SUMMARY MONITORING REPORT
July 2023

DATE:	22 August 2023	**CONFIDENTIALITY:**	Restricted
SUBJECT:	Monthly Air Quality Monitoring Report – July 2023		
PROJECT:	NVCC TCAR	**AUTHOR:**	Sachin Kumar
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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 July 2023.

Concentrations of particulate matter (PM_{10} and $PM_{2.5}$) and Nitrogen Dioxide (NO_2) are being continuously monitored at four locations within the study area (See Figure 1). There are two monitors continuously sampling for NO_2, PM_{10} and $PM_{2.5}$ (Zephyr monitors) located close to the Hollybush Estate site and close to the construction site entrance. There are also dedicated PM_{10} and $PM_{2.5}$ monitors (DM11 Pro) located outside 19 Park Road and at a location On-site.

The Zephyrs and DM11 Pro monitors 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 is can be viewed and downloaded by specific individuals.

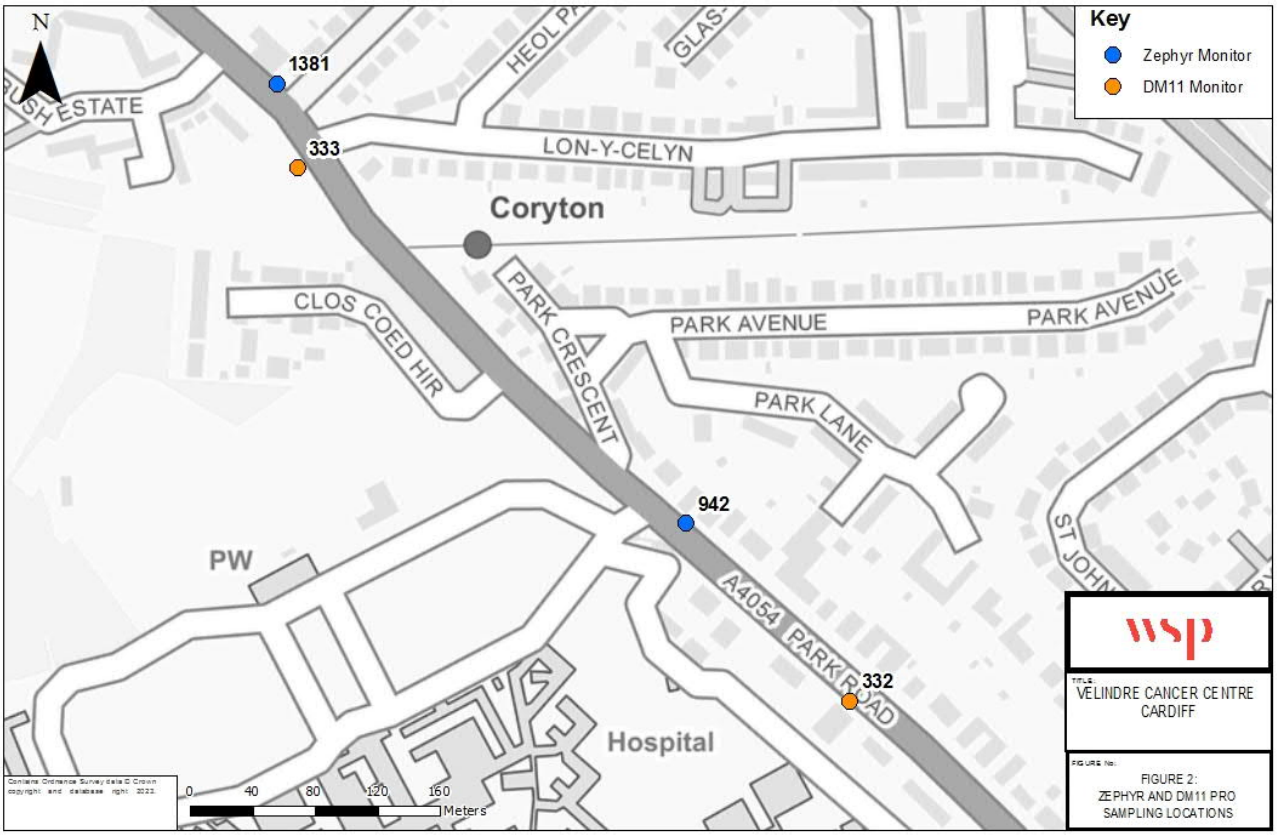

Figure 1 Air Quality Monitoring Locations

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 legislation[2].

