# 47a Lower Mortlake Road
Richmond
London
TW9 2LW

# Air Quality Assessment

apple environmental

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# Contents

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# 1 Introduction, aims and objectives

## 1.1 Introduction

Apple Environmental Limited has been commissioned to undertake an air quality assessment for the proposed redevelopment of 47a Lower Mortlake Road, Richmond, London TW9 2LW, in support of an outline planning application for the conversion of an unused yard into 16 co-living units with communal living space.

This assessment was requested due to the site being located within a designated Air Quality Management Area in the London Borough of Richmond, due more specifically to predicted unacceptable airborne concentrations of nitrogen dioxide and possibly particulate matter.

## 1.2 Purpose

The UK National Air Quality Strategy (NAQS) sets standards and objectives for various airborne pollutants. Under the Air Quality (England) Regulations 2000 enacted by the Environment Act 1995, local authorities must review and assess air quality in their area for a number of pollutants taking into account these standards and objectives. The specific pollutants are carbon monoxide, benzene, 1,3-butadiene, nitrogen dioxide ($NO_2$), lead, sulphur dioxide ($SO_2$), and particles of 10µm diameter or less ($PM_{10}$).

Air quality objectives are health-based, and therefore the focus for air quality assessment is on public exposure. Relevant locations are considered for each pollutant and individual objective in turn. Any part of the local authority's area in which the standards and objectives are not being met, or are unlikely to be met within the relevant specified period, must be designated as an 'air quality management area' (AQMA). Following the designation of an AQMA, the local authority must draw up an action plan setting out the measures, and target dates by which it aims to meet the air quality standards.

Development has the potential to significantly affect local air quality. The impact on air quality is likely to be particularly important where a development is proposed inside, or adjacent to, an AQMA, or where the development itself could result in the designation of an AQMA. Equally, local air quality management has the potential to affect the location and design of a development in order to minimise environmental impact and public exposure. Therefore, consideration of air quality issues is a key aspect of the local development control process.

The designation of an AQMA is not intended to cause refusal of proposed development in that area. However, where a development may have a significant effect on air quality or where the air quality will have an effect on the future occupants of the development, the local authority usually requires the applicant to provide an assessment of the likely impacts.

If the impacts are assessed to be harmful, or likely to affect local air quality management objectives then developers are expected to incorporate mitigation measures into the development, and demonstrate that the proposed measures will reduce the impacts to an acceptable level.

## 1.3 Aim

The aim of this work is to undertake an air quality assessment by means of collating available data for known airborne pollutants in the general area of the site.

The data is to be used to assess the significance of any potential impacts on future occupants of the proposed development site, as well determining any potential impacts that the development itself could have on local air quality.

## 1.4 Objectives

In achieving this aim, the following objectives have been identified:

- to provide details of the site location and the proposed development;
- to review existing air quality data with regard to airborne pollutants in the area through reference to air quality review and assessments published by the local authority;
- to identify any potential impacts of the present and future air quality (with specific regard to nitrogen dioxide) on the future occupiers/visitors/workers of the proposed development;
- to put forward a construction phase assessment with specific regard to dust mitigation measures; and
- to propose or recommend mitigation measures where necessary.

## 1.5 Guidance

This assessment has been carried out in accordance with The National Planning Policy Framework (2018), The Borough of Richmond Council published air quality data, the Design Manual for Roads and Bridges Volume 11, Section 3 Part 1 (Air Quality) and Local Air Quality Management Technical Guidance LAQM.TG16 (2018), and is based on the following information sources:

- Air Pollution in the UK 2016, DEFRA, September 2017, http://uk-air.defra.gov.uk/library/annualreport/viewonline?year=2016_issue_2;
- National Atmospheric Emissions Inventory, http://naei.defra.gov.uk/;
- London Borough of Richmond upon Thames Action Plan 2019;
- London Borough of Richmond Air Quality Annual Status Report for 2018;
- DEFRA Local Air Quality Management Support (http://laqm.defra.gov.uk/);
- National Air Quality Information Archive (NAQIA) (http:/www.airquality.co.uk);
- Compilation of New Roadside Monitoring Data Obtained by Local Authorities as Part of the Review and Assessment Process: Update, Air Quality Consultants Ltd and University of Bristol on behalf of DEFRA, 2002;
- Air Quality Expert Group: nitrogen dioxide in the United Kingdom, prepared for the Department of the Environment, Food and Rural Affairs; Scottish Executive, Welsh Assembly Government; and the Department of Environment in Northern Ireland, 2009.
- https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html
- IAQM document Land-use Planning & Development Control: Planning for Air Quality January 2017 (https://iaqm.co.uk/guidance/)

# 2 Background

## 2.1 Site location and description

This assessment has been requested due to the site being located within an air quality management area, along with being located adjacent to the A316 Lower Mortlake Road.

The site currently exists as a derelict yard area with a concrete ground surface, accessed from the A316 (Lower Mortlake Road). This report has been prepared in support of the redevelopment of the vacant yard to create a three-storey co-living scheme comprising 16 bedrooms and communal courtyard area.

It is not expected for there to be any dedicated vehicle parking spaces associated with the proposed development, although the proposal does include an area for bicycles.

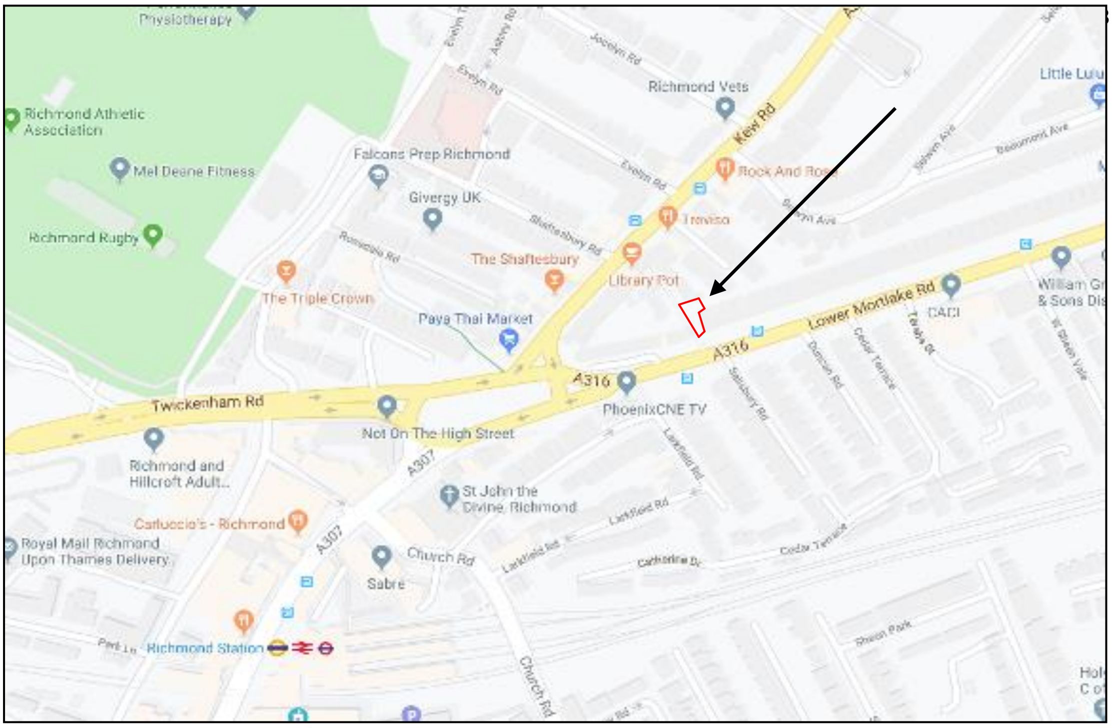
Approximately 180m to the south of the site there is a railway line, running in a southwest to northeast direction, for which the closest station is located in Richmond, 350m to the southwest. The line is electrified, and although diesel trains may still be in occasional use here, these are not deemed to be frequent enough to pose a significant risk to the air quality for future residents in this area. Consequently air pollutants from the railway line are not considered to be a significant source in this instance.

Residential development is present in all directions surrounding the site.

