Air Quality Monitoring Plan

Brill Place, Camden

Client: Cudd Bentley Consulting

Reference: 4556r4

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Report Issue

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Report Reference: 4556

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1.0 INTRODUCTION

1.1 Background

1.1.1 Redmore Environmental Ltd was commissioned by Cudd Bentley Consulting to prepare an Air Quality Monitoring Plan in order to address the requirements of a planning condition attached to a residential development on land off Brill Place, Camden.

1.1.2 The purpose of the Air Quality Monitoring plan is to:

- Confirm the Air Quality Monitoring locations;
- Confirm the pollutants that will be considered as part of the Air Quality Monitoring;
- Provide details of the proposed Air Quality Monitoring equipment and associated technical specifications;
- Provide details of the calibration and maintenance requirements for the Air Quality Monitoring equipment;
- Provide details of the trigger level parameters that be utilised as part of the the Air Quality Monitoring programme;
- Provide details of the alert systems that will be implemented in order to provide notification of trigger level exceedences and additional elements required as part of the condition; and,
- Confirm the Air Quality Monitoring data reporting procedures.

1.2 Site Location and Context

1.2.1 The site is located on land off Brill Place, Camden, NW1 1DX, at National Grid Reference (NGR): 529848, 183125. Reference should be made to Figure 1 for a map of the site and surrounding area.

1.2.2 The proposals comprise the construction of a 22-storey building to provide commercial land use at ground floor level and 68 residential apartments from first floor level upwards.

1.2.3 Planning consent for the scheme was granted by London Borough of Camden (LBoC) on 23rd April 2021, subject to a number of conditions (reference: 2020/4631/P). These include the following in relation to air quality:

"Condition 138: External Air Quality Monitoring and Alert System - Plot 7

Prior to occupation of residential units on floors 14 and below, evidence that an appropriate NO_2 and $PM_{2.5}$ real time monitoring system, has been installed, a detailed mechanism to secure maintenance of this system is in place and a system to manage alerts to residents has been established. These should be submitted to the Local Planning Authority and approved in writing. Thereafter the number of alerts to residents should be reported quarterly to the Local Planning Authority and access to data provided on request.

Installation should not take place until:

a) Full details of the specification of the air quality monitors, with a high level of accuracy with a maximum Root Mean Square Error of 10ug/m^3 for both NO_2 and $PM_{2.5}$, have been submitted to and approved by the local planning authority in writing.

b) The location and number of monitors, including evidence that at least 2 monitors will be installed on the building at the corner of Brill Place and Purchese Street at ground and 14th floor levels, and at least 1 monitor will be installed on the building at the NE corner (nearest St. Pancras International station) at 7th floor level, and with all monitors to have a 270° free flow of air but avoiding any wind tunnels, have been submitted to and approved by the local planning authority in writing.

c) Details of the alert system to residents, if a level of 40µg/m^3 of NO_2 or a 25µg/m^3 of $PM_{2.5}$ is breached (as a one-hour average), if there is a 'medium', 'high' or 'very high' pollution event warning from the LAQN, or black start event at the Francis Crick Institute (including routine generator testing), have been submitted to and approved by the local planning authority in writing.

d) A detailed mechanism to secure calibration and maintenance of this system in accordance with manufacturer recommendations has been submitted to and approved by the local planning authority in writing.

Reason: To protect the enmity of residents in accordance with London Borough of Camden Local Plan Policy CC4 and London Plan Policy 7.14."

1.2.4 An Air Quality Monitoring Plan has been prepared in order to address the requirements of the above condition. This is detailed in the following report.

2.0 AIR QUALITY MONITORING PLAN

2.1 Introduction

2.1.1 The purpose of this Air Quality Monitoring Plan is to address the requirements of the planning condition attached to the development through provision of the requested information. This is detailed in the following Sections.

2.2 Monitoring Locations

2.2.1 In accordance with the planning condition, Air Quality Monitoring will be undertaken at three separate locations at the site. These are summarised in Table 1.