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 (µg/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 ($PM_{2.5}$) *	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 $PM_{2.5}$ at this time, only a framework.

The UK Government published its Environmental Targets (Fine Particulate Matter) (England) Regulations on 30th January 2023[3]. The regulations include a long-term target annual mean $PM_{2.5}$ concentration of 10µg/m^3 and an exposure reduction target of 35% when compared to 2018 levels, both to be met by 2040. There is also an interim $PM_{2.5}$ target, which is to be met by the end of January 2028, of 12µg/m^3 as an annual mean concentration and a 22% reduction in exposure when compared to 2018 levels.

DEFRA AIR QUALITY INDEX

Defra's Air Quality Index[4] 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
µg/m³	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
µg/m³	0-16	17-33	34-50	51-58	59-66	67-75	76-83	84-91	92-100	101 or more

$PM_{2.5}$ 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
µgm^{-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] Environmental Targets (Fine Particulate Matter) (England) Regulations 2023

[4] https://uk-air.defra.gov.uk/air-pollution/daqi

MONITORING RESULTS

Zephyr Continuous Monitors

Nitrogen Dioxide

Figure shows the monitored hourly concentrations for the period 1st July to 31st July 2023 and a summary of the monitored concentrations for this period are provided in Table .

Average hourly NO_2 concentrations across the monitoring period at both monitoring sites were well below the air quality objective of 40µg/m^3, compared to last month average concentrations were slightly lower. There were no exceedances of the one-hour mean objective (200µg/m^3) at either of the sites. Several peaks in the data were recorded at both sites, it suggests more of a regional influence driving the spikes rather than a local source. During the month of July, 100% data capture was recorded at both the Hollybush Inn (Z1381) and on Park Road (Z942) Zephyrs.