The prevailing wind comes from a southwesterly direction, which has the potential to bring vehicle pollution onto the site from the adjacent A316. In consideration of this therefore, the only potentially significant source of air pollution is expected to be road traffic.

The site location and some of the identified features are shown below in Figure 1 and in Photographs 1 to 6.

**Figure 1** The location of the proposed development site



**Photograph 1** Showing the subject site from the south

**Photograph 2** Showing the site and the adjacent dwelling to the southwest

**Photograph 3** Showing the site and the adjacent dwelling to the northeast

**Photograph 4** Showing the A316 looking southwestwards

**Photograph 5** Showing the A316 looking northeastwards

**Photograph 6** Showing the roundabout to the southwest

**Photograph 7** Showing Kew Road looking northwards from Lower Mortlake Road


## 2.2 Vehicle movement

Lower Mortlake Road (A316) provides off-street parking for the nearby dwellings. The area is generally flat, and the ground surface consists of tarmacadam roads, and tarmacadam or paved pavements.

A roundabout is present 80m to the southwest of the site (which connects to Kew Road (A307).

Vehicle movements were observed along Lower Mortlake Road during a site visit on the 30th January 2020. A traffic count was carried out here for a period of fifteen minutes from 12:15H to 12:30H in order to observe typical day-time vehicle characteristics of the area. During this period 605 vehicles were recorded, 6% of which were heavy vehicles, 12% were light goods vehicles, and the remainder were car movements. This possibly equates to an estimated 43560 vehicles using Lower Mortlake Road, throughout an 18-hour day.

Vehicle movements were also observed along Kew Road at the junction with Lower Mortlake Road. A traffic count was carried out here for a period of fifteen minutes from 12:40H to 12:55H. 5 During this period 6 vehicles were recorded, 3% of which were heavy vehicles, 1% were light goods vehicles and the remainder were car movements. This possibly equates to an estimated 4032 vehicles using Kew Road, of which approximately 2448 will presumably have entered Lower Mortlake Road.

For the purposes of utilising the DMRB model therefore, daily vehicle values of 43560 and 4032 have been initially considered as baseline values for the two links respectively for 2020. These have been subdivided into light vehicles and heavy vehicles, as required by the model.

.
It is understood that the proposed development will not have any parking facilities and therefore there should be no increase in vehicle movements apart from any expected natural increase for light and heavy goods vehicles.

In utilising the model, the above observed break-down percentages have also been referred to. Consequently, for Lower Mortlake Road (DMRB Link 1), light vehicles accounted for 94% of all movements, and heavy vehicles accounted for 6% of all movements. For Kew Road (DMRB Link 2), light vehicles accounted for 97% of all movements, and heavy vehicles accounted for 3% of all movements.

In order to obtain a more representative adjusted year-on-year value the Department for Transport published figures for Richmond Upon Thames 1993 - 2018 have also been referred to. In doing so it has been seen that the mean decrease in vehicle movements over the last three years appears to be around 2% per year.

Taking all this data into consideration, the estimated vehicle movements for future years beyond 2020 has been calculated and shown below in Tables 1 and 2.

**Table 1** Projected vehicle numbers using Lower Mortlake Road

| Year | Cars | Light goods | Total light vehicles | Heavy goods | Total vehicles |
|---|---|---|---|---|---|
| 2020 | 36032 | 4914 | 40946 | 2614 | **43560** |
| 2021 | 35311 | 4815 | 40126 | 2561 | **42688** |
| 2022 | 34605 | 4718 | 39323 | 2510 | **41833** |
| 2023 | 33913 | 4623 | 38536 | 2460 | **40996** |
| 2024 | 33234 | 4531 | 37764 | 2411 | **40175** |
| 2025 | 32569 | 4440 | 37009 | 2363 | **39372** |

**Table 2** Projected vehicle numbers using Kew Road

| Year | Cars | Light goods | Total light vehicles | Heavy goods | Total vehicles |
|---|---|---|---|---|---|
| 2020 | 3871 | 40 | 3911 | 121 | **4032** |
| 2021 | 3794 | 39 | 3833 | 119 | **3952** |
| 2022 | 3718 | 38 | 3756 | 117 | **3873** |
| 2023 | 3644 | 37 | 3681 | 115 | **3796** |
| 2024 | 3571 | 36 | 3607 | 113 | **3720** |
| 2025 | 3500 | 35 | 3535 | 111 | **3646** |

## 2.3 Local air quality assessment

The London Borough of Richmond upon Thames lies in southwest London and forms part of outer London.

Richmond is located on a meander of the River Thames. The London Boroughs of Hammersmith and Fulham lie to the northeast, Hounslow to the northwest, Kingston upon Thames to the south and Elmbridge to the soutwest.

A summary of the Annual Status Report for air quality prepared in 2019 is as follows:

- the 2019 assessment concluded that $NO_2$ concentrations measured during 2018 showed a slight decrease at roadside and background monitoring locations between 2017 and 2018;
- continuous monitoring data for $PM_{10}$ have been relatively stable since 2012, with a slight reduction in concentrations between 2012 and 2018;
- the Borough of Richmond-Upon-Thames was designated an AQMA in December 2000 for nitrogen dioxide and particles (specifically $PM_{10}$);
- the Annual status Report has identified that the council also routinely monitor for ozone and $PM_{2.5}$.

A review of new monitoring data in the same 2019 report identifies the following:

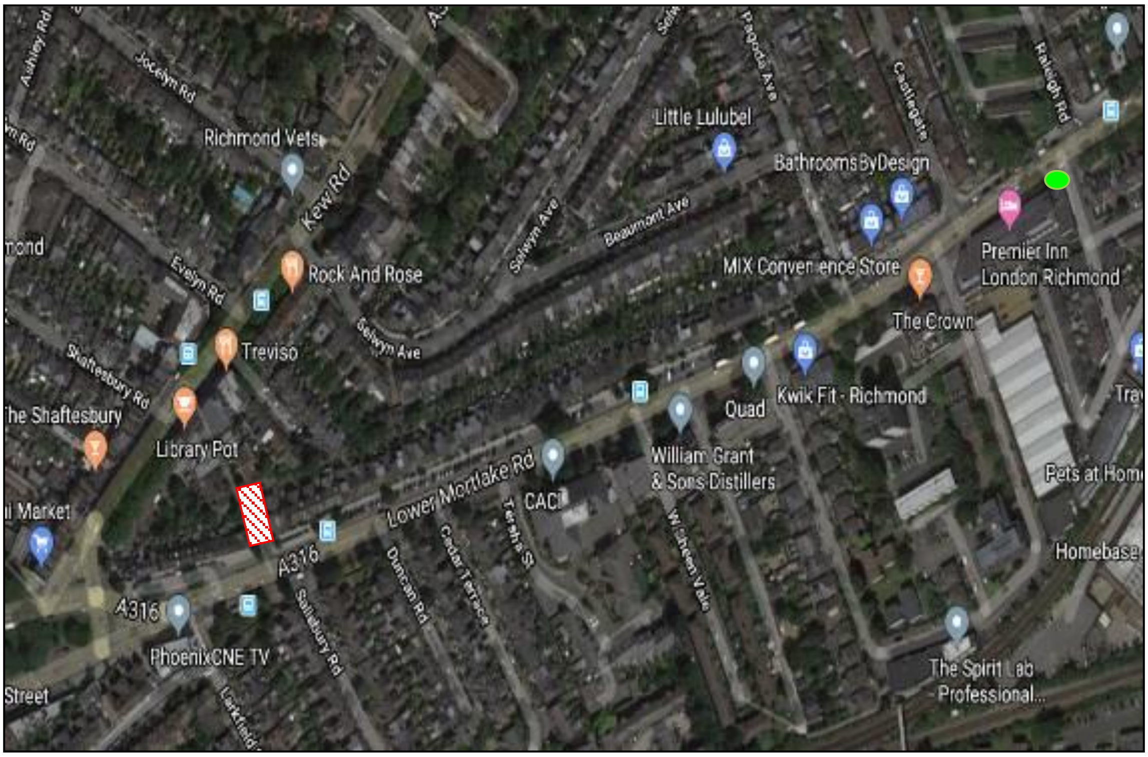
- forty-one of the sixty-four nitrogen dioxide diffusion tube sites located within the existing AQMA recorded an annual mean concentration in excess of the 40µg/m$^3$ objective in 2018;
- of these forty-one sites, three exceeded 60µg/m$^3$, which indicates that the 1-hour mean objective may have also been exceeded at these locations:
- the mean concentration for all of the sites that exceeded the objective was 47.6µg/m$^3$, which has decreased marginally from previous years;
- the highest annual mean concentrations for $PM_{10}$ in 2018 was at one mobile unit located at Chertsey Road; where the concentration was 21µg/m$^3$; and
- the results from all three sites show that the daily mean objective for $PM_{10}$ was only exceeded in this above location in 2018.

