



SUMMARY MONITORING REPORT

January 2024

| | | | |
|-----------------|------------------------------------------------------|-------------------------|--------------|
| DATE: | 15 March 2024 | CONFIDENTIALITY: | Restricted |
| SUBJECT: | Monthly Air Quality Monitoring Report – January 2024 | | |
| PROJECT: | NVCC TCAR | AUTHOR: | Sachin Kumar |
| CHECKED: | Caroline Odber | APPROVED: | Peter Walsh |

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 January 2024.

Historically, concentrations of particulate matter (PM₁₀ and PM_{2.5}) and Nitrogen Dioxide (NO₂) have been continuously monitored at four locations within the study area (See Figure 1). Two monitors have been continuously sampling for NO₂, PM₁₀ and PM_{2.5} using Zephyr monitors located close to the Hollybush Estate site and close to the construction site entrance. There have also been dedicated PM₁₀ and PM_{2.5} monitors (DM11 Pro) located outside 19 Park Road and at a location On-site, however, power to the On-Site monitor was removed in October 2023 and no suitable alternative location has yet been identified.

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 it can be viewed and downloaded by specific individuals.

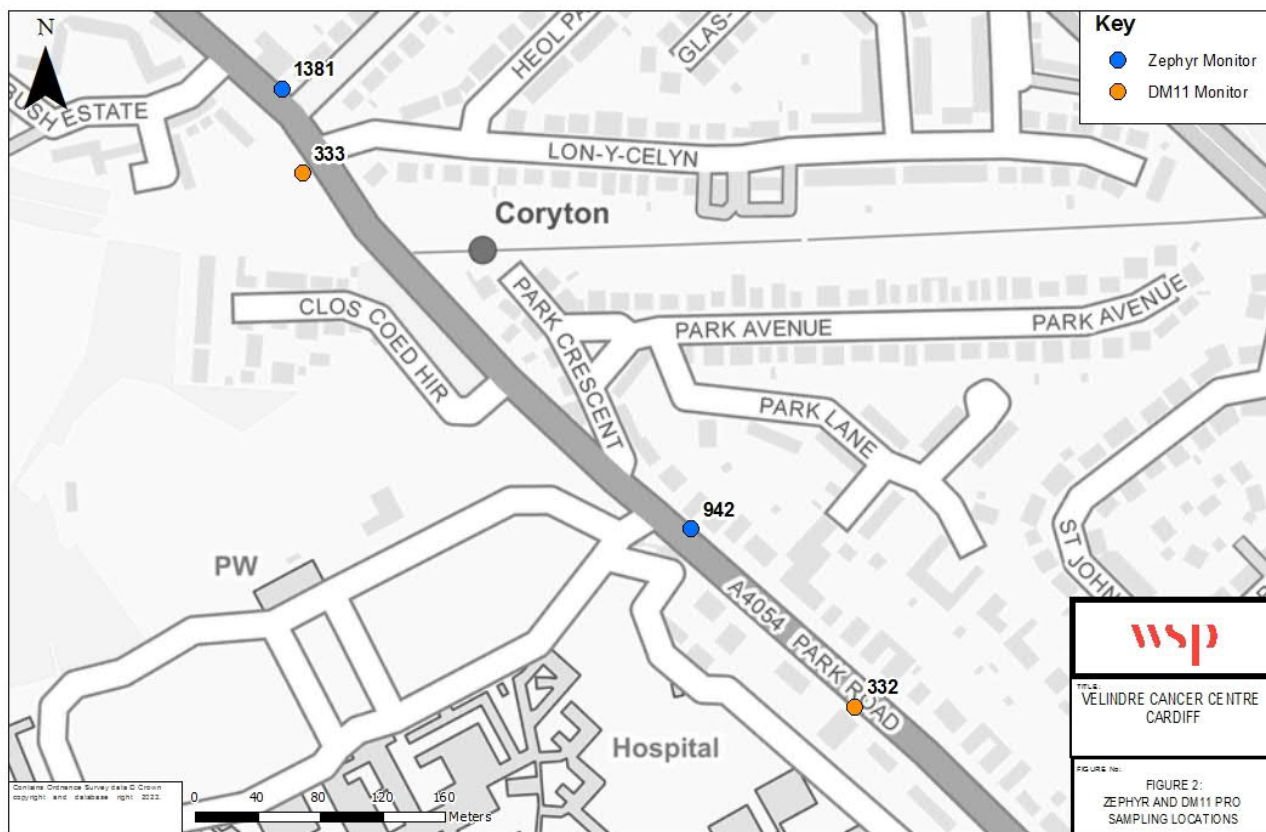


Figure 1 Air Quality Monitoring Locations

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 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.