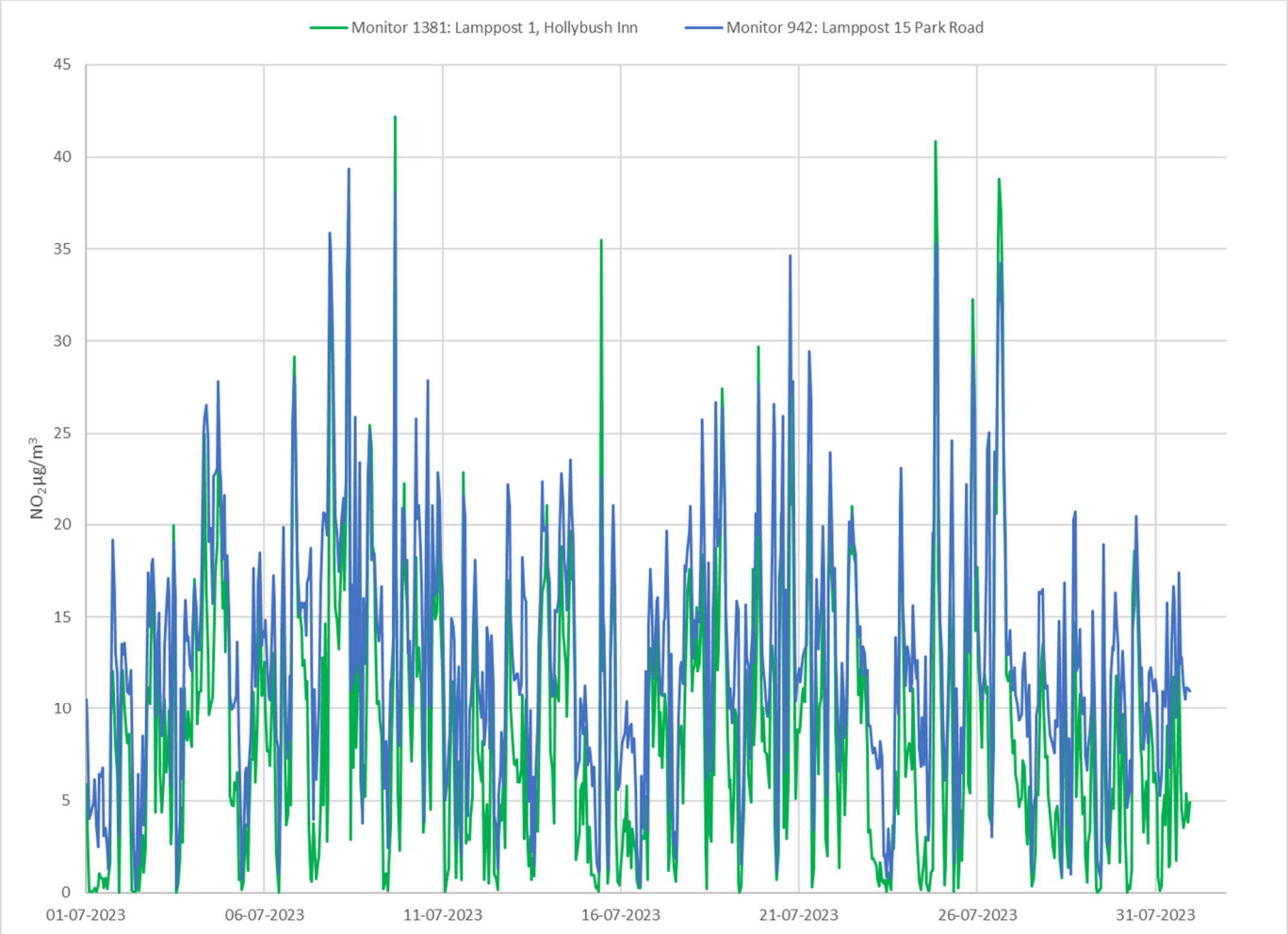

Figure 3 – Monitored Zephyr NO_2 Hourly Concentrations (µg/m^3)

Table 2 – NO_2 Concentrations, 1st to 31st July 2023

Monitor	Location	NO_2 Concentration Summary (µg/m^3)	
		Average	Hourly Maximum
Z1381	Lamppost 1, Hollybush Inn	8.8	42.2
Z942	Lamppost 15, Park Road	12.8	39.4

Particulate Matter (PM_{10} and $PM_{2.5}$)

Figure and Figure show the monitored concentration from 1st July to 31st July and a summary of the monitored concentrations for this period are provided in Table . Data capture for monitors Z1381 and Z942 was 100% during the month of July. Overall, a similar trend in concentrations was noted.

Average hourly concentrations of PM_{10} and $PM_{2.5}$ at both the Zephyr monitors were below the respective annual mean objectives of 40µg/m^3 and 20µg/m^3 during the monitoring period. In addition, there were no 24-hour mean concentrations above the 24-hour mean air quality objective of 50µg/m^3. Overall, concentrations were slightly lower than last month.

Overall, the PM_{10} and $PM_{2.5}$ concentrations follow a similar trend at both monitor locations., There were several peaks in both PM_{10} and $PM_{2.5}$ monitored at both sample locations; however, these were over for a short period of time. Given the peaks were recorded at both sites, it suggests more of a regional influence driving the spike in ambient PM_{10} and $PM_{2.5}$.