The Borough of Richmond upon Thames measured nitrogen dioxide within the borough between 2002 and 2018 at 64 diffusion tube sites; two of which were background locations; with the remainder being roadside or kerbside locations.

Automatic monitoring for both $NO_2$ and $PM_{10}$ is undertaken within the borough at three separate sites.

The closest non-automated monitoring (diffusion tube) site to 47a Lower Mortlake Road is actually on Lower Mortlake Road, approximately 510m to the northeast of the site, as shown below in Figure 2.

**Figure 2** Closest non-automated monitoring site to 47a Lower Mortlake Road




Diffusion tube site

Subject site

Source - Gridreferencefinder.com

Details relating to this monitoring site are shown below in Table 3.

**Table 3** Details of non-automatic monitoring (diffusion tube) sites for $NO_2$ only

| Site ID and name | Site type | OS grid ref | In AQMA | Distance to kerb of nearest roadside (m) | Distance from site (km) |
|---|---|---|---|---|---|
| Lower Mortlake Road | Kerbside | 518822 175590 | Yes | 0.9m | 0.5 NE |

The closest automatic monitoring site to the proposal site is on Chertsey Road; hence this provides the closest data for both nitrogen dioxide and airborne particulate concentrations to the proposal site. (Note that this is a mobile site).

Details relating to this monitoring location are reproduced below in Table 4.

**Table 4** Details of automatic monitoring for $NO_2$ only

| Site ID and name | Site type | OS grid ref | In AQMA | Distance to kerb of nearest roadside (m) | Distance from site (km) |
|---|---|---|---|---|---|
| Mobile Air Quality Unit, Chertsey Rd. TW2 | Roadside | 541879 175016 | Yes | 1.6 | 3.3 NE |

## .3.1 National Air Quality Standard Objectives

The NAQS objectives for nitrogen dioxide ($NO_2$) and particle matter ($PM_{10}$), along with other airborne pollutants are shown in Table 5 below.

**Table 5** National Air Quality Strategy Objectives included in Regulations for the purpose of Local Air Quality Management in England

| Substance | Concentration | Measured as | Objective date |
|---|---|---|---|
| **Benzene** | 16.25 µg/m$^3$ | Annual mean | 31/12/2003 |
| | 3.25 µg/m$^3$ | Annual mean | 31/12/2010 |
| **1,3-Butadiene** | 2.25 µg/m$^3$ | Running annual mean | 31/12/2003 |
| **Carbon monoxide** | 10.0 mg/m$^3$ | Maximum daily running 8 hour mean | 31/12/2003 |
| **Nitrogen dioxide ($NO_2$)** | 200 µg/m$^3$ | 1 hour mean not to be exceeded more than 18 times per year | 31/12/2005 |
| | 40 µg/m$^3$ | Annual mean | 31/12/2005 |
| **Particulates ($PM_{10}$)** | 50 µg/m$^3$ | 24 hour mean not to be exceeded more than 35 times per year | 31/12/2004 |
| | 40 µg/m$^3$ | Annual mean | 31/12/2004 |
| **Sulphur dioxide ($SO_2$)** | 350 µg/m$^3$ | 1 hour mean not to be exceeded more than 24 times per year | 31/12/2004 |
| | 125 µg/m$^3$ | 24 hour mean not to be exceeded more than 3 times per year | 31/12/2004 |
| | 266 µg/m$^3$ | 15 minute mean not to be exceeded more than 35 times per year | 31/12/2005 |

### 2.3.2 Nitrogen dioxide

Any location where the $NO_2$ concentration exceeds 40µg/m$^3$ as a yearly average is considered to pose a potential risk to health. It is considered to be toxic and acts as an irritant, although it is additionally a problem due to it being a precursor for ground-level ozone.

According to national statistics, traffic flows have been generally increasing in the UK but improved vehicle technology has led to more fuel efficient engines which initially offset the rise in $NO_2$ concentrations. There is some evidence to suggest that this situation may now be reverting.

$NO_2$ has been non-automatically monitored at the Lower Mortlake Road site as detailed in Table 6.

**Table 6** Results of $NO_2$ diffusion tube monitoring - annual mean

| Location | Annual mean concentration (µg/m³) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
| Lower Mortlake Road | 68 | 71 | 66 | 67 | 56 | 58 | 46 |

Data up to December 2018.

As shown above, the values at Lower Mortlake Road have exceeded the annual mean $NO_2$ limit of 40µg/m³ for the last 7 years of data, although they also show that the $NO_2$ concentration fell quite significantly in both 2016 and 2018, with 2017 showing only a marginal increase on the 2016 concentration.

### 2.3.3 Other National Air Quality Standard pollutants

The Borough of Richmond Council also measures $PM_{10}$ particulates within the district, at three separate automatic sites.

The closest of these to Lower Mortlake Road is located at Chertsey Road as shown below in Figure 4, for which monitoring commenced in 2012; the details of which have been provided below in Tables 7 and 8.

**Figure 4** Closest automated site to Lower Mortlake Road


**Table 7** Details of automatic monitoring for $PM_{10}$

| Site ID and name | Site type | OS grid ref | In AQMA | Distance to kerb of nearest roadside (m) | Distance from site (km) |
|---|---|---|---|---|---|
| Mobile Air Quality Unit, Chertsey Rd. TW2 | Roadside | 541879 175016 | Yes | 1.6 | 3.3 NE |

**Table 8** Results of $PM_{10}$ automatic monitoring - annual mean

| Location | Annual mean concentration (µg/m³) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
| Chertsey Road | 24 | 25 | N/A | N/A | N/A | 18 | 21 |
| | Number of exceedences of 24-hour mean (µg/m³) | | | | | | |
| | 10 | 8 | N/A | N/A | N/A | 1 | 1 |

Data up to December 2018.

As shown above, the annual mean $PM_{10}$ concentration at Chertsey Road is not reported to have exceeded the limit value of 40µg/m³.

It can also be seen that the 24-hour mean objective of 50µg/m³ permitted over 35 days per year was also not exceeded.

These concentrations can only be compared between 2017 and 2018, as the mobile unit was previously located at different sites along this road. Between 2017 and 2018 therefore, it can be seen that the concentration appears to be generally increasing; although when considering airborne particulate material it has to be considered that there may well be a non-vehicle related reason for this increase. No data is available for 2014 to 2016.

The Borough of Richmond Council is also currently measuring $PM_{2.5}$. This monitoring is carried out in one AQMA location (Bushy Park, Teddington). The annual mean concentration objective of 25µg/m$^3$ has not been exceeded since monitoring began in 2012.

# 3 DMRB assessment

## 3.1 Input data

Using the results above from the closest non-automatic monitoring site at Lower Mortlake Road, the DMRB model has been employed to determine the possible future traffic related $NO_2$ trends for the receptor area of the development site. In view of the fact that the $PM_{10}$ monitoring has not identified a problem in this area this has not been included within the model run. The data sources used for the model are summarised below in Table 9.

**Table 9** Data sources used for the DMRB model

| Component | Source |
|---|---|
| **Pollution data** | 2012-2018 nitrogen dioxide monitoring results data provided by The Borough of Richmond Council. |
| **Traffic data** | On-site traffic count on 30th January 2020 (See Tables 1 and 2) adjusted for future trends using published Department for Transport statistical data for Richmond. |
| **Vehicle speed data** | Observations during on-site traffic count on 30th January 2020. |

The first scenario used for the model considers the traffic flow data from the manual count carried out on the 30th January 2020 along Lower Mortlake Road. The second scenario uses traffic flow data from the manual count carried out along Kew Road on the same day.