The UK Government published its Environmental Targets (Fine Particulate Matter) (England) Regulations on 30th January 2023³. The regulations include a long-term target annual mean $\text{PM}_{2.5}$ concentration of $10\mu\text{g}/\text{m}^3$ and an exposure reduction target of 35% when compared to 2018 levels, both to be met by 2040. There is also an interim $\text{PM}_{2.5}$ target, which is to be met by the end of January 2028, of $12\mu\text{g}/\text{m}^3$ as an annual mean concentration and a 22% reduction in exposure when compared to 2018 levels.

DEFRA AIR QUALITY INDEX

Defra's Air Quality Index⁴ 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 |

³ Environmental Targets (Fine Particulate Matter) (England) Regulations 2023

⁴ <https://uk-air.defra.gov.uk/air-pollution/daqi>

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

MONITORING RESULTS

Zephyr Continuous Monitors

Data Capture

During the month of January, 81% data capture was recorded at the Hollybush Inn Zephyr (Z1381), and 90% data capture was recorded at the Park Road (Z942) Zephyr. Power at the Z1381 Zephyr continued to drop out due to insufficient charging from the solar panel. As highlighted in the December report, the current solar panel is at the optimum position for sunlight capture and therefore it has been necessary to take down the Zephyr and re-charge the monitor at a mains source when the internal battery power source has been depleted. This occurred at the beginning of the month and therefore the data for Z1381 is presented from the 6th Jan onwards after the monitor was re-established at site and a period of stabilisation had occurred. In addition, the Zephyr located at Park Road experienced a period of down-time at the beginning of the month, so again, concentrations are shown from 3rd January when the Zephyr had stabilised.

Nitrogen Dioxide

Figure shows the monitored hourly average concentrations for the respective monitoring period during January 2024 and a summary of the monitored concentrations for this period are provided in Table 2.

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 mean objective (200µg/m³) 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.

