

Sipson Village Garden Centre
Sipson Road
West Drayton
Middlesex
UB7 0HW

Air Quality Impact Assessment



December 2018

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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 development site at the former Sipson Village Garden Centre, Sipson Road, West Drayton, in support of the proposal to redevelop the site to create a new garden centre.

This assessment has been primarily requested due to the site being located within close proximity to the M4 motorway and Heathrow Airport.

1.2 Purpose

The UK National Air Quality Strategy (NAQS) sets standards and objectives for various airborne pollutants. Under the Air Quality (England) (Amendment) Regulations 2002 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 (NO₂), lead, sulphur dioxide (SO₂), and particles of 10µm diameter or less (PM₁₀).

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 development in that area. However, where a development could have a significant effect on air quality or where the air quality could have an effect on the future occupants or users 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 and generated 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, as well determining any potential impacts that the development itself may have on local air quality.

1.4 Objectives

In achieving this aim, the following objectives have been specifically 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 the impact of air quality on any future users/visitors/workers at the proposed development site;
- to identify whether existing residents in the general area may be adversely impacted by the proposed development; and
- to propose or recommend mitigation measures where necessary.

This assessment has been carried out in accordance with The National Planning Policy Framework (2018), The London Borough of Hillingdon 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 Hillingdon Air Quality Annual progress report 2018;
- London Borough of Hillingdon Air Quality Action Plan report for 2018;
- London Borough of Hillingdon Updating and Screening Assessment May 2009;
- 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>

2 Background

2.1 Site location and description

The application site is located to the immediate east of Sipson Road (A408) and 150m to the west and 300m to the south of the M4 motorway. An air quality assessment has been requested by the LPA due the fact that the site falls within a designated Air Quality Management Area (AQMA); due principally to the close proximity of these roads along with Heathrow Airport, which is located around 1.5km to the south.

The subject site is not currently in use. It is occupied by a large derelict greenhouse and an associated timber outbuilding.

The new garden centre will be accessed from Sipson Road which runs both parallel and perpendicular to sections of the M4 motorway.

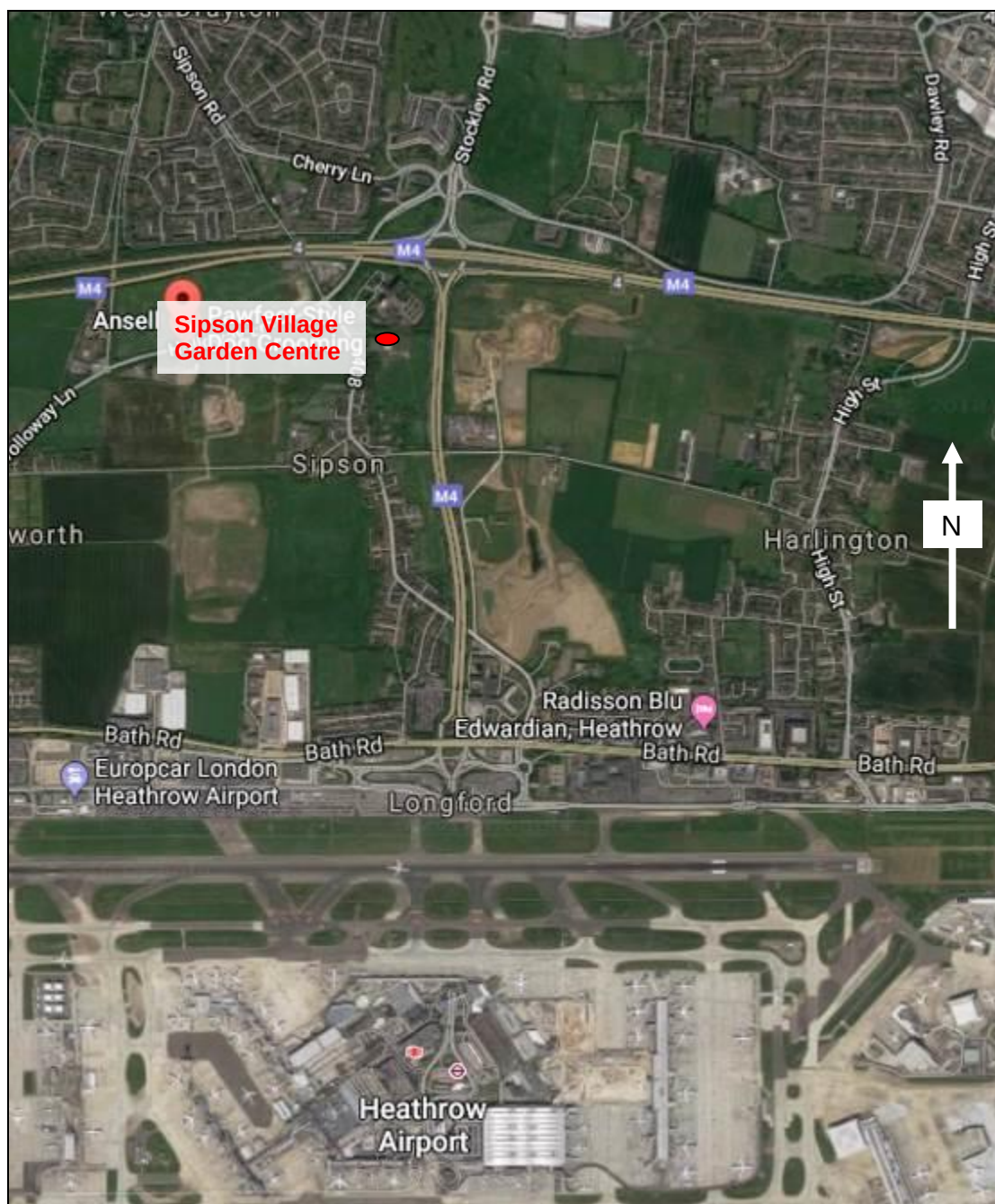
The site is located within a moderately developed urban area, albeit with surrounding green spaces in all directions. Sipson Quarry is also located 230m to the east of the site.