These counts were undertaken over a period of 15 minutes and have been used to extrapolate a daily mean traffic count over a ‘daytime’ period of 18-hours whereby this is presumed to be representative of a typical day.

The traffic count on both Lower Mortlake Road and Kew Road was undertaken within a 30mph zone. The input values used to run the model are shown below in Tables 10 and 11.

**Table 10** Scenario 1 Link 1 - Lower Mortlake Road contribution

| Substance | Background concentration | Distance from link centre to receptor (m) | Traffic flow (vehicles per 18-hour day) | Annual mean speed (km/h) | Road type | LDV (%) | HDV (%) |
|---|---|---|---|---|---|---|---|
| **CO** | N/A | 15 | 43560 | 48 | A | 94 | 6 |
| **Benzene** | N/A | | | | | | |
| **1,3-butadiene** | N/A | | | | | | |
| **$NO_x$** | N/A | | | | | | |
| **$NO_2$** | 46µg/m$^3$ | | | | | | |
| **$PM_{10}$** | N/A | | | | | | |

**Table 11** Scenario 2 Link 2 - Kew Road contribution

| Substance | Background concentration | Distance from link centre to receptor (m) | Traffic flow (vehicles per 18-hour day) | Annual mean speed (km/h) | Road type | LDV (%) | HDV (%) |
|---|---|---|---|---|---|---|---|
| **CO** | N/A | 65 | 4032 | 48 | A | 97 | 3 |
| **Benzene** | N/A | | | | | | |
| **1,3-butadiene** | N/A | | | | | | |
| **$NO_x$** | N/A | | | | | | |
| **$NO_2$** | 52.4µg/m$^3$ | | | | | | |
| **$PM_{10}$** | N/A | | | | | | |

## 3.2 DMRB output

The findings from both scenarios have been summarised below in Tables 12 and 13. The contribution of each pollutant for the link is also presented within this Table. The model data output sheets can be found in Appendix I.

As stated above, only data for $NO_2$ has been used for this assessment due to exceedences of the objective values of this determinand only.

The model specifies 'zero' to be entered for any substances that are not required, in order to make the projected calculations, therefore the output shows projected values for these substances based upon this (in this case, carbon monoxide, benzene, 1,3-butadiene, $NO_x$ and $PM_{10}$; hence for the purpose of this assessment, the output values for these substances can be ignored.

**Table 12** DMRB output for Lower Mortlake Road using 46µg/m$^3$

| Year | CO (mg/m$^3$) | Benzene (µg/m$^3$) | 1,3-butadiene (µg/m$^3$) | $NO_x$ (µg/m$^3$) | $NO_2$ (µg/m$^3$) | $PM_{10}$ (µg/m$^3$) | $PM_{10}$ (µg/m$^3$) |
|---|---|---|---|---|---|---|---|
| | Annual Mean | | | | | | Days >50µg/m$^3$ |
| **2020** | 0.08 | 0.17 | 0.17 | 15.68 | **51.35** | 1.53 | 0.00 |
| **2021** | 0.08 | 0.17 | 0.16 | 15.48 | **51.30** | 1.52 | 0.00 |
| **2022** | 0.08 | 0.16 | 0.16 | 15.33 | **51.26** | 1.52 | 0.00 |
| **2023** | 0.08 | 0.16 | 0.16 | 15.20 | **51.22** | 1.52 | 0.00 |
| **2024** | 0.08 | 0.16 | 0.15 | 15.09 | **51.19** | 1.51 | 0.00 |
| **2025** | 0.08 | 0.15 | 0.15 | 14.99 | **51.17** | 1.51 | 0.00 |

**Table 13** DMRB output for Kew Road using 46µg/m$^3$

| Year | CO (mg/m$^3$) | Benzene (µg/m$^3$) | 1,3-butadiene (µg/m$^3$) | $NO_x$ (µg/m$^3$) | $NO_2$ (µg/m$^3$) | $PM_{10}$ (µg/m$^3$) | $PM_{10}$ (µg/m$^3$) |
|---|---|---|---|---|---|---|---|
| | Annual Mean | | | | | | Days >50µg/m$^3$ |
| **2019** | 0.00 | 0.00 | 0.00 | 0.61 | **46.34** | 0.07 | 0.00 |
| **2020** | 0.00 | 0.00 | 0.00 | 0.59 | **46.34** | 0.07 | 0.00 |
| **2021** | 0.00 | 0.00 | 0.00 | 0.58 | **46.33** | 0.07 | 0.00 |
| **2022** | 0.00 | 0.00 | 0.00 | 0.57 | **46.32** | 0.07 | 0.00 |
| **2023** | 0.00 | 0.00 | 0.00 | 0.56 | **46.32** | 0.07 | 0.00 |
| **2024** | 0.00 | 0.00 | 0.00 | 0.55 | **46.31** | 0.06 | 0.00 |
| **2025** | 0.00 | 0.00 | 0.00 | 0.61 | **46.34** | 0.07 | 0.00 |

Predictive outcomes from using the model suggest that the annual mean $NO_2$ concentrations likely to be experienced at the receptor site show a marginal decrease between 2020 and 2022, prior to remaining steady for the next few years.

The model output also shows that although the $NO_2$ concentration is predicted to continue exceeding the AQA Objective of 40µg/m$^3$, the situation is not expected to be exacerbated by the introduction of new residential units or commercial premises in this area.

# 4 Future Trends

## 4.1 Information source

The National Atmospheric Emissions Inventory compiles information regarding UK emissions from a variety of sources such as traffic and industrial plant. These emissions are predicted to assist in finding methods of reducing the impact of human activities on human health and the environment.

The national trend for traffic-related nitrogen dioxide has been discussed below.

## 4.2 Nitrogen oxides

Road transport is the largest source of nitrogen oxides in the UK accounting for around one third of the UK emissions, with vehicles travelling at high speeds contributing most. Stationary combustion and power generation also form significant sources.

The estimation of nitrogen oxide emissions attributed to road transport is complex since the nitrogen can be derived from either the fuel or atmospheric nitrogen. The emission is dependent on the conditions of combustion, in particular temperature and excess air ratio, which can vary considerably. Thus combustion conditions, load and even state of maintenance are important.

Studies show that since 1970, overall nitrogen oxides emissions have decreased by 61%, although this decrease has not been constant. The emission profile up to 1984 was relatively flat with small peaks in 1973 and 1979 largely due to harsh winters in those years. Emissions rose sharply from 1984 as a result of a growth in road traffic, peaking in 1989. Since then, a decline in total emissions of up to 64% has been observed largely as a result of emission reductions from power stations and the road transport sector.

More specifically, road transport related emissions in the UK have largely decreased due to technological advances in vehicle engine design and management. In 2009, UK emissions fell below the National Emissions Ceilings Directive target for 2010 for the first time. Overall however, although NOx emissions decreased notably during the period 1990 to 2002, urban concentrations had largely remained static since, although according to the DEFRA report December 2016, the period from 2015 to 2016 actually saw a 4% decrease nationally.

## 4.3 Particulates ($PM_{10}$)

In the 1970s particulate emissions were largely dominated by stationary combustion sources such as domestic heating, but currently the principal urban source of particulate material is believed to be diesel-fuelled road vehicles.

All motor vehicles emit particulate material although diesel engines generally emit a greater mass of $PM_{10}$ per kilometre than petrol engines. Overall however, the development and subsequent widespread use of both fuel and emission technology, has resulted in a decrease of $PM_{10}$ emissions by around 60% since 1990. Increased efforts made by local authorities in road sweeping also reduces the quantity of insoluble matter, which otherwise would have the ability to circulate with wind movement.

According to the aforementioned DEFRA report, UK airborne $PM_{10}$ concentrations have largely remained static since 2014.

# 5 Construction phase assessment

## 5.1 Construction activities

During the construction phase of any development project there are a number of activities that have the potential to adversely affect air quality.

Of these, the demolition of existing buildings and structures, the disturbance of ground dust on the site along with new construction and the undertaking of groundworks and excavations, can have a high potential for the release of particulate material into the air.

Similarly, building projects can often see a significant increase in plant and vehicle activity; including movement in and out of a site. This brings not only a possible concern from HGV exhaust fumes but can also result in soil, mud and dust deposition on nearby roads. The latter can easily become airborne during periods of dry and windy weather.