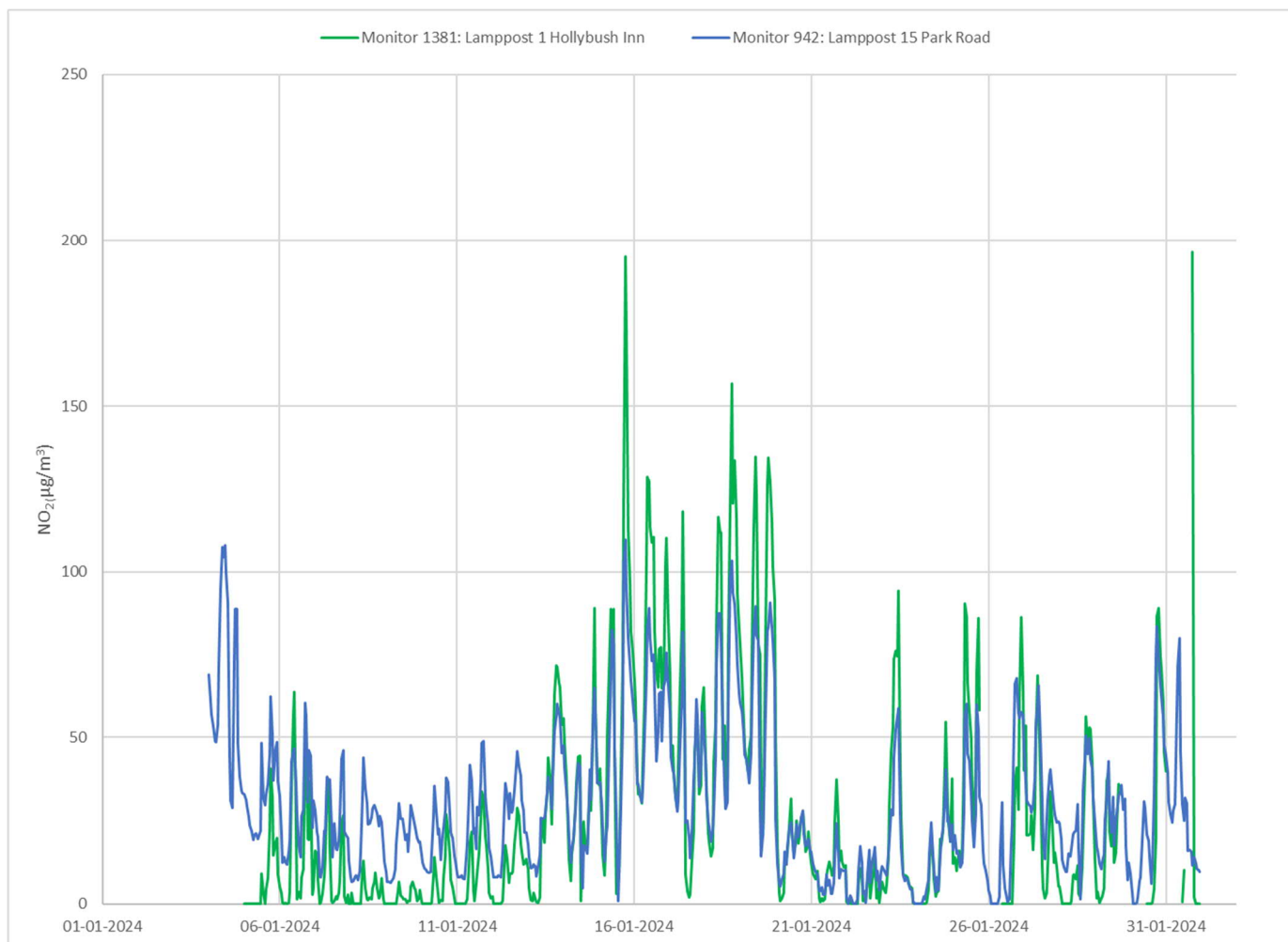


Figure 3 – Monitored Zephyr NO₂ Hourly Concentrations (µg/m³)

Table 2 – NO₂ Concentrations, January 2024

| Monitor | Location | NO ₂ Concentration Summary (µg/m ³) | |
|---------|---------------------------|------------------------------------------------------------|----------------|
| | | Average | Hourly Maximum |
| Z1381 | Lamppost 1, Hollybush Inn | 26.5 | 196.4 |
| Z942 | Lamppost 15, Park Road | 30.0 | 109.6 |

Particulate Matter (PM₁₀ and PM_{2.5})

Figure 4 and Figure 5 show the monitored concentrations for January 2024 and a summary of the monitored concentrations for this period are provided in Table . As highlighted in the December report, a post monitoring adjustment factor of 2.0 has been applied to both the PM₁₀ and PM_{2.5} data as a result of the co-location exercise.

Average hourly concentrations of PM₁₀ and PM_{2.5} at both the Zephyr 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, except for 13th Jan at Z942, which recorded concentration of 55.8µg/m³.

Overall, the PM₁₀ and PM_{2.5} concentrations follow a similar trend at both monitor locations, there were several peaks in PM₁₀ 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 PM₁₀ and PM_{2.5}.