The prevailing wind at the site comes from a southwesterly direction which therefore has the potential to bring any associated air traffic pollution from Heathrow Airport north-eastwards, towards the development site. Conversely, this should enable any vehicle related pollution along the adjacent M4 corridors to the north and east being carried away north-eastwards away from the site.

In consideration of the above outlined characteristics, the only air pollution sources of potential significance are expected to be local road traffic and possibly the airport.

Figure 1 below shows the site location highlighting the proximity of these features. Some of these are also shown below in Photographs 1 to 8.

Figure 1 Map showing the location of the proposed development site



Source: © Googlemaps

Photograph 1 Showing the derelict greenhouse on-site



Photograph 2 Showing the timber outbuilding on-site



Photograph 3 Showing land at the rear of the site



Photograph 4 Showing the car park to the front and the adjacent hotel



Photograph 5 Looking north along the A408



Photograph 6 Looking south along the A408



Photograph 7 Looking northeast along Holloway Lane



Photograph 8 Looking southwest along Holloway Lane



2.2 Vehicle movement

The A408 (Sipson Road) travels in a north to south direction from a roundabout located at Holloway Lane (to the north of the subject site) towards the edge of Heathrow Airport. There are hotels and dwellings lining both sides of the road, along with a pedestrian pavement.

Vehicle movement was observed on Sipson Road (A408) during a site visit on the 6th December 2018. A traffic count was carried out for a period of fifteen minutes from 09:25H to 09:40H in order to obtain an idea of typical day-time vehicle characteristics within the area.

A count of 100 vehicles was recorded during this period, 9% of which were bus movements, 3% of which were lorry movements, 3% were light goods vehicle movements and the remainder were car movements. This approximates to an expected 7200 vehicles using the A408, over a typical 18-hour day.

Vehicle movement was also observed on Holloway Lane on the same day, and again was carried out over a period of fifteen minutes; albeit between 09:45H and 10:00H. A total count of 246 vehicles was recorded during this period, 8% of which were lorry movements, 3% of which were bus movements, 2% of which were light goods vehicle movements and the remainder were car movements. This approximates to an expected 17712 vehicles using Holloway Lane, over an 18-hour day, of which around 8300 will be expected to have entered or left Sipson Road.

For the purposes of utilising the DMRB model, daily vehicle values of 7200 and 17712 have been initially considered as baseline values for the two links respectively for 2018. These have been subdivided into light vehicles and heavy vehicles, as required by the model.

The former garden centre on the subject site provided parking for 52 vehicles; the proposed development will provide parking for 165 vehicles. The number of vehicles actually expected to visit the site is not known, however it is not unreasonable to expect a Monday-Friday attendance of around 20 vehicles per hour, and a weekend attendance of around 40 vehicles per hour.

On the basis of the facility being open for 8 hours per day (when taken as a weekly average) this could equate to 160 vehicles per day on week-days and 320 vehicles per day during the weekend; totalling around 1500 vehicles per week, or around 3000 movements. This further equates to a mean daily number of around 430 vehicle movements; almost all of which are expected to be light vehicles. It is accepted that there will additionally be some heavy vehicle movement relating to bulk deliveries etc., however it is doubtful that these would amount to more than 5 vehicles per day.