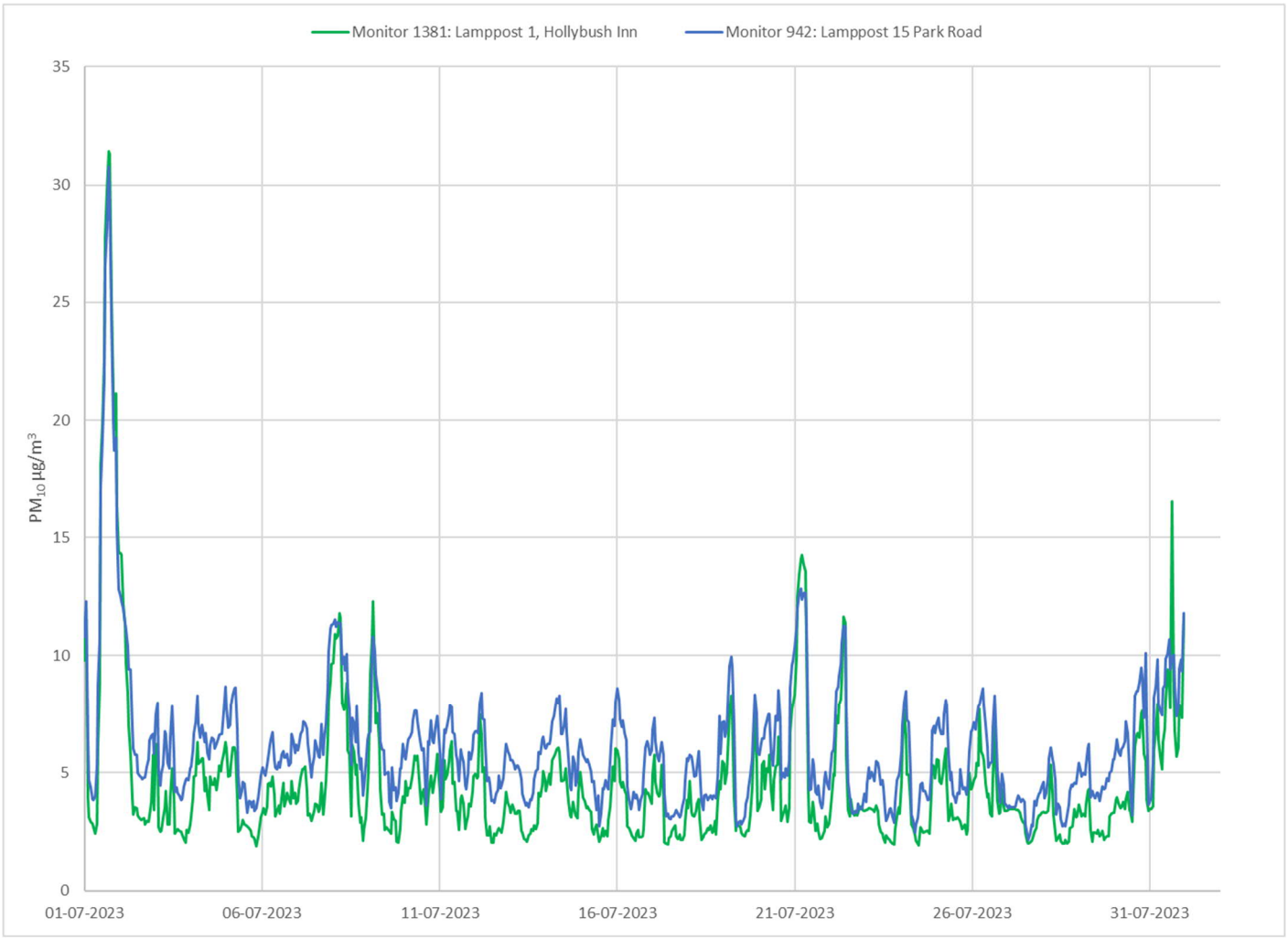

Figure 4 – Monitored Zephyr PM_{10} Hourly Concentrations (µg/m^3)