## 5.2 Mitigation

To minimise the potential effects of emissions from the site, it is necessary that on-site activities follow best practice guidance for the control of dust and nitrogen oxides from construction and demolition.

The Institute of Air Quality Management (IAQM) provides a direct guidance framework for controlling these substances during activities such as demolition, earthworks, construction and track-out.

Mitigation details in the document concentrate on a number of key areas, as summarised below:

- a need for communication between all stakeholders and regulators;
- the drawing up and implementation of a dust management plan;
- site management should ensure that air quality is considered at all times during the project and assume a position of ultimate responsibility accordingly;
- logs and record keeping - including and recording all dust and air quality complaints, identifying causes and taking appropriate measures to reduce emissions;

- monitoring and inspections;
- careful planning and preparation to ensure adverse effects from all site activities are minimised at all times - and especially near sensitive receptors;
- maintaining the site environment;
- the operation and use of machinery and vehicles, including the introduction and enforcement of site-specific policy requirements, whereby all tools and plant should be used carefully and sympathetically to minimise dust particulate generation and liberation;
- the loading of waste onto vehicles for off-site disposal should be undertaken carefully and sympathetically to minimise dust particulate production; and
- all vehicles removing waste from the site should ensure that loads are appropriately covered to prevent fugitive release, and hence complaint with the Waste (England and Wales) Regulations 2011 (now superseding the Duty of Care Regulations 1991).

It is expected that if the above guidance measures are fully implemented during the construction phase, there should be no significant residual impacts.

# 6 Post-construction assessment

## 6.1 Vehicle emissions

The most potentially significant impact on air quality arising from any new residential-type development, (including this co-living scheme), is likely to be from vehicle emissions due to an associated increase in road traffic. However, in this specific instance there are no proposed vehicle parking spaces, therefore it is deemed unlikely that the development will have any impact on the local air quality.

UK Government guidance requires planning authorities to promote and exploit public transport as a means of accessing jobs, education, health facilities, shopping, leisure and local services. Developments should therefore encourage sustainable modes of transport, such as buses, trains, cycling and walking.

Guidance also requires local authorities to place the needs of people before ease of traffic movement when designing the layout of a residential-type development (including this co-living scheme). To facilitate this, developments should aim to make use of the most accessible sites, such as those in existing town centres, located close to local amenities and public transport facilities.

In this instance, the application site is ideally placed to conform to this guidance through its central location and good public transport connections, thereby assisting in reducing the dependency on private vehicle use.

The proposed development site itself is located within close proximity of a number of sustainable links, including: a railway station and bus routes.

## 6.2 Reduction of car dependency and vehicle movements

As described above in Section 6.1, the proposed development site is within very easy access of a number of local amenities including public road and rail transport links, thus making it a favourable location compliant with the government's target of reducing personal vehicle use.

## 6.3 Exposure of residents to vehicle pollution

This report has shown that despite the fact that future residents of the site could be exposed to unacceptable levels of $NO_2$, the proposed development itself is not expected to have any adverse effect on air quality in any way.

With further regard to airborne nitrogen dioxide it has also been indicated within this report that the existing level in this part of the borough has been slowly decreasing marginally year-on-year. This downward trend is expected to continue thereafter, due in part to the expected reduction in diesel fuel vehicles on the roads, and increase in vehicles using cleaner technology.

In regards to the residential accommodation it is imperative that consideration to air quality should form an important part of the design process, in order to minimise exposure to airborne traffic pollution within the building.

In view of the fact that traffic-derived pollutants could still be present within the air at window level, consideration should be given to providing a means of obtaining fresh air within dwelling areas, such as through the installation of mechanical ventilation with appropriate filtration capable of removing $NO_2$, thereby reducing any exposure to such whilst indoors.

It is beyond the scope of this document to recommend a specific ventilation system for this development and it is recommended that further consultation from a specialist company is sought. It is however imperative that any introduced system is actively maintained throughout its lifetime to ensure that vehicle pollutants continue to be effectively arrested.

# 7 Conclusion

A qualitative assessment has been undertaken on the potential impact on local air quality from traffic related nitrogen dioxide for the future occupiers of the proposed co-living development at 47a Lower Mortlake Road.

In doing so, pollutant data and statistics from local authority sources and UK national databases has been used in conjunction with the DMRB model to identify the projected pollution concentration from the present day to 2025. The findings show that the NAQS objective (annual mean) value for traffic-related nitrogen dioxide is currently being exceeded; and potentially will continue to be exceeded at the site in future years; albeit expected to slowly decrease in concentration year-on-year.

In view of the above findings it has been recommended that consideration should be given to incorporating a mechanical ventilation system with the filtration capability to remove $NO_{2,}$ into the design of the co-living development within the building in order to minimise any exposure to such whilst indoors.

The report has also made reference to the potential for air quality to be affected during the construction phase of the development, and therefore the IAQM guidelines should be consulted and adhered to in order to mitigate for and minimise any such effect. However, through consideration of appropriate measures during the design and construction of the development, the associated risk should similarly be lessened.

To reiterate that which has been stated above, the UK Government guidance requires planning authorities to promote and exploit public transport; therefore new developments should encourage both public transport use as well as other more sustainable modes of transport. In this specific instance, the application site is ideally placed to conform to this guidance through its location, thereby reducing the dependency on private vehicles as it lies in good proximity of a number of transport routes, schools and local amenities

# 8 Limitations

The results, comments and recommendations within this report are based upon the information made available at the time of undertaking this work, and relate to this specific work only. They must not be used to assess similar concerns at any other time, or at any other location.

Furthermore it should be pointed out that Apple Environmental Limited has been contracted to provide an objective review and assessment only and as such has made every effort to achieve this aim.

Apple Environmental Limited will not be held responsible for the accuracy of referenced information quoted within the report, or any other information provided by third party sources. Furthermore it will not be held responsible for any subsequent outcomes arising from the implementation of any recommendations herein based on this information.

# Appendix

## DMRB model input and output data

# DMRB Input Parameters

| Step 1 | Receptor name | Lower Mortlake Road | Receptor number | 1 |
|---|---|---|---|---|
| Step 2 | Year | 2020 | | |
| Step 3 | Number of links | 1 | | |

Step 6: CALCULATE

Step 7: STORE RESULTS FOR THIS RECEPTOR

CLEAR INPUT DATA

Step 4

| Background concentrations for 2020 | | | | | |
|---|---|---|---|---|---|
| CO (mg/m³) | Benzene (µg/m³) | 1,3-butadiene (µg/m³) | $NO_x$ (µg/m³) | $NO_2$ (µg/m³) | $PM_{10}$ (µg/m³) |
| 0 | 0 | 0 | 0 | 46 | 0 |

Step 5

| Link number | Distance from link centre to receptor (m) | Traffic flow & speed: AADT (combined, veh/day) | Traffic flow & speed: Annual average speed (km/h) | Traffic composition: Road type (A,B,C,D) | Vehicles <3.5t GVW (LDV): % passenger cars | Vehicles <3.5t GVW (LDV): % light goods vehicles | Vehicles <3.5t GVW (LDV): Total % LDV | Vehicles>3.5t GVW (HDV): % buses and coaches | Vehicles>3.5t GVW (HDV): % rigid HGV | Vehicles>3.5t GVW (HDV): % articulated HGV | Vehicles>3.5t GVW (HDV): Total % HDV |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 15 | 43560 | 48 | A | | | 94 | | | | 6 |
| 2 | | | | | | | | | | | |
| 3 | | | | | | | | | | | |
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| 13 | | | | | | | | | | | |
| 14 | | | | | | | | | | | |
| 15 | | | | | | | | | | | |

| Step 1 | Receptor name | Lower Mortlake Road | Receptor number | 2 |
|---|---|---|---|---|
| Step 2 | Year | 2021 | | |
| Step 3 | Number of links | 1 | | |

Step 6: CALCULATE

Step 7: STORE RESULTS FOR THIS RECEPTOR

CLEAR INPUT DATA

Step 4

| Background concentrations for 2021 | | | | | |
|---|---|---|---|---|---|
| CO (mg/m³) | Benzene (µg/m³) | 1,3-butadiene (µg/m³) | $NO_x$ (µg/m³) | $NO_2$ (µg/m³) | $PM_{10}$ (µg/m³) |
| 0 | 0 | 0 | 0 | 46 | 0 |