Table 1 Proposed Monitoring Locations

Monitor	Floor Level	Location
1	Ground Floor	On the building at the corner of Brill Place and Purchase Street
2	Base of 15th Floor	On the building at the corner of Brill Place and Purchase Street
3	7th Floor	On the building at the north-east corner closest to St. Pancreas International Station

2.2.2 The specific sampling locations will be determined following completion of all construction works associated with the development and an initial visit to site. These will then be agreed with LBoC prior to installation of the Air Quality Monitoring equipment.

2.2.3 Reference should be made to Figure 2 for a map showing the locations of the proposed monitoring positions.

2.3 Air Quality Monitoring Systems

2.3.1 In accordance with the planning condition, automatic real-time monitoring of the following species will be undertaken at the identified locations:

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

2.3.2 Monitoring will be undertaken at each location using Earthsense Zephyr Air Quality Samplers. These devices use electrochemical sensor technology to measure ambient NO_2 concentrations. $PM_{2.5}$ is measured using light-scattering optical particle counters.

2.3.3 The monitors will be configured to measure NO_2 and $PM_{2.5}$ levels automatically at 10-second intervals and record real-time atmospheric concentrations every 15-minutes.

2.3.4 The Zephyr Air Quality Samplers are fitted with internal data loggers and cellular GPS connections which enable access to real-time pollutant measurements and analysis tools. A summary of the performance parameters for the monitors is provided in Table 2.

Table 2 Earthsense Zephyr Performance Parameters

Pollutant	Accuracy (+/- µg/m³)	Measurement Range (µg/m³)	Limit of Detection (µg/m³)	Root Mean Square Error (µg/m³)
NO_2	10µg/m³	0 to 20,000	8µg/m³	<10µg/m³
$PM_{2.5}$	5µg/m³	0 to 20,000	5µg/m³	<10µg/m³

2.3.5 As shown in Table 2, the Root Mean Square Error (RMSE) for the monitors is less 10µg/m³ and the sampler operates with a high level of accuracy, as required by the planning condition. A full technical specification for the Earthsense Zephyr system is provided in Appendix 1.

2.3.6 Prior to deployment of the monitors at the site, the systems will be calibrated to provide verification of sensor readings and to determine any adjustment required to optimise the accuracy of measurement data. Following completion of system verification, installation of the monitors at the identified sampling locations will be undertaken by a trained technician provided by Redmore Environmental.

2.4 Calibration and Maintenance

2.4.1 Site visits will be undertaken on a 6-monthly basis in order to complete visual inspection of the monitors and carry out any maintenance work required. All visits will be undertaken by a trained technician provided by Redmore Environmental Ltd.

2.4.2 In accordance with the manufacturer's specification for the equipment, routine replacement of the sensors installed within the monitors with equivalent units pre-

calibrated against MCERTS certified reference analysers, will be undertaken at 18 to 24-month intervals. The specific schedule for sensor replacement will be confirmed following installation of the systems and statistical analysis of data captured over the first 17-months of monitoring by Earthsense.

2.4.3 It should be noted that the monitoring network operated by Earthsense is reviewed daily in order to determine the analog output from the raw sensors, the effects of temperature/humidity that can cause cross-interference and the comparability of results against the national real-time air quality model (MappAir) which is operated by the company. In the event that this process indicates that interim sensor replacement is required, a site visit will be undertaken by trained technician in order to complete the relevant works.

2.5 Trigger Levels and Alert Systems

2.5.1 In accordance with the planning condition, the monitors will be configured to allow remote communication of exceedences of the following trigger level parameters:

- NO_2 concentration of 40µg/m^3 averaged over a 1-hour period; and,
- $PM_{2.5}$ concentration of 25µg/m^3 averaged over a 1-hour period.

2.5.2 In the event of a trigger level exceedence at any of the monitoring locations, a notification will be issued to a central email account maintained by Redmore Environmental Ltd. This will feature an automatic forwarding system in order allow communication of all notifications to individual email accounts held by residents at the development.

2.5.3 In addition, the central email account will maintain a subscription to the London Air Quality Network (LAQN) service. This will allow daily communication of pollution forecasts to the residents and notification if there is a 'medium', 'high' or 'very-high' pollution event warning, as required by the planning condition.