In considering these projected vehicle movements, for the purposes of applying the DMRB model for 2019 the expected vehicle movement for both the A408 and Holloway Lane could potentially increase by 430, giving values of 7630 and 18142 accordingly (for cars only) plus any expected trend increase for light and heavy goods vehicles.

In utilising the model, the above observed breakdown percentages have also been referred to. Hence for the A408 (DMRB Link 1) light vehicles accounted for 88% of all movements, whereas heavy vehicles accounted for 12% of all movements. For Holloway Lane (DMRB Link 2) light vehicles accounted for 89% of all movements, whereas heavy vehicles accounted for 11% of all movements.

In order to obtain a more representative adjusted year-on-year value the Department for Transport published figures for Sipson Road 2000 - 2017 have been referred to. In doing so it has been seen that the mean decrease in cars over this time appears to be around 1% per year, whereas the decrease in light goods vehicles is around 3%, and heavy goods vehicles is around 4%.

It has also been noted that the Crossrail service is expected to be introduced within the Borough during 2020, which has been projected to result in a further reduction in vehicle movement, by around 2% in the London area.

Taking all this into consideration, the estimated vehicle movements for future years beyond 2019 has been calculated and shown below in Tables 1 and 2.

Table 1 Vehicle numbers using Sipson Road (A408)

Year	Cars	Light goods	Total light vehicles	Heavy goods	Total vehicles
2019	6486	229	6715	915	7630
2020	6421	222	6643	878	7521
2021	6356	215	6571	842	7413
2022	6292	208	6500	808	7308
2023	6229	201	6430	775	7205
2024	6166	195	6361	744	7105
2025	6104	189	6293	714	7007

Table 2 Vehicle numbers using Holloway Lane

Year	Cars	Light goods	Total light vehicles	Heavy goods	Total vehicles
2019	15785	362	16147	1995	18142
2020	15627	351	15978	1915	17893
2021	15470	340	15810	1838	17648
2022	15315	329	15644	1764	17408
2023	15161	319	15480	1693	17173
2024	15009	309	15318	1625	16943
2025	14859	299	15158	1560	16718

2.3 Heathrow Airport

With specific regard to Heathrow Airport, their air quality strategy also focuses on measures to reduce airport-related emissions year-on-year from four main related sources, including:

- aircraft emissions - both airborne and whilst on the ground;
- airport-related road traffic;
- air-side vehicles and plant; and
- fixed energy plants.

Despite the airport being considered as a 'high pollution zone', it is not expected for any pollution arising from the airport or its associated facilities, to impact the air quality at the subject site to any significant degree.

This has been concluded on the understanding that the nitrogen dioxide concentration in the vicinity of the airport is reportedly lower than in other areas of the Borough, whereas although the PM₁₀ particulate concentration is expected to be greater in the vicinity of the airport it has a comparatively short airborne retention time, and is therefore less likely to reach the subject site.

2.4 Local air quality assessment

The London Borough of Hillingdon lies to the northwest of central London, within which the A40 trunk road lies to the north of the Borough and the London Borough of Ealing lies to the east.

A summary of the London Borough of Hillingdon Air Quality Annual Status Report 2017 is as follows:

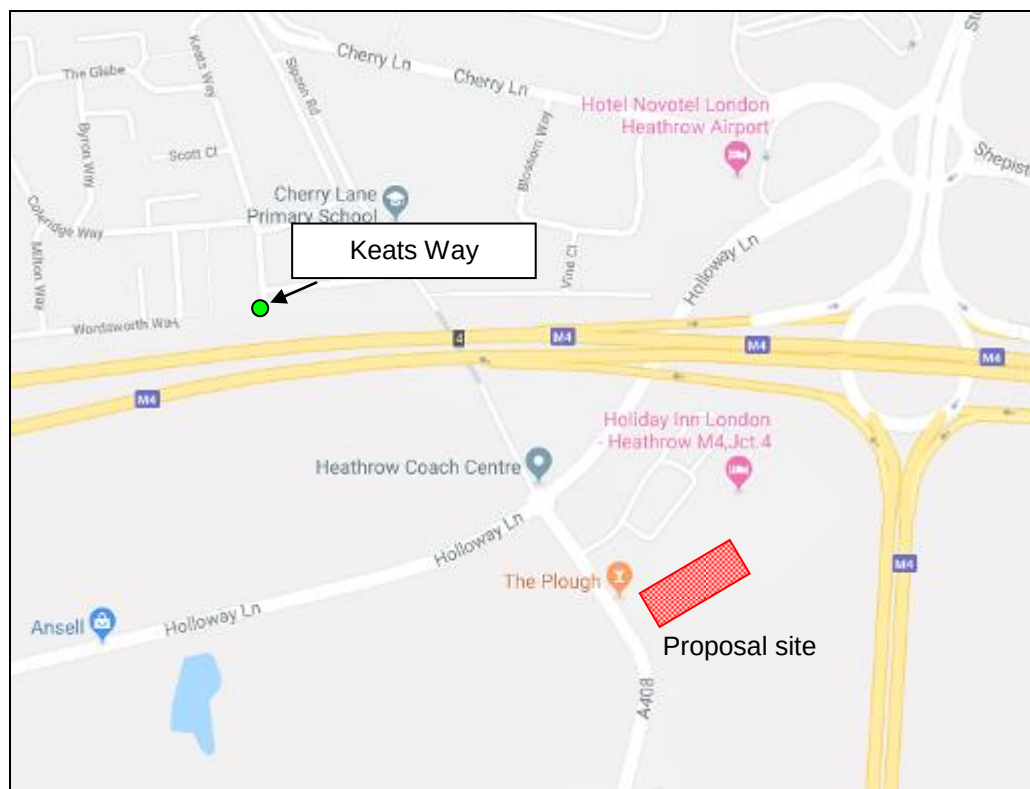
- following a detailed assessment for nitrogen dioxide and inhalable particles (PM₁₀), the council designated the whole Borough an Air Quality Management Area (AQMA) in 2003;
- air quality appears to be most severe around Heathrow Airport;
- there is no clear trend in PM₁₀ levels over a 7-year period, with all values well below the annual limit;
- in 2017 levels of nitrogen dioxide increased slightly across the Borough; and
- the M4 motorway and Heathrow Airport are identified as Air Quality Focus Areas.

A review of new monitoring data in the 2015 Updating and Screening Assessment for the Borough identifies the following:

- thirteen out of the thirty-nine nitrogen dioxide diffusion tube sites within the existing AQMA recorded an annual mean concentration in excess of the 40µg/m³ objective in 2014;
- of these thirty-nine sites, one roadside and one background site exceeded 50µg/m³;
- the mean concentration for all the sites that exceeded the objective was 44.9µg/m³, which shows little change from previous years;
- the highest annual mean concentrations for PM₁₀ monitored in 2014 were at two roadside locations at Hillingdon Hayes and Hillingdon 1 South Ruislip where the results were 34.5µg/m³ and 23.2µg/m³ respectively; and
- results from all sites show that the daily mean objective for PM₁₀ was exceeded at the Hillingdon Hayes automatic monitoring station in 2014.

The closest non-automated monitoring site to Sipson Road is at Keats Way, some 540m northwest of the proposal site, as shown below in Figure 2.

Figure 2 Closest non-automated monitoring site to Sipson Village Garden Centre



● Diffusion tube site

Source - www.gridreferencefinder.com

Details relating to this monitoring location are reproduced below in Table 3.

Table 3 Details of the closest non-automatic monitoring (diffusion tube) site for nitrogen dioxide measurement only

Site ID and name	Site type	OS grid ref	In AQMA	Distance to kerb of nearest roadside (m)	Distance from site (m)
Keats Way	Roadside	506926 178614	Yes	2.5	540 NW

The closest automatic monitoring site to the proposal site is at London Heathrow Airport. This provides the nearest data for airborne particulate material to the proposal site; the details of which have been reproduced below in Table 4.

Table 4 Details of automatic monitoring sites for PM₁₀ particulate material only

Site ID and name	Site type	OS grid ref	In AQMA	Distance to kerb of nearest roadside (m)	Distance from site (km)
LHR2 London Heathrow	Airport	508600 176700	Yes	N/A	2 SW

2.4.1 National Air Quality Standard Objectives

The NAQS objective for nitrogen dioxide (NO₂) and particles expressed as PM₁₀ 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
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

2.4.2 Nitrogen dioxide

Any location where nitrogen dioxide concentrations exceed $40\mu\text{g}/\text{m}^3$ as a yearly average is considered to pose a potential risk to human health. Nitrogen dioxide is toxic and acts as an irritant, although it is additionally a concern due to it being a precursor for ground-level ozone production.

According to national statistics, traffic flows are generally increasing but improved vehicle technology is leading to more fuel-efficient engines which is ultimately expected to off-set any rise in nitrogen dioxide concentrations.

Nitrogen dioxide has been non-automatically monitored at the Keats Way location since at least 2011, the details of which are reproduced below in Table 6.