Step 5

| Link number | Distance from link centre to receptor (m) | Traffic flow & speed: AADT (combined, veh/day) | Traffic flow & speed: Annual average speed (km/h) | Traffic composition: Road type (A,B,C,D) | Vehicles <3.5t GVW (LDV): % passenger cars | Vehicles <3.5t GVW (LDV): % light goods vehicles | Vehicles <3.5t GVW (LDV): Total % LDV | Vehicles>3.5t GVW (HDV): % buses and coaches | Vehicles>3.5t GVW (HDV): % rigid HGV | Vehicles>3.5t GVW (HDV): % articulated HGV | Vehicles>3.5t GVW (HDV): Total % HDV |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 15 | 42688 | 48 | A | | | 94 | | | | 6 |
| 2 | | | | | | | | | | | |
| 3 | | | | | | | | | | | |
| 4 | | | | | | | | | | | |
| 5 | | | | | | | | | | | |
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| 14 | | | | | | | | | | | |
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| Step | | | | | |
|---|---|---|---|---|---|
| Step 1 | Receptor name | Lower Mortlake Road | Receptor number | 3 | |
| Step 2 | Year | 2022 | | | |
| Step 3 | Number of links | 1 | | | |

Step 6: CALCULATE

Step 7: STORE RESULTS FOR THIS RECEPTOR

CLEAR INPUT DATA

Step 4

| Background concentrations for 2022 | | | | | |
|---|---|---|---|---|---|
| CO ($mg/m^3$) | Benzene ($\mu g/m^3$) | 1,3-butadiene ($\mu g/m^3$) | $NO_x$ ($\mu g/m^3$) | $NO_2$ ($\mu g/m^3$) | $PM_{10}$ ($\mu g/m^3$) |
| 0 | 0 | 0 | 0 | 46 | 0 |

Step 5

| Link number | Distance from link centre to receptor (m) | Traffic flow & speed: AADT (combined, veh/day) | Traffic flow & speed: Annual average speed (km/h) | Road type (A,B,C,D) | Vehicles <3.5t GVW (LDV): % passenger cars | Vehicles <3.5t GVW (LDV): % light goods vehicles | Total % LDV | Vehicles>3.5t GVW (HDV): % buses and coaches | Vehicles>3.5t GVW (HDV): % rigid HGV | Vehicles>3.5t GVW (HDV): % articulated HGV | Total % HDV |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 15 | 41833 | 48 | A | | | 94 | | | | 6 |
| 2 | | | | | | | | | | | |
| 3 | | | | | | | | | | | |
| 4 | | | | | | | | | | | |
| 5 | | | | | | | | | | | |
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| 13 | | | | | | | | | | | |
| 14 | | | | | | | | | | | |
| 15 | | | | | | | | | | | |

| Step | | | | | |
|---|---|---|---|---|---|
| Step 1 | Receptor name | Lower Mortlake Road | Receptor number | 4 | |
| Step 2 | Year | 2023 | | | |
| Step 3 | Number of links | 1 | | | |

Step 6: CALCULATE

Step 7: STORE RESULTS FOR THIS RECEPTOR

CLEAR INPUT DATA

Step 4

| Background concentrations for 2023 | | | | | |
|---|---|---|---|---|---|
| CO ($mg/m^3$) | Benzene ($\mu g/m^3$) | 1,3-butadiene ($\mu g/m^3$) | $NO_x$ ($\mu g/m^3$) | $NO_2$ ($\mu g/m^3$) | $PM_{10}$ ($\mu g/m^3$) |
| 0 | 0 | 0 | 0 | 46 | 0 |

Step 5

| Link number | Distance from link centre to receptor (m) | Traffic flow & speed: AADT (combined, veh/day) | Traffic flow & speed: Annual average speed (km/h) | Road type (A,B,C,D) | Vehicles <3.5t GVW (LDV): % passenger cars | Vehicles <3.5t GVW (LDV): % light goods vehicles | Total % LDV | Vehicles>3.5t GVW (HDV): % buses and coaches | Vehicles>3.5t GVW (HDV): % rigid HGV | Vehicles>3.5t GVW (HDV): % articulated HGV | Total % HDV |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 15 | 40996 | 48 | A | | | 94 | | | | 6 |
| 2 | | | | | | | | | | | |
| 3 | | | | | | | | | | | |
| 4 | | | | | | | | | | | |
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|---|---|---|---|---|---|
| Step 1 | Receptor name | Lower Mortlake Road | Receptor number | 5 | |
| Step 2 | Year | 2024 | | | |
| Step 3 | Number of links | 1 | | | |
| Step 6 | CALCULATE | | | | |
| Step 7 | STORE RESULTS FOR THIS RECEPTOR | | | | |
| | CLEAR INPUT DATA | | | | |

Step 4

| Background concentrations for 2024 | | | | | |
|---|---|---|---|---|---|
| CO (mg/m³) | Benzene (μg/m³) | 1,3-butadiene (μg/m³) | $NO_x$ (μg/m³) | $NO_2$ (μg/m³) | $PM_{10}$ (μg/m³) |
| 0 | 0 | 0 | 0 | 46 | 0 |

Step 5

| Link number | Distance from link centre to receptor (m) | Traffic flow & speed: AADT (combined, veh/day) | Annual average speed (km/h) | Road type (A,B,C,D) | Vehicles <3.5t GVW (LDV): % passenger cars | % light goods vehicles | Total % LDV | Vehicles>3.5t GVW (HDV): % buses and coaches | % rigid HGV | % articulated HGV | Total % HDV |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 15 | 40175 | 48 | A | | | 94 | | | | 6 |
| 2 | | | | | | | | | | | |
| 3 | | | | | | | | | | | |
| 4 | | | | | | | | | | | |
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| 14 | | | | | | | | | | | |
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|---|---|---|---|---|---|
| Step 1 | Receptor name | Lower Mortlake Road | Receptor number | 6 | |
| Step 2 | Year | 2025 | | | |
| Step 3 | Number of links | 1 | | | |
| Step 6 | CALCULATE | | | | |
| Step 7 | STORE RESULTS FOR THIS RECEPTOR | | | | |
| | CLEAR INPUT DATA | | | | |

Step 4

| Background concentrations for 2025 | | | | | |
|---|---|---|---|---|---|
| CO (mg/m³) | Benzene (μg/m³) | 1,3-butadiene (μg/m³) | $NO_x$ (μg/m³) | $NO_2$ (μg/m³) | $PM_{10}$ (μg/m³) |
| 0 | 0 | 0 | 0 | 46 | 0 |

Step 5

| Link number | Distance from link centre to receptor (m) | Traffic flow & speed: AADT (combined, veh/day) | Annual average speed (km/h) | Road type (A,B,C,D) | Vehicles <3.5t GVW (LDV): % passenger cars | % light goods vehicles | Total % LDV | Vehicles>3.5t GVW (HDV): % buses and coaches | % rigid HGV | % articulated HGV | Total % HDV |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 15 | 39372 | 48 | A | | | 94 | | | | 6 |
| 2 | | | | | | | | | | | |
| 3 | | | | | | | | | | | |
| 4 | | | | | | | | | | | |
| 5 | | | | | | | | | | | |
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| 12 | | | | | | | | | | | |
| 13 | | | | | | | | | | | |
| 14 | | | | | | | | | | | |
| 15 | | | | | | | | | | | |

| Step | | | | |
|---|---|---|---|---|
| Step 1 | Receptor name | Kew Road | Receptor number | 1 |
| Step 2 | Year | 2020 | | |
| Step 3 | Number of links | 1 | | |

Step 6 CALCULATE

Step 7 STORE RESULTS FOR THIS RECEPTOR

CLEAR INPUT DATA

Step 4

| Background concentrations for 2020 | | | | | |
|---|---|---|---|---|---|
| CO ($mg/m^3$) | Benzene ($\mu g/m^3$) | 1,3-butadiene ($\mu g/m^3$) | $NO_x$ ($\mu g/m^3$) | $NO_2$ ($\mu g/m^3$) | $PM_{10}$ ($\mu g/m^3$) |
| 0 | 0 | 0 | 0 | 46 | 0 |