2.5.4 The nearby Francis Crick Institute includes a number of Combined Heat and Power (CHP) units, as well as backup generators. The planning condition indicates that there is a requirement for notification to the residents of any black start or testing events associated with the plant. As such, initial consultation with the Institute will be undertaken in order to

determine the schedule for such activities and to formalise a procedure for communication of both routine and non-routine testing/ black start events to the central email account and subsequent notification to the residents via the automatic forwarding system.

2.6 Reporting Procedures

2.6.1 In accordance with the requirements of the condition, a technical note will be prepared on a quarterly basis to confirm the number of trigger levels exceedences at each monitoring location. Full access to the raw monitoring data will be provided to the LBoC on request.

3.0 SUMMARY

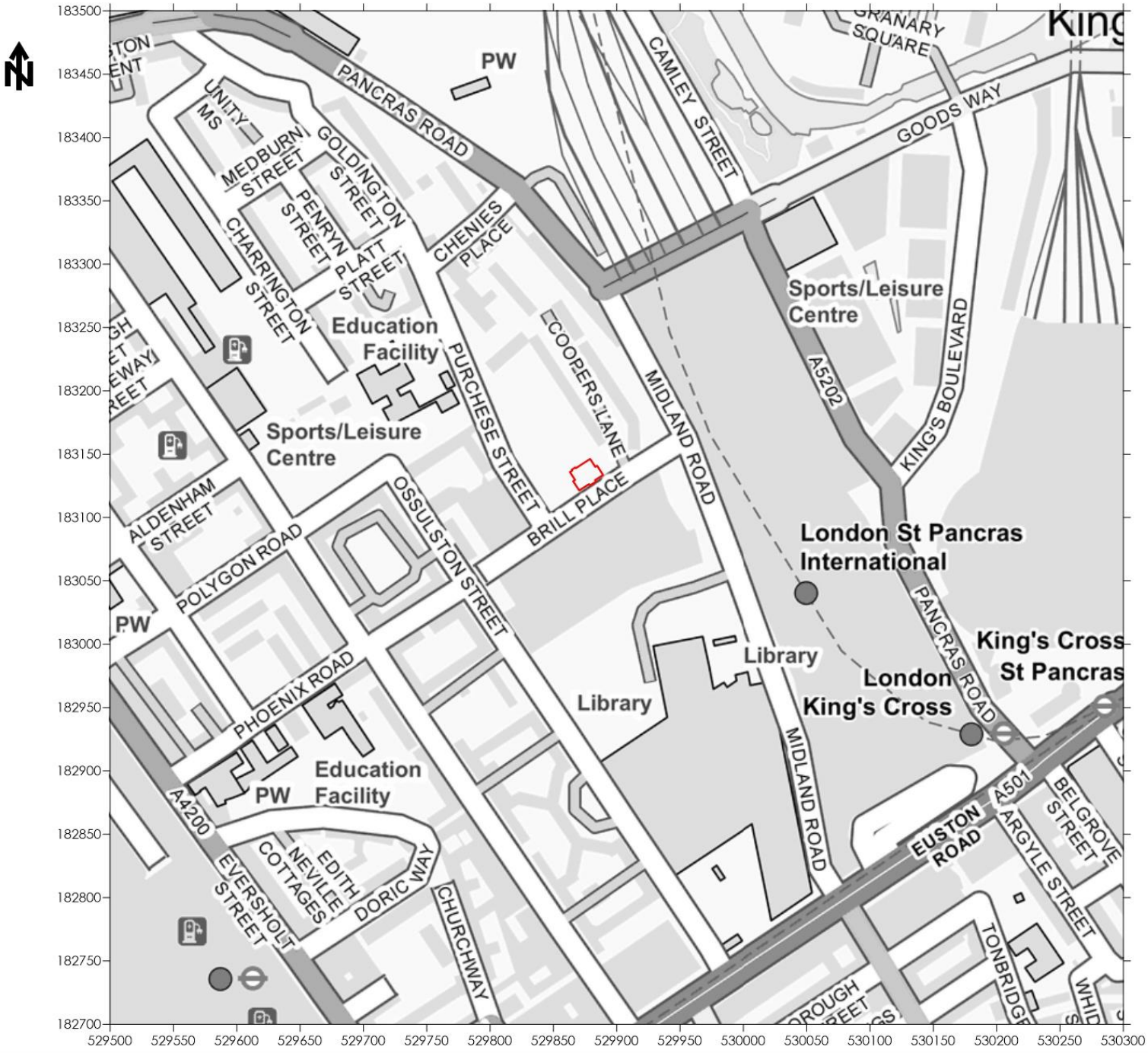
3.1.1 Redmore Environmental Ltd was commissioned by Cudd Bentley Consulting to prepare an Air Quality Monitoring Plan in order to address the requirements of a planning condition attached to a residential development on land off Brill Place, Camden.