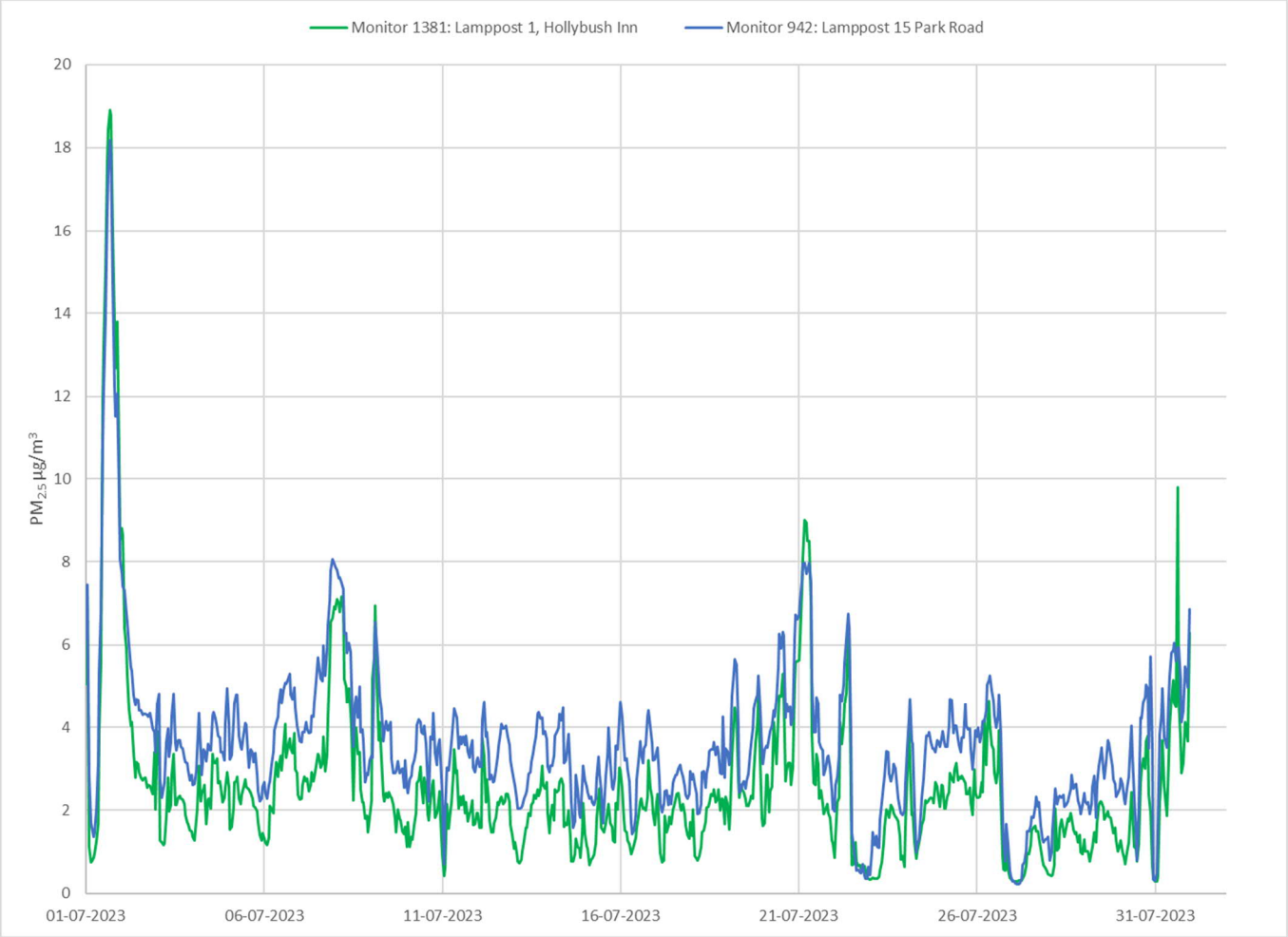

Figure 5 – Monitored Zephyr $PM_{2.5}$ Hourly Concentrations (µg/m^3)

Table 3 – PM_{10} and $PM_{2.5}$ Concentrations Recorded by Zephyr Monitors, 1st to 31st July 2023

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
Z1381	Lamppost 1, Hollybush Inn	4.6	31.4	14.8	2.6	18.9
Z942	Lamppost 15, Park Road	6.1	30.8	14.9	3.7	18.2

DM11 Pro Continuous Monitors

Particulate Matter (PM_{10} and $PM_{2.5}$)

Figure and Figure , show the PM_{10} and $PM_{2.5}$ data monitored at the DM11 Pro continuous monitors located at Park Road and the On-site monitor, respectively. A summary of the monitored concentrations is provided in Table 4.

During July, the DM11 continuous monitors located On-site and on Park Road had 100% data capture. Average hourly concentrations of PM_{10} and $PM_{2.5}$ were below the respective annual mean objectives of 40µg/m^3 and 20µg/m^3 during the monitoring period. In addition, there were no 24-hour mean concentrations above 50µg/m^3. Concentrations at both sites follow a similar trend, however, concentrations at the On-site monitor are slightly higher than those at Park Road. This is most likely due to the location of the monitor closer to the site works and access. Peaks in data at the On-site monitor are most likely due to localised events in the vicinity of the monitor.