Step 5

| Link number | Distance from link centre to receptor (m) | Traffic flow & speed: AADT (combined, veh/day) | Traffic flow & speed: Annual average speed (km/h) | Traffic composition: Road type (A,B,C,D) | Vehicles <3.5t GVW (LDV): % passenger cars | Vehicles <3.5t GVW (LDV): % light goods vehicles | Vehicles <3.5t GVW (LDV): Total % LDV | Vehicles>3.5t GVW (HDV): % buses and coaches | Vehicles>3.5t GVW (HDV): % rigid HGV | Vehicles>3.5t GVW (HDV): % articulated HGV | Vehicles>3.5t GVW (HDV): Total % HDV |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 65 | 4032 | 48 | A | | | 97 | | | | 3 |
| 2 | | | | | | | | | | | |
| 3 | | | | | | | | | | | |
| 4 | | | | | | | | | | | |
| 5 | | | | | | | | | | | |
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| 12 | | | | | | | | | | | |
| 13 | | | | | | | | | | | |
| 14 | | | | | | | | | | | |
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| Step | | | | |
|---|---|---|---|---|
| Step 1 | Receptor name | Kew Road | Receptor number | 2 |
| Step 2 | Year | 2021 | | |
| Step 3 | Number of links | 1 | | |

Step 6 CALCULATE

Step 7 STORE RESULTS FOR THIS RECEPTOR

CLEAR INPUT DATA

Step 4

| Background concentrations for 2021 | | | | | |
|---|---|---|---|---|---|
| CO ($mg/m^3$) | Benzene ($\mu g/m^3$) | 1,3-butadiene ($\mu g/m^3$) | $NO_x$ ($\mu g/m^3$) | $NO_2$ ($\mu g/m^3$) | $PM_{10}$ ($\mu g/m^3$) |
| 0 | 0 | 0 | 0 | 46 | 0 |

Step 5

| Link number | Distance from link centre to receptor (m) | Traffic flow & speed: AADT (combined, veh/day) | Traffic flow & speed: Annual average speed (km/h) | Traffic composition: Road type (A,B,C,D) | Vehicles <3.5t GVW (LDV): % passenger cars | Vehicles <3.5t GVW (LDV): % light goods vehicles | Vehicles <3.5t GVW (LDV): Total % LDV | Vehicles>3.5t GVW (HDV): % buses and coaches | Vehicles>3.5t GVW (HDV): % rigid HGV | Vehicles>3.5t GVW (HDV): % articulated HGV | Vehicles>3.5t GVW (HDV): Total % HDV |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 65 | 3952 | 48 | A | | | 97 | | | | 3 |
| 2 | | | | | | | | | | | |
| 3 | | | | | | | | | | | |
| 4 | | | | | | | | | | | |
| 5 | | | | | | | | | | | |
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| 12 | | | | | | | | | | | |
| 13 | | | | | | | | | | | |
| 14 | | | | | | | | | | | |
| 15 | | | | | | | | | | | |

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|---|---|---|---|---|
| Step 1 | Receptor name | Kew Road | Receptor number | 3 |
| Step 2 | Year | 2022 | | |
| Step 3 | Number of links | 1 | | |

Step 6 CALCULATE

Step 7 STORE RESULTS FOR THIS RECEPTOR

CLEAR INPUT DATA

Step 4

| Background concentrations for 2022 | | | | | |
|---|---|---|---|---|---|
| CO (mg/m³) | Benzene (µg/m³) | 1,3-butadiene (µg/m³) | $NO_x$ (µg/m³) | $NO_2$ (µg/m³) | $PM_{10}$ (µg/m³) |
| 0 | 0 | 0 | 0 | 46 | 0 |

Step 5

| Link number | Distance from link centre to receptor (m) | Traffic flow & speed: AADT (combined, veh/day) | Traffic flow & speed: Annual average speed (km/h) | Road type (A,B,C,D) | Vehicles <3.5t GVW (LDV): % passenger cars | Vehicles <3.5t GVW (LDV): % light goods vehicles | Vehicles <3.5t GVW (LDV): Total % LDV | Vehicles>3.5t GVW (HDV): % buses and coaches | Vehicles>3.5t GVW (HDV): % rigid HGV | Vehicles>3.5t GVW (HDV): % articulated HGV | Vehicles>3.5t GVW (HDV): Total % HDV |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 65 | 3873 | 48 | A | | | 97 | | | | 3 |
| 2 | | | | | | | | | | | |
| 3 | | | | | | | | | | | |
| 4 | | | | | | | | | | | |
| 5 | | | | | | | | | | | |
| 6 | | | | | | | | | | | |
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| 14 | | | | | | | | | | | |
| 15 | | | | | | | | | | | |

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|---|---|---|---|---|
| Step 1 | Receptor name | Kew Road | Receptor number | 4 |
| Step 2 | Year | 2023 | | |
| Step 3 | Number of links | 1 | | |

Step 6 CALCULATE

Step 7 STORE RESULTS FOR THIS RECEPTOR

CLEAR INPUT DATA

Step 4

| Background concentrations for 2023 | | | | | |
|---|---|---|---|---|---|
| CO (mg/m³) | Benzene (µg/m³) | 1,3-butadiene (µg/m³) | $NO_x$ (µg/m³) | $NO_2$ (µg/m³) | $PM_{10}$ (µg/m³) |
| 0 | 0 | 0 | 0 | 46 | 0 |

Step 5

| Link number | Distance from link centre to receptor (m) | Traffic flow & speed: AADT (combined, veh/day) | Traffic flow & speed: Annual average speed (km/h) | Road type (A,B,C,D) | Vehicles <3.5t GVW (LDV): % passenger cars | Vehicles <3.5t GVW (LDV): % light goods vehicles | Vehicles <3.5t GVW (LDV): Total % LDV | Vehicles>3.5t GVW (HDV): % buses and coaches | Vehicles>3.5t GVW (HDV): % rigid HGV | Vehicles>3.5t GVW (HDV): % articulated HGV | Vehicles>3.5t GVW (HDV): Total % HDV |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 65 | 3796 | 48 | A | | | 97 | | | | 3 |
| 2 | | | | | | | | | | | |
| 3 | | | | | | | | | | | |
| 4 | | | | | | | | | | | |
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| 14 | | | | | | | | | | | |
| 15 | | | | | | | | | | | |

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|---|---|---|---|---|---|
| Step 1 | Receptor name | Kew Road | Receptor number | 5 | Step 6: CALCULATE |
| Step 2 | Year | 2024 | | | Step 7: STORE RESULTS FOR THIS RECEPTOR |
| Step 3 | Number of links | 1 | | | CLEAR INPUT DATA |

Step 4

| Background concentrations for 2024 | | | | | |
|---|---|---|---|---|---|
| CO (mg/m³) | Benzene (µg/m³) | 1,3-butadiene (µg/m³) | $NO_x$ (µg/m³) | $NO_2$ (µg/m³) | $PM_{10}$ (µg/m³) |
| 0 | 0 | 0 | 0 | 46 | 0 |

Step 5

| Link number | Distance from link centre to receptor (m) | Traffic flow & speed: AADT (combined, veh/day) | Annual average speed (km/h) | Road type (A,B,C,D) | Traffic composition: Vehicles <3.5t GVW (LDV): % passenger cars | % light goods vehicles | Total % LDV | Vehicles>3.5t GVW (HDV): % buses and coaches | % rigid HGV | % articulated HGV | Total % HDV |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 65 | 3720 | 48 | A | | | 97 | | | | 3 |
| 2 | | | | | | | | | | | |
| 3 | | | | | | | | | | | |
| 4 | | | | | | | | | | | |
| 5 | | | | | | | | | | | |
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| 12 | | | | | | | | | | | |
| 13 | | | | | | | | | | | |
| 14 | | | | | | | | | | | |
| 15 | | | | | | | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Step 1 | Receptor name | Kew Road | Receptor number | 6 | Step 6: CALCULATE |
| Step 2 | Year | 2025 | | | Step 7: STORE RESULTS FOR THIS RECEPTOR |
| Step 3 | Number of links | 1 | | | CLEAR INPUT DATA |