3.1.2 An Air Quality Monitoring Plan was produced in order to provide the following information required by the condition:

- Confirmation of the Air Quality Monitoring locations;
- Confirmation of the pollutants that will be considered as part of the Air Quality Monitoring;
- Details of the proposed Air Quality Monitoring equipment and associated technical specifications;
- Details of the calibration and maintenance requirements for the Air Quality Monitoring equipment;
- Details of the trigger level parameters that be utilised as part of the Air Quality Monitoring programme;
- Details of the alert systems that will be implemented in order to provide notification of trigger level exceedences and additional elements required as part of the condition; and,
- Confirmation of the Air Quality Monitoring data reporting procedures.

3.1.3 The information detailed within the Air Quality Monitoring Plan is considered to fully address the requirements of the condition. It is therefore recommended that the plan is submitted in support of a planning application to discharge the condition.

Figures



Legend

Site Boundary

Title
Figure 1 - Site Location Plan

Project
Air Quality Monitoring Plan
Brill Place, Camden

Project Reference
4556

Client
Cudd Bentley Consulting

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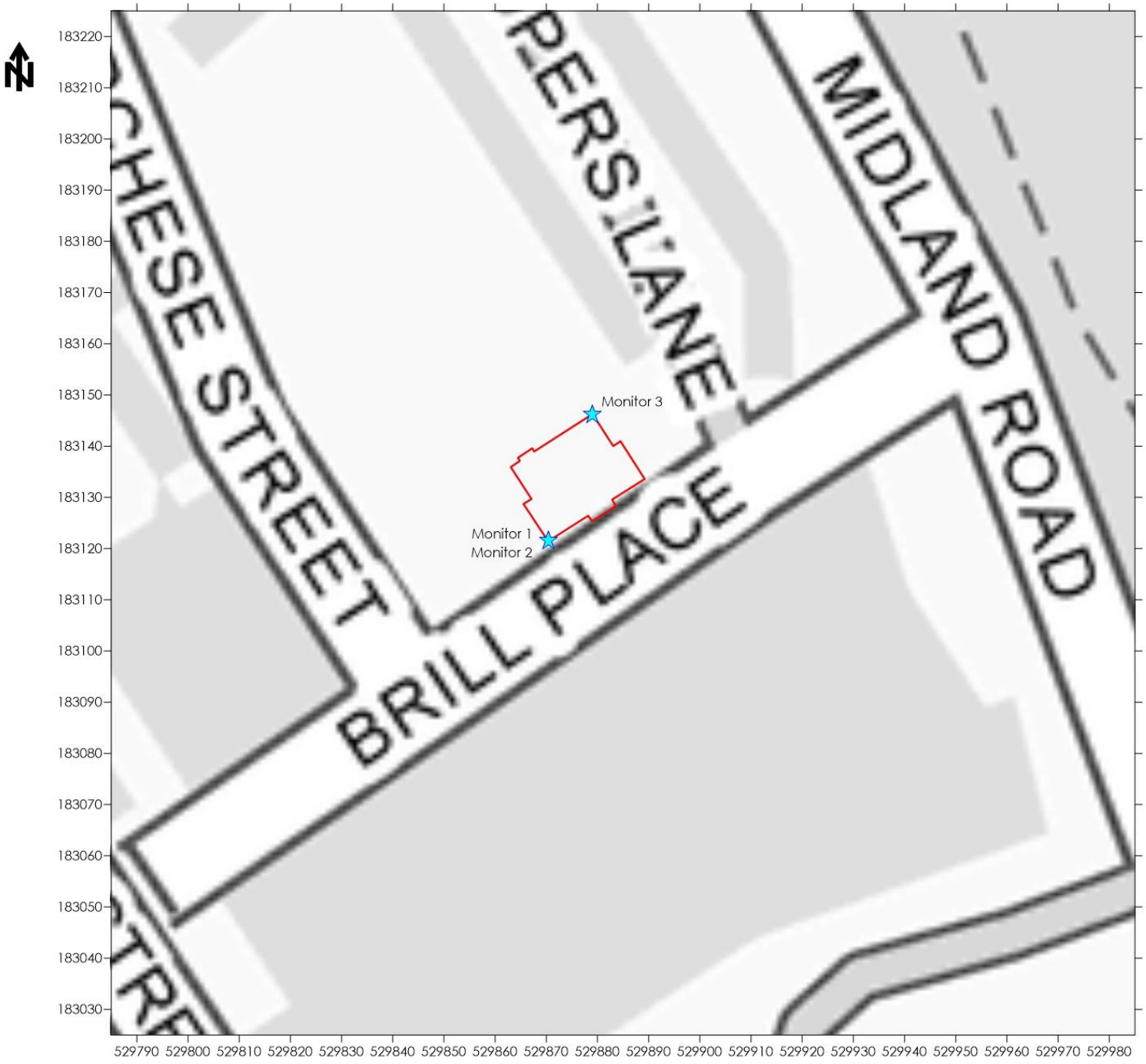

