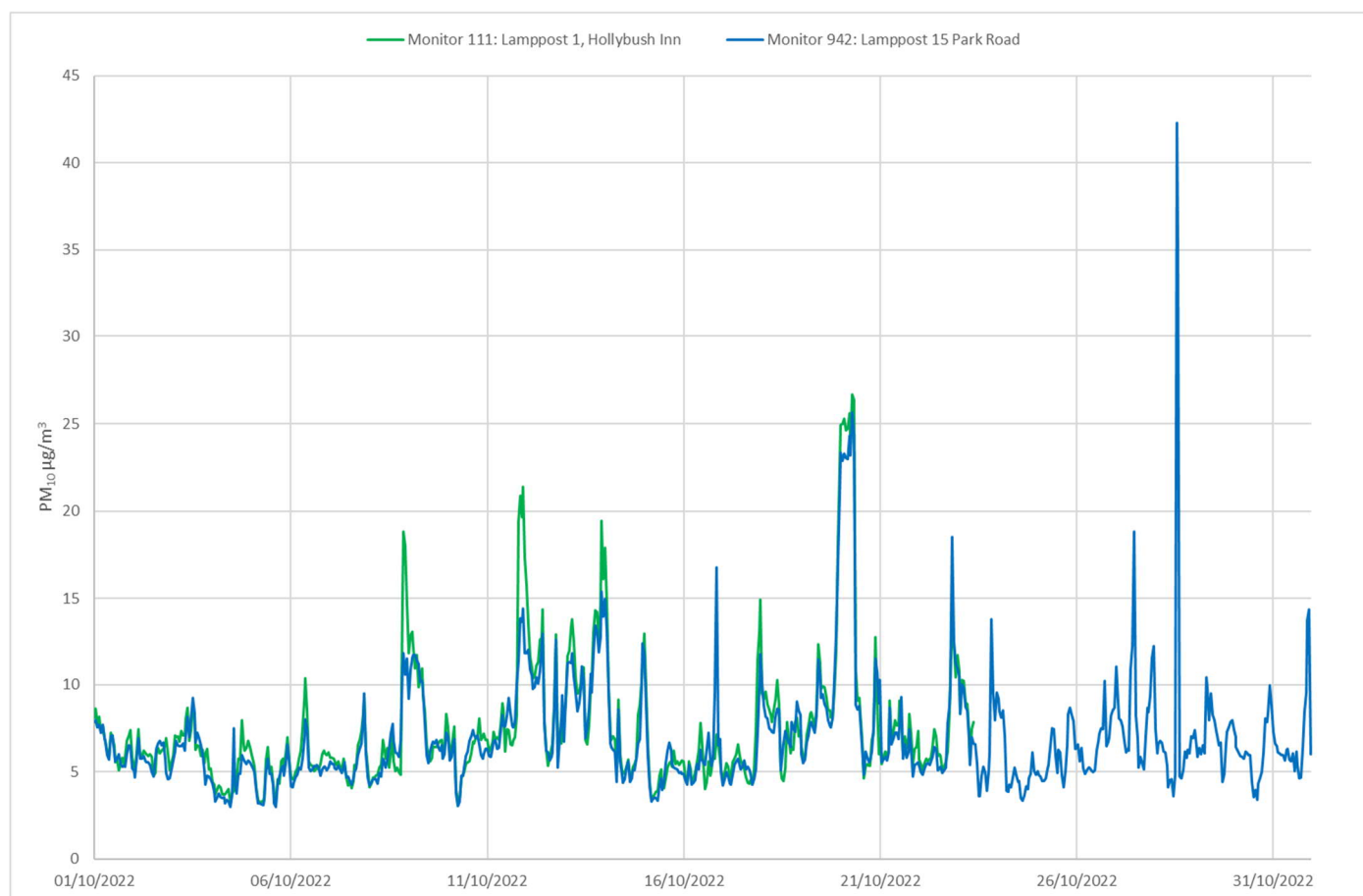


Figure 4 – Monitored Zephyr Hourly PM₁₀ Concentrations (µg/m³)