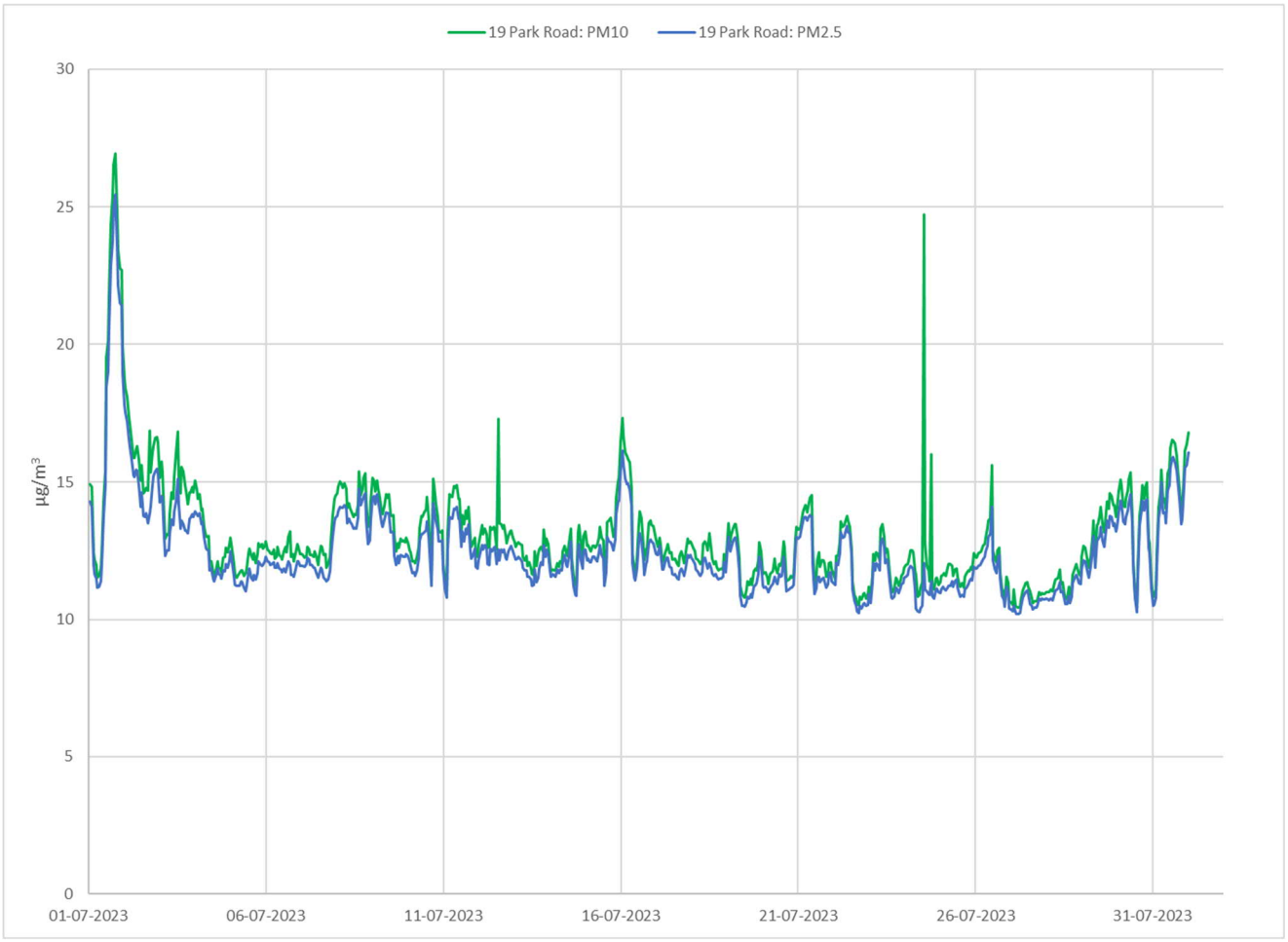

Figure 6 – Monitored DM11 PM_{10} and $PM_{2.5}$ Concentrations 19 Park Road (µg/m^3)