Legend

Site Boundary

Monitor

Title
Figure 2 - Proposed Monitoring Locations

Project
Air Quality Monitoring Plan
Brill Place, Camden

Project Reference
4556

Client
Cudd Bentley Consulting

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Appendix 1 - Technical Data Sheets

Zephyr® Air Quality Sensor

Specification Sheet

EARTHSENSE

Key
* - accuracy may be diminished where Zephyrs are exposed to direct sunlight
[b] - lowest tested concentrations are background
[c] - estimates of range are based on the theoretical limits of the electronics

Mechanical	
Size	235mm (h) x 160mm (w) x 114mm (d)
Weight	1750g - 2000g (dependent on cartridge)
Operating Temperatures	-20°C to +45°C
Construction	Extruded aluminium body, hard anodised with ASA-PC end mouldings. Stainless steel mounting brackets for 80-140mm diameter poles.
IP Rating	IP65 - without cartridges IP63 - with catridges

Electrical		
Power Inputs	12-32V DC via IP68 connector for automotive applications (~13.8V for cars and LCV, ~27.6V for HGV) or solar powered applications (~18-20V)	
Internal Battery	Li-Ion ~55 Whr. Charged by MPPT battery charging controller to maximise solar panel output. Increase battery capacity option available	
Power Draw	Max: 19W at 19V Nominal: ~ 0.2W at 19V	
Battery Run Time	Normal mode: 4 days	Low Power/Winter Mode: 2-4 days dependant on configuration options
IP Rated Power Supply Unit	IP67	
Solar Panel (Optional)	50WP output Bracket, mount and straps included Dimensions: 530mm (h) x 670mm (w) x 250mm (d) Mass: 5.5kg	

Cartridge Options - *all Zephyrs come with a cartridge based system that uses active sampling*