Step 4

| Background concentrations for 2025 | | | | | |
|---|---|---|---|---|---|
| CO (mg/m³) | Benzene (µg/m³) | 1,3-butadiene (µg/m³) | $NO_x$ (µg/m³) | $NO_2$ (µg/m³) | $PM_{10}$ (µg/m³) |
| 0 | 0 | 0 | 0 | 46 | 0 |

Step 5

| Link number | Distance from link centre to receptor (m) | Traffic flow & speed: AADT (combined, veh/day) | Annual average speed (km/h) | Road type (A,B,C,D) | Traffic composition: Vehicles <3.5t GVW (LDV): % passenger cars | % light goods vehicles | Total % LDV | Vehicles>3.5t GVW (HDV): % buses and coaches | % rigid HGV | % articulated HGV | Total % HDV |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 65 | 3646 | 48 | A | | | 97 | | | | 3 |
| 2 | | | | | | | | | | | |
| 3 | | | | | | | | | | | |
| 4 | | | | | | | | | | | |
| 5 | | | | | | | | | | | |
| 6 | | | | | | | | | | | |
| 7 | | | | | | | | | | | |
| 8 | | | | | | | | | | | |
| 9 | | | | | | | | | | | |
| 10 | | | | | | | | | | | |
| 11 | | | | | | | | | | | |
| 12 | | | | | | | | | | | |
| 13 | | | | | | | | | | | |
| 14 | | | | | | | | | | | |
| 15 | | | | | | | | | | | |

# DMRB Output

CLEAR RESULTS - CURRENT RECEPTOR | CLEAR RESULTS - ALL RECEPTORS

## Current receptor

| Receptor Name | Lower Mortlake Road | Receptor number | 6 |
|---|---|---|---|
| Assessment year | 2025 | | |

## Results

| Pollutant | Annual mean | | | | For comparison with Air Quality Standards | | |
|---|---|---|---|---|---|---|---|
| | Background concentration | Road traffic component | Total | Units | Metric | Value | Units |
| CO | 0.00 | 0.08 | 0.08 | mg/m³ | Annual mean* | 0.08 | mg/m³ |
| Benzene | 0.00 | 0.15 | 0.15 | µg/m³ | Annual mean | 0.15 | µg/m³ |
| 1,3-butadiene | 0.00 | 0.15 | 0.15 | µg/m³ | Annual mean | 0.15 | µg/m³ |
| $NO_x$ | 0.0 | 15.0 | 15.0 | µg/m³ | Not applicable | | |
| $NO_2$ | 46.0 | 5.2 | 51.2 | µg/m³ | Annual mean* | 51.2 | µg/m³ |
| $PM_{10}$ | 0.0 | 1.51 | 1.51 | µg/m³ | Annual mean | 1.5 | µg/m³ |
| | | | | | Days >50µg/m³ | 0 | Days |

* See Footnote 32 in DMRB Volume 11 Chapter 3

## Contribution of each link to annual mean

| Link number | CO (mg/m³) | Benzene (µg/m³) | 1,3-butadiene (µg/m³) | NOx (µg/m³) | $PM_{10}$ (µg/m³) |
|---|---|---|---|---|---|
| 1 | 0.08 | 0.15 | 0.15 | 14.99 | 1.51 |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | |
| 5 | | | | | |
| 6 | | | | | |
| 7 | | | | | |
| 8 | | | | | |
| 9 | | | | | |
| 10 | | | | | |
| 11 | | | | | |
| 12 | | | | | |
| 13 | | | | | |
| 14 | | | | | |
| 15 | | | | | |

## All receptors

| Receptor number | Name | Year | Pollutant concentrations at receptor | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | CO* | Benzene | 1,3-butadiene | $NO_x$ | $NO_2$* | $PM_{10}$ | |
| | | | Annual mean mg/m³ | Annual mean µg/m³ | Annual mean µg/m³ | Annual mean µg/m³ | Annual mean µg/m³ | Annual mean µg/m³ | Days >50µg/m³ |
| 1 | Lower Mortlake Road | 2020 | 0.08 | 0.17 | 0.17 | 15.68 | 51.35 | 1.53 | 0.00 |
| 2 | Lower Mortlake Road | 2021 | 0.08 | 0.17 | 0.16 | 15.48 | 51.30 | 1.52 | 0.00 |
| 3 | Lower Mortlake Road | 2022 | 0.08 | 0.16 | 0.16 | 15.33 | 51.26 | 1.52 | 0.00 |
| 4 | Lower Mortlake Road | 2023 | 0.08 | 0.16 | 0.16 | 15.20 | 51.22 | 1.52 | 0.00 |
| 5 | Lower Mortlake Road | 2024 | 0.08 | 0.16 | 0.15 | 15.09 | 51.19 | 1.51 | 0.00 |
| 6 | Lower Mortlake Road | 2025 | 0.08 | 0.15 | 0.15 | 14.99 | 51.17 | 1.51 | 0.00 |

CLEAR RESULTS - CURRENT RECEPTOR | CLEAR RESULTS - ALL RECEPTORS

## Current receptor

| Receptor Name | Kew Road | Receptor number | 6 |
|---|---|---|---|
| Assessment year | 2025 | | |

## Results

| Pollutant | Annual mean | | | | For comparison with Air Quality Standards | | |
|---|---|---|---|---|---|---|---|
| | Background concentration | Road traffic component | Total | Units | Metric | Value | Units |
| CO | 0.00 | 0.00 | 0.00 | mg/m³ | Annual mean* | 0.00 | mg/m³ |
| Benzene | 0.00 | 0.00 | 0.00 | µg/m³ | Annual mean | 0.00 | µg/m³ |
| 1,3-butadiene | 0.00 | 0.00 | 0.00 | µg/m³ | Annual mean | 0.00 | µg/m³ |
| $NO_x$ | 0.0 | 0.5 | 0.5 | µg/m³ | Not applicable | | |
| $NO_2$ | 46.0 | 0.3 | 46.3 | µg/m³ | Annual mean* | 46.3 | µg/m³ |
| $PM_{10}$ | 0.0 | 0.06 | 0.06 | µg/m³ | Annual mean | 0.1 | µg/m³ |
| | | | | | Days >50µg/m³ | 0 | Days |

* See Footnote 32 in DMRB Volume 11 Chapter 3

## Contribution of each link to annual mean

| Link number | CO (mg/m³) | Benzene (µg/m³) | 1,3-butadiene (µg/m³) | NOx (µg/m³) | $PM_{10}$ (µg/m³) |
|---|---|---|---|---|---|
| 1 | 0.00 | 0.00 | 0.00 | 0.55 | 0.06 |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | |
| 5 | | | | | |
| 6 | | | | | |
| 7 | | | | | |
| 8 | | | | | |
| 9 | | | | | |
| 10 | | | | | |
| 11 | | | | | |
| 12 | | | | | |
| 13 | | | | | |
| 14 | | | | | |
| 15 | | | | | |

## All receptors

| Receptor number | Name | Year | Pollutant concentrations at receptor | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | CO* | Benzene | 1,3-butadiene | $NO_x$ | $NO_2$* | $PM_{10}$ | |
| | | | Annual mean mg/m³ | Annual mean µg/m³ | Annual mean µg/m³ | Annual mean µg/m³ | Annual mean µg/m³ | Annual mean µg/m³ | Days >50µg/m³ |
| 1 | Kew Road | 2020 | 0.00 | 0.00 | 0.00 | 0.61 | 46.34 | 0.07 | 0.00 |
| 2 | Kew Road | 2021 | 0.00 | 0.00 | 0.00 | 0.59 | 46.34 | 0.07 | 0.00 |
| 3 | Kew Road | 2022 | 0.00 | 0.00 | 0.00 | 0.58 | 46.33 | 0.07 | 0.00 |
| 4 | Kew Road | 2023 | 0.00 | 0.00 | 0.00 | 0.57 | 46.32 | 0.07 | 0.00 |
| 5 | Kew Road | 2024 | 0.00 | 0.00 | 0.00 | 0.56 | 46.32 | 0.07 | 0.00 |
| 6 | Kew Road | 2025 | 0.00 | 0.00 | 0.00 | 0.55 | 46.31 | 0.06 | 0.00 |