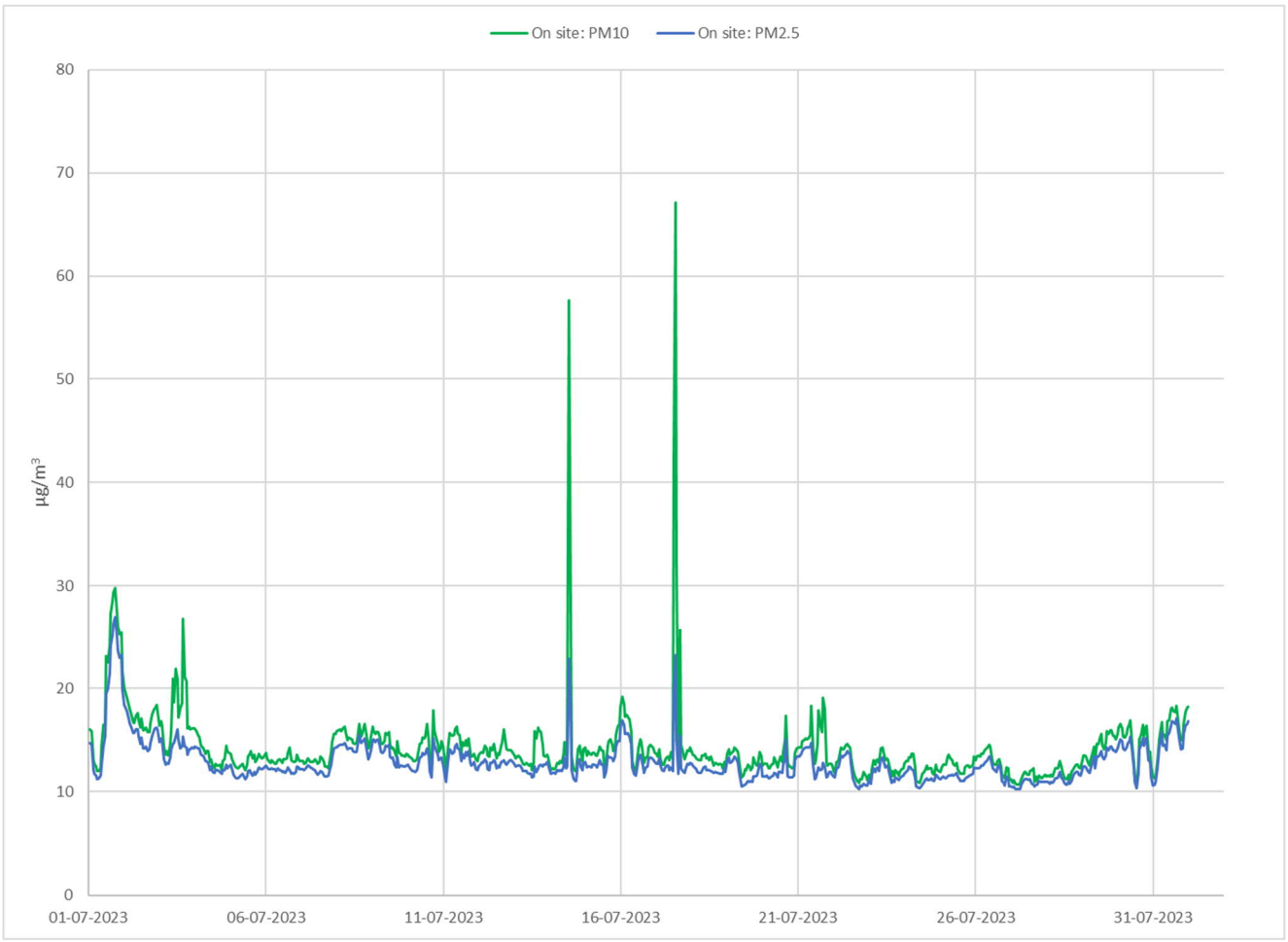

Figure 7 – Monitored DM11 PM_{10} and $PM_{2.5}$ Concentrations On-site (µg/m^3)

Table 4 – PM_{10} and $PM_{2.5}$ Concentrations, 1st to 31st July 2023

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
332	19 Park Road	13.1	27	18.4	12.5	25.5
333	On-Site	14.3	67.1	20.2	12.9	27