Measure	Standard Cartridge	Enhanced Cartridge	Estimated Accuracy		Range		Limits of Detection	
			µg/m³ | mg/m³	ppb | ppm	µg/m³ | mg/m³	ppb | ppm	µg/m³ | mg/m³	ppb | ppm
NO_2	•	•	10 µg/m³	5.2 ppbV	0 - 20,000 µg/m³[c]	0 - 10,000 ppbV[c]	8 µg/m³	4 ppbV
NO	•	•	10 µg/m³	8 ppbV	0 - 6,000 µg/m³[c]	0 - 5,000 ppbV[c]	10 µg/m³	8 ppbV
O_3	•	•	15 µg/m³	7.5 ppbV	0 - 15,000 µg/m³[c]	0 - 7,500 ppbV[c]	10 µg/m³	8 ppbV
PM_1	•	•	5 µg/m³		0 - 20,000 µg/m³[c]		2 µg/m³	
$PM_{2.5}$	•	•	5 µg/m³		0 - 20,000 µg/m³[c]		5 µg/m³	
PM_{10}	•	•	5 µg/m³		0 - 20,000 µg/m³[c]		5 µg/m³	
CO		•	0.3 mg/m³	0.3 ppmV	0 - 40 mg/m³[c]	0 - 35 ppmV[c]	0.23 mg/m³	0.2 ppmV
SO_2		•	20 µg/m³	7.6 ppbV	0 - 6,500 µg/m³[c]	0 - 2,500 ppbV[c]	8 µg/m³	3 ppbV
H_2S		•	5 µg/m³	3.6 ppbV	0 - 1,500 µg/m³[c]	0 - 1,000 ppbV[c]	25 µg/m³	18 ppbV
CO_2 (optional)		•	30 ppmV		0 - 5,000 ppm		405 ppmV[b]	
TVOCs (optional)		•	-		0 - 15,000 ppbV[c]		-	
Pressure	•	•	1.2 hPa		300 - 1,100 hPa		-	
Temperature	•	•	5°C*		-20°C - 45°C		-	
Relative Humidity	•	•	5%*		0 - 100%		-	

Location Sensing	
High Sensitivity GNSS	GPS, GLONASS, Galileo and Beidou module with internal active antenna.

Internal Storage	
8GB SD Card	Sufficient for 16 million measurements

Data Handling		
GSM module with internal antenna	During the sensing programme, data is collected inside the unit is uploaded to the database at configurable intervals	
Web Services Infrastructure	Data infrastructure is hosted in the cloud to give high service availability, resilience. and regional selection	
Communication Technologies	Wi-Fi (802.11 b/g/n 2.4GHz) Bluetooth (2.4GHz v4.2 BR/EDR + BLE compliant) GSM 2G 4G 5G technologies (NB-IoT and LTE Cat-M1)* RS232*, RS485* *Optional	
Data Access		
MyAir® Web App	View and download data via a URL link to the MyAir web app. MyAir functionality includes: - Mapped Zephyr locations - Data charting and download via KML or CSV - Additonal data overlays including global MappAir and 3rd party data - Satellite, AURN and Air Quality Management Area map overlays - Source apportionment - Historic and forecast data Our server via the customer username & password will hold collected Zephyr® data until the of subscription.	
Zephyr® API	Data can be integrated into existing systems such as traffic management, environmental reports and GIS.	
		
Default Sensing Programme		
	Standard Cartridge	Enhanced Cartridge
Sample Rate:	10 seconds	60 seconds
Upload Rate:	15 minutes	60 minutes
Custom modes can be configured		
Data Integrations		
Stratos	Compatible with Siemens Mobility Stratos traffic management system	
Third Party Device Integrations		
RS232 / RS485	Zephyr input power can be passed through to the connector (9-30V) to supply the auxilliary hardware with up to 1A. We are able to configure data connections for a wide range of additional hardware, please contact us if your proposed device is not listed below.	
Other Sensor Providers that Work with the Zephyr®	Gill MaxiMet range - GMX100, 101, 200, 240, 300, 301, 400, 500, 501, 531, 541, 550, 551 and 600. Any other integrations are available upon application.	
Subscription Includes		
Cartridge Calibration	All calibration and testing carried out at the EarthSense manufacturing facility to near-reference site standard with no in-field calibration required.	
Data Hosting & SIM	All costs included	
Continous Monitoring	In-house data scientist carry out remote monitoring of sensor performance to ensure no loss of data quality	
Replacement Cartridges	Throughout the duration of your subscription	
Power Supply	Internal rechargeable battery with option of solar panel	
Data Access	Via API or MyAir	
In-house Technical Support	Comprehensive service levels and technical assistance	
Warranty	Full warranty on manufacturer faults	
Support Levels		
Supported Hours	09:00 - 17:00 (UK Official Time)	
Supported Calls	All support calls will be answered on average within 30 seconds. EarthSense will use reasonable endeavours to provide a plan of action for all support calls within 7.5 Supported Hours of the call being logged.	