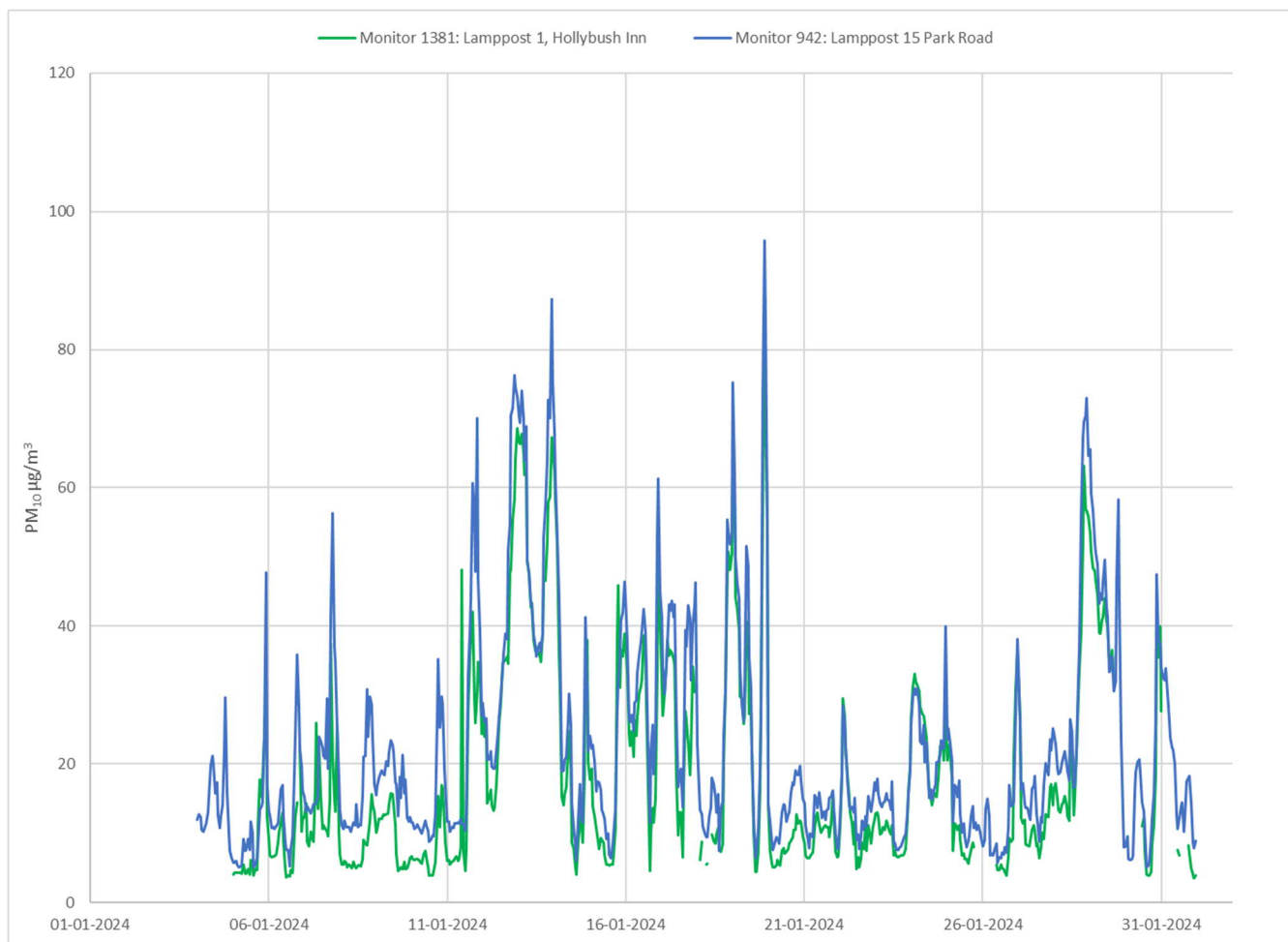


Figure 4 – Monitored Zephyr PM₁₀ Hourly Concentrations (µg/m³)

