# **Locally managed air quality monitoring API specification**

# Introduction

To be able to harvest air quality data currently not made available via web sites where the data can be easily accessed it would be beneficial to create an application programming interface ([API](https://en.wikipedia.org/wiki/API)) to facilitate this data harvesting. Currently the only pollutants intended for harvest are shown in table 1 below, although over time these requirements may change.

## Table 1

|  |  |
| --- | --- |
| **Pollutant name** | **Code** |
|  Carbon monoxide  |  CO  |
|  Nitric oxide  |  NO  |
|  Nitrogen dioxide  |  NO2  |
|  Nitrogen oxides |  NOX |
|  PM10 particulate matter |  PM10  |
|  PM2.5 particulate matter |  PM2.5  |
|  Sulphur dioxide  |  SO2  |

# API Specification

The API needs to deliver two main things, metadata and measurement data.

The API should be a [REST*ful*](https://en.wikipedia.org/wiki/Representational_state_transfer) web API which, if not to be accessed publicly, can be secured by either “API tokens”, or customer status validations i.e. username password pairs.

The purpose of the API is to supply information only and as such will only respond to HTTP “GET” requests.

The API will use [JSON](https://en.wikipedia.org/wiki/JSON) as default for sending information although other alternatives are available such as XML and CSV. JSON is a low-overhead data interchange format alternative to XML which has widespread support for creation, reading, and decoding in the real-world situations where it is commonly used.

The initial endpoint of the API (Site) will be the point at which the metadata of the air pollution monitoring sites is returned. i.e. https://api.mydomain.com/Site

This will return a complete list of all the monitoring sites and the associated pollutants measured at each site, for which any air pollution data is available. Examples of this are shown in appendix 1.

The full list of metadata elements for the monitoring site and the sub array of measurands for each site are shown in Tables 2 & 3. Mandatory fields must be included in the API return other may be ignored or passed back as blank.

## Table 2

|  |  |  |  |
| --- | --- | --- | --- |
| **Key** | **Mandatory** | **Options** | **Format** |
| SiteName | Yes |  | String |
| SiteCode | Yes |  | String |
| AreaType | Yes | Urban / Suburban / Rural | String |
| SiteType | Yes | Traffic / Industrial / Background | String |
| Latitude | Yes |  | Float |
| Longitude | Yes |  | Float |
| DateOpened | Yes |  | YYYY-MM-DD |
| DateClosed | Yes |  | YYYY-MM-DD |
| SampleHeight | No |  | Float |
| KerbDistance | No |  | Float |
| LocalAuthority | No |  | String |
| DataManager | No |  | String |

## Table 3

|  |  |  |
| --- | --- | --- |
| **Key** | **Mandatory** | **Format** |
| Measurand | Yes | String |
| DateStarted | Yes | YYYY-MM-DD |
| DateEnded | Yes | YYYY-MM-DD |

To allow measurement data to be selected from the API the end point will be Data i.e. https://api.mydomain.com/Data

The options passed to the API will be /Data/SiteCode={SiteCode}/Measurand={Measurand}/ StartDate={StartDate}/EndDate={EndDate}

Table 4 details the elements to return and an example of returned data is shown in appendix 2.

## Table 4

|  |  |  |
| --- | --- | --- |
| **Key** | **Mandatory** | **Format** |
| MeasurementDate | Yes | YYYY-MM-DDTHH:MM |
| SiteCode | Yes | string |
| Measurand | Yes | string |
| Period | Yes | int |
| Value | Yes | float |
| Unit | Yes | string |
| Status | Yes | String |

A call to the Data endpoint will return data based on 'SiteCode', 'Measurand', 'StartDate', 'EndDate'.

The period is returned as minutes. 60 for hourly mean data, 15 for 15minute means.

All times will be shown as hour ending GMT.

All measurement units will be shown as mass units either of the following:

* micrograms per metre cubed (mg/m3)
* milli-grams per metre cubed (mg/m3).

The measurement status will be either of the following:

* provisional (P)
* ratified (R)

Measurand values returned as blank will be assumed to be missing data. all other fields should be populated with appropriate data.

If you require more information or wish to let us know you have an API from which air pollution measurement data can be collected please contact aqharveting@ricardo.com

# Appendix 1

Example JSON output for Site metadata – this has been expanded to simplify looking at the information.

{"Sites":[

 {"SiteName":"Bolton A579 Derby Street",

 "SiteCode":"BOL03",

 "SiteType":"ROADSIDE",

 "Latitude":53.573002,

 "Longitude":-2.435176,

 "DateOpened":"2020-10-20",

 "DateClosed":"",

 "SampleHeight":"",

 "KerbDistance":"",

 "LocalAuthority":"Bolton Metropolitan Borough Council",

 "DataManager":"Ricardo-AEA",

 "Measurands":[

{"Measurand":"PM10",

 "StartDate":"2020-10-20",

 "EndedDate":""}

{"Measurand":"NO2",

 "StartDate":"2020-10-20",

 "EndedDate":""}

{"Measurand":"PM25",

 "StartDate":"2020-10-20",

 "EndedDate":""}

 ]}

 {"SiteName":"Bury Prestwich",

 "SiteCode":"BUR2",

 "SiteType":"ROADSIDE",

 "Latitude":53.524915,

 "Longitude":-2.277565,

 "DateOpened":"2002-09-18",

 "DateClosed":"",

 "SampleHeight":"",

 "KerbDistance":"",

 "LocalAuthority":"Bury Metropolitan Borough Council",

 "DataManager":"Ricardo-AEA",

 "Measurands":[

{"Measurand":"PM10",

 "StartDate":"2002-09-18",

 "EndedDate":"2020-01-27"}

{"Measurand":"NO2",

 "StartDate":"2002-09-18",

 "EndedDate":""}

 ]}

]}

# Appendix 2

Example JSON output for pollutant measurement data – this has been expanded to simplify looking at the information.

{"Measures":[

 {"MeasurementDate":"2020-11-30T01:00",

 "SiteCode":"KC3",

 "Measurand":"NO2",

 “Period”:”60”,

 "Value":"34.0",

 "Unit":"ug/m3"

 “Status”:”P”}

{"MeasurementDate":"2020-11-30T02:00",

 "SiteCode":"KC3",

 " Measurand ":"NO2",

 “Period”:”60”,

 "Value":"33.2",

 "Unit":"ug/m3"

 “Status”:”P”}

{"MeasurementDate":"2020-11-30T03:00",

 "SiteCode":"KC3",

 " Measurand ":"NO2",

 “Period”:”60”,

 "Value":"29.3",

 "Unit":"ug/m3",

 “Status”:”P”}

{"MeasurementDate":"2020-11-30T04:00",

 "SiteCode":"KC3",

 " Measurand ":"NO2",

 “Period”:”60”,

 "Value":"24.3",

 "Unit":"ug/m3",

 “Status”:”P”}

{"MeasurementDate":"2020-11-30T05:00",

 "SiteCode":"KC3",

 "Species":"NO2",

 “Period”:”60”,

 "Value":"22.3",

 "Unit":"ug/m3",

 “Status”:”P”}

]}