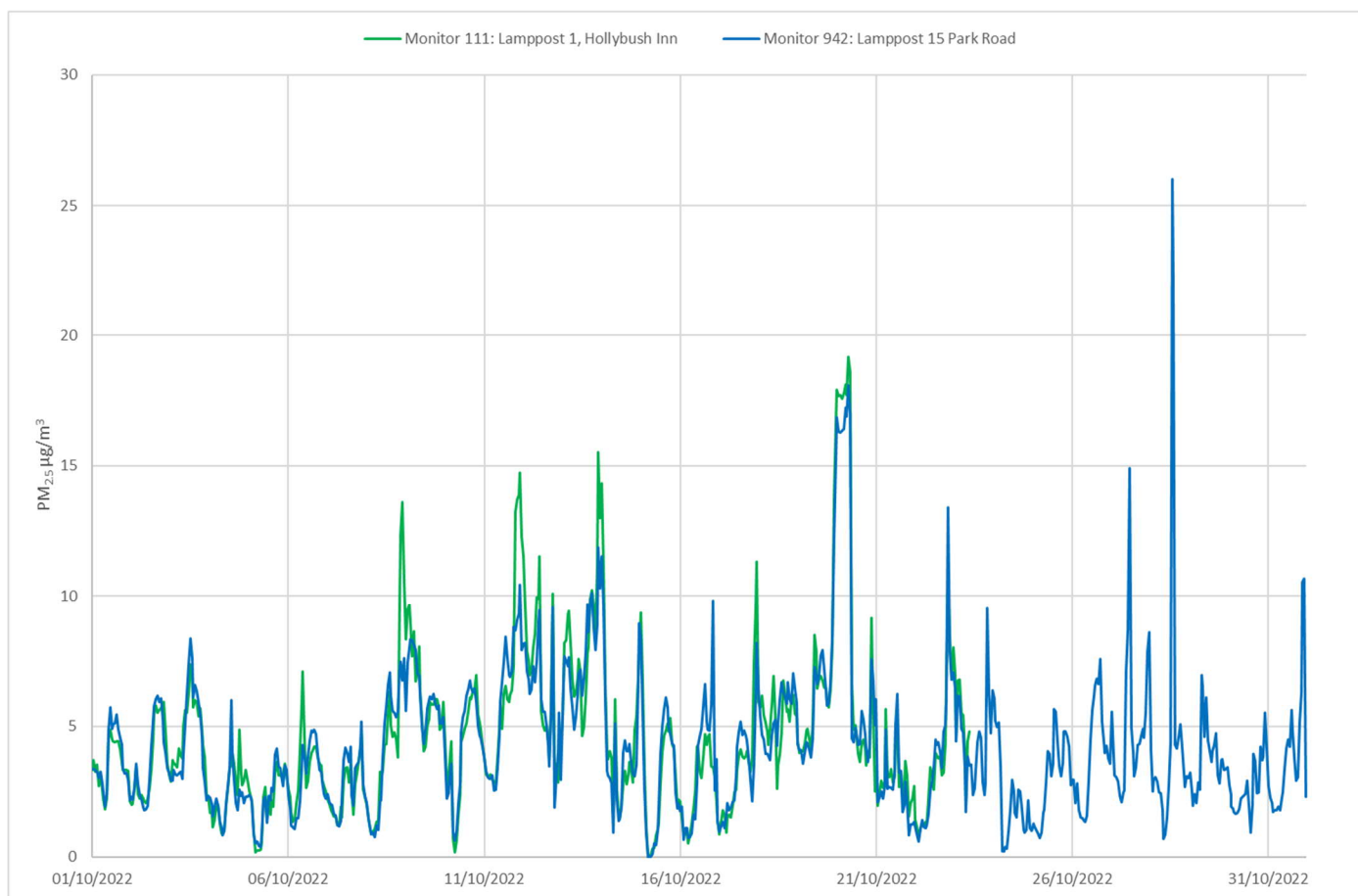


Figure 5 – Monitored Zephyr Hourly PM_{2.5} Concentrations (µg/m³)

Table 3 – PM₁₀ and PM_{2.5} Concentrations Recorded by Zephyr Monitors, October 2022

Monitor	Location	PM ₁₀ Concentrations (µg/m ³)			PM _{2.5} Concentrations (µg/m ³)	
		Average	Maximum Hourly	Maximum 24-hour mean	Average	Maximum Hourly
111	Lamppost 1, Hollybush Inn	7.5	26.7	14.1	4.6	19.2
942	Lamppost 15, Park Road	7.0	42.3	13.6	4.2	26.0

DM11 Pro Continuous Monitor

Particulate Matter (PM₁₀ and PM_{2.5})

Figure 6, shows the PM₁₀ and PM_{2.5} data monitored at the DM11 Pro continuous monitor for the period 1st to 31st October 2022. A summary of the monitored concentrations is provided in Table 4.

The DM11 continuous monitor had 100% data capture during the monitoring period. Average hourly concentrations of PM₁₀ and PM_{2.5} are below the respective annual mean objectives of 40µg/m³ and 20µg/m³ during the monitoring period. In addition, there were no 24-hour mean concentrations above 50µg/m³.