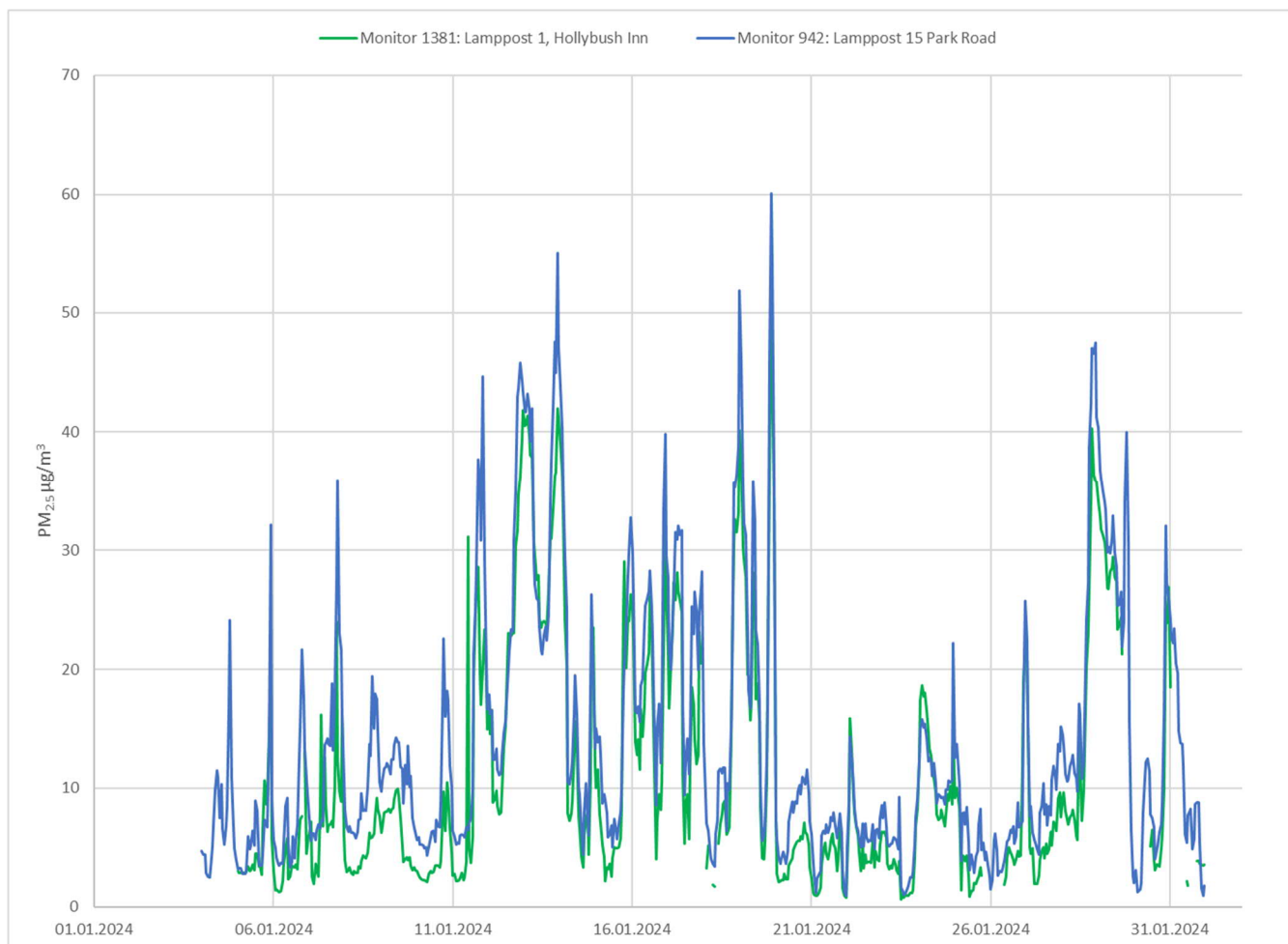


Figure 5 – Monitored Zephyr PM_{2.5} Hourly Concentrations (µg/m³)

Table 3 – PM₁₀ and PM_{2.5} Concentrations Recorded by Zephyr Monitors, January 2024

| 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 | 18.6 | 84.3 | 32.2 | 11.1 | 52.0 |
| Z942 | Lamppost 15, Park Road | 22.8 | 95.8 | 55.8 | 13.7 | 60.1 |

Note that background colour applied is based on bandings which are classed for a 24-hour running mean PM concentration not an hourly concentration presented.

DM11 Pro Continuous Monitors

Data Capture

Concentrations at the Park Road monitor continued and recorded 93.7% data capture for January.

Particulate Matter (PM₁₀ and PM_{2.5})

Figure show the hourly average PM₁₀ and PM_{2.5} concentrations monitored at the DM11 Pro continuous monitor located at Park Road. A summary of the monitored concentrations is provided in Table 4.

Average hourly concentrations of PM₁₀ and PM_{2.5} 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 50µg/m³.

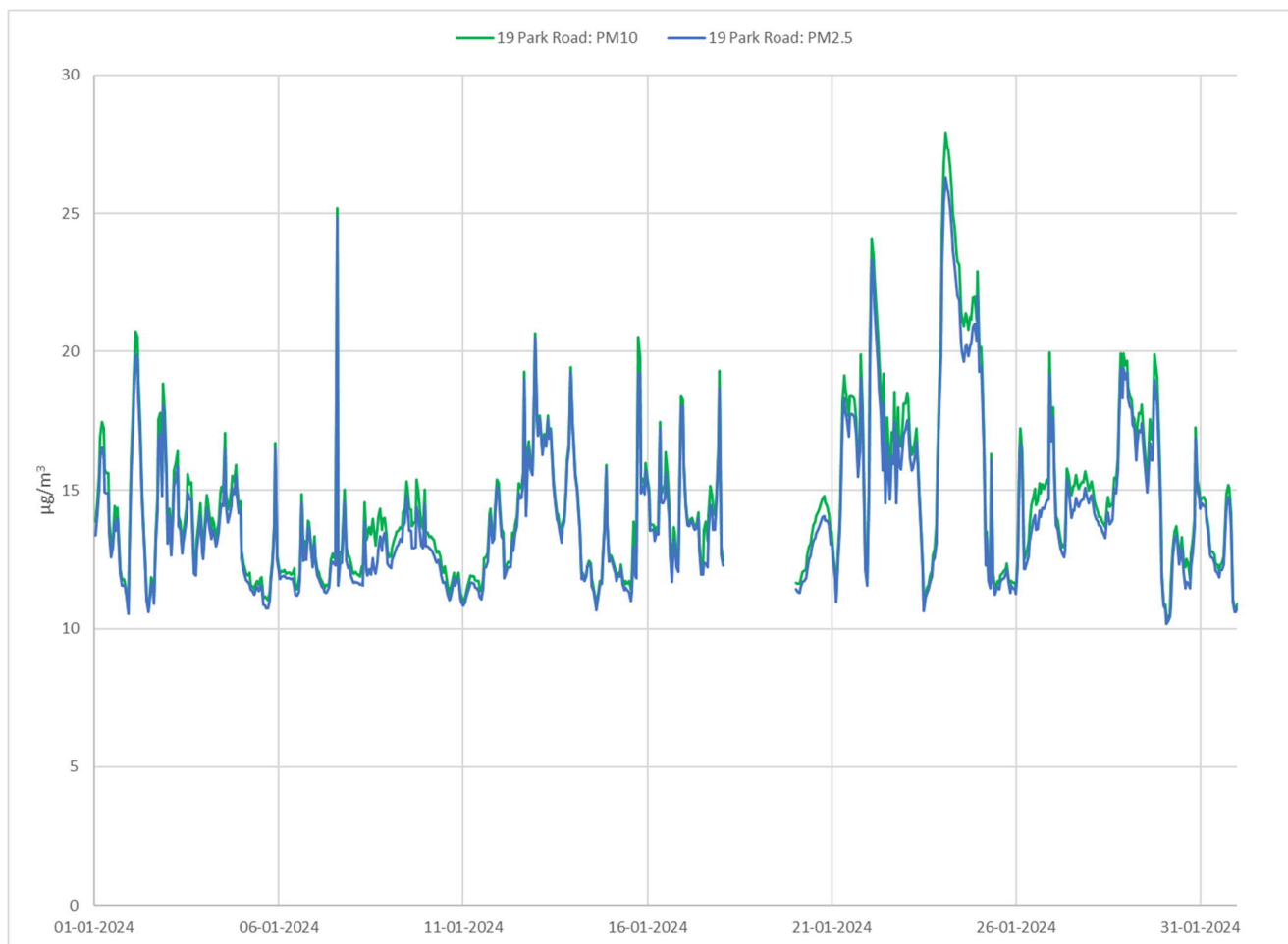


Figure 6 – Monitored DM11 PM₁₀ and PM_{2.5} Concentrations 19 Park Road (µg/m³)

Table 4 – PM₁₀ and PM_{2.5} Concentrations, 1st to 31st January 2024

| 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 | 14.5 | 27.9 | 23.3 | 14.1 | 26.3 |

Note that background colour applied is based on bandings which are classed for a 24-hour running mean PM concentration not an hourly concentration presented.