A peak in PM₁₀ concentrations occurred on the 3rd October at 4am, however, a similar peak was not recorded in the PM_{2.5} data. This implies that the peak relates to an invalid reading by the DM11 monitor, especially as monitored concentrations fell again immediately after.

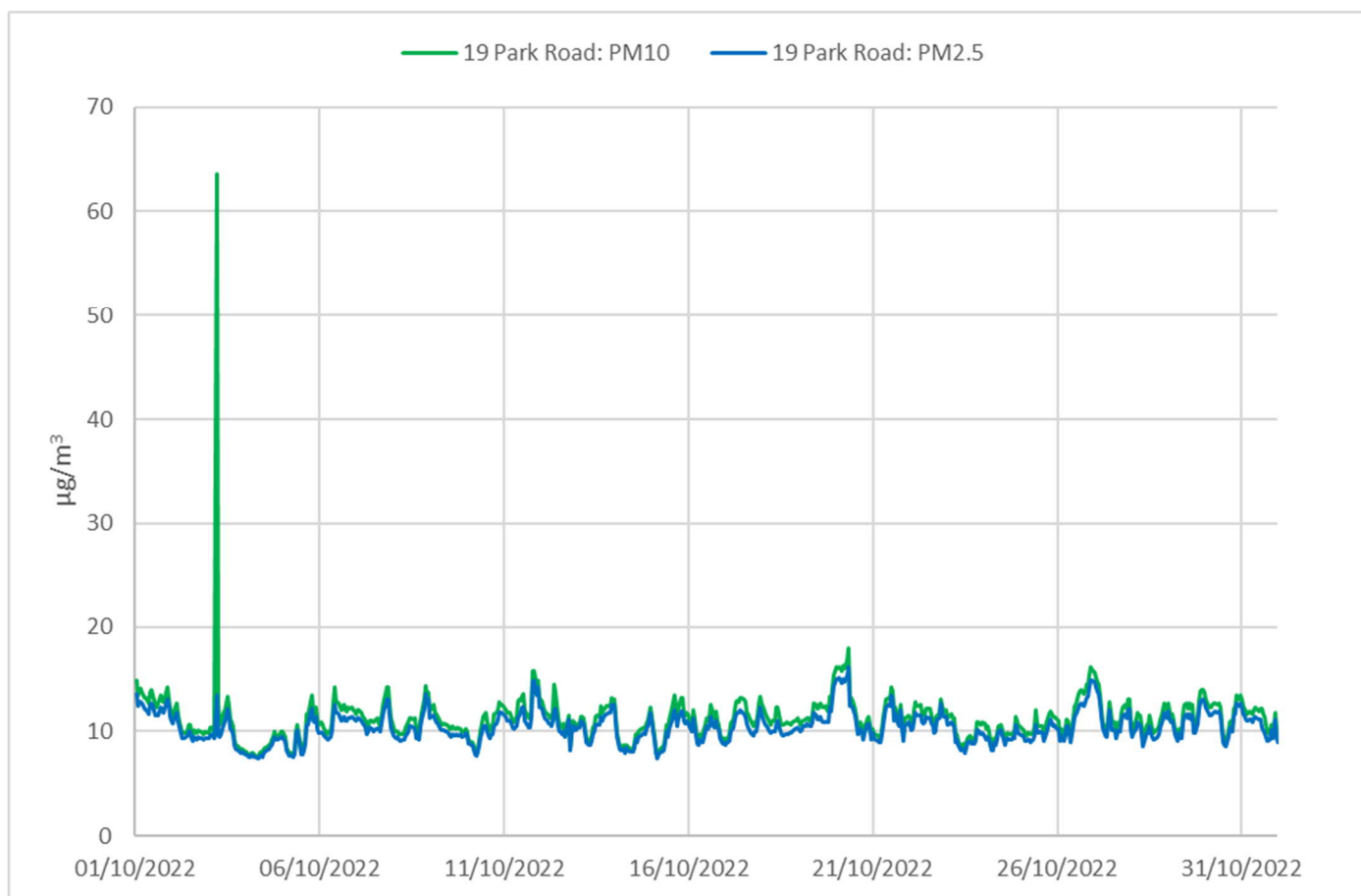


Figure 6 – Monitored DM11 PM₁₀ and PM_{2.5} Concentrations (µg/m³)

Table 4 – PM₁₀ and PM_{2.5} Concentrations, October 2022

Monitor	Location	PM ₁₀ Concentrations (µg/m³)			PM _{2.5} Concentrations (µg/m³)	
		Average	Maximum Hourly	Maximum 24-hour mean	Average	Maximum Hourly
332	19 Park Road	11.2	63.6	13.2	10.4	16.1