Table 6 Results from nitrogen dioxide diffusion tube monitoring - annual mean

Site ID and name	Annual mean concentration ($\mu\text{g}/\text{m}^3$)						
	2011	2012	2013	2014	2015	2016	2017
Keats Way	45.7	46.8	43.4	47.3	41.1	34.3	45.3

Data up to 2017

As shown above, the annual mean nitrogen dioxide concentration at Keats Way has been above the $40\mu\text{g}/\text{m}^3$ objective concentration for six out of the seven years from 2011 to 2017. It is understood that the lower concentration reported in 2016 may have been due to poor data capture.

2.4.3 Particulate material

Airborne particulate material has been automatically monitored at the London Heathrow site, as detailed below in Table 7. As shown below, the annual mean PM_{10} concentration at London Heathrow is not reported to have exceeded the objective value of $40\mu\text{g}/\text{m}^3$; furthermore it appears to be stabilising. It can also be seen that the 24-hour mean objective of $50\mu\text{g}/\text{m}^3$ permitted over 35 days per year was similarly not exceeded between 2011 and 2017.

Table 7 Results of PM₁₀ automatic monitoring - annual mean

Location	Annual mean concentration (µg/m ³)						
	2011	2012	2013	2014	2015	2016	2017
Millennium Village	25	24.8	24.6	18.6	13	15	15
	Number of exceedences of 24-hour mean (µg/m ³)						
	19	18	12	6	3	3	7

Data up to May 2018.

2.4.4 Other National Air Quality Standard pollutants

The London Borough of Hillingdon Council is also currently measuring PM_{2.5} fine particulate concentrations at five AQMA locations. During 2017 the annual mean concentration objective of 25µg/m³ was not exceeded.

There were however four exceedences of the 8-hour mean ozone limit value in 2017 at the London Hillingdon monitoring station, and forty-four exceedences at the London Harlington airport monitoring station. The permitted number of exceedences annually is ten.

The exceedence of this limit has been noted; however ozone is not a pollutant under local authority control; and can only be realistically managed by means of minimising nitrogen dioxide generation.

3 DMRB assessment

3.1 Input data

Using the results above, the DMRB model has been applied in order to determine any predicted traffic-related nitrogen dioxide trend for the receptor area of Sipson Village Garden Centre.

This has specifically assessed for points along Sipson Road (A408) and Holloway Lane. The data sources used for the model have been summarised below in Table 8.

Table 8 Data sources used for the DMRB model

Component	Source
Pollution data	2011-2017 nitrogen dioxide monitoring results data provided by The London Borough of Hillingdon Council.
Traffic data	On-site traffic count on 6 th December 2018 (See Tables 1 and 2) along with proposed vehicle movements entering the site.
Vehicle speed data	Observations made during on-site traffic count on 6 th December 2018.

The scenarios used for the model consider the traffic flow data used for the links which has been calculated from a manual vehicle count carried out on Sipson Road and Holloway Lane during a site visit in December 2018. The counts were undertaken over a period of fifteen minutes in each instance and have been used to extrapolate a daily mean traffic count over a 'daytime' period of 18-hours, which is presumed to be representative of a typical day.

The traffic count on Sipson Road was undertaken within a 30mph zone, whereas the traffic count undertaken on Holloway Lane was undertaken within a 70mph zone. The input values used to run the model are shown below in Tables 9 and 10.

Table 9 **Scenario 1** Link 1 - Sipson Road (A408) 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	5	7630	48	B	88	12
Benzene	N/A						
1,3-butadiene	N/A						
NO _x	N/A						
NO ₂	45.3 µg/m ³ ,						
PM ₁₀	N/A						

Table 10 **Scenario 2** Link 1 - Holloway Lane 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	170	18142	112	B	89	11
Benzene	N/A						
1,3-butadiene	N/A						
NO _x	N/A						
NO ₂	45.3 µg/m ³ ,						
PM ₁₀	N/A						

3.2 DMRB output

The findings from the two scenarios have been summarised below in Tables 11 and 12. The contribution of each pollutant for each link is presented in Tables 13 and 14. The model data output sheets have been appended to this report.

Only data for nitrogen dioxide has been used for this assessment, as this realistically appears to be the only principal concern in this area.

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, and NO_x). Hence, for the purpose of this assessment, the output values for these substances can be ignored.

Table 11 DMRB output Sipson Road using 45.3 µg/m³

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 >50 µg/m ³
2019	0.03	0.04	0.04	7.78	48.33	0.64	0.00
2020	0.03	0.04	0.04	7.65	48.29	0.64	0.00
2021	0.03	0.04	0.04	7.56	48.26	0.63	0.00
2022	0.03	0.04	0.04	7.50	48.24	0.63	0.00
2023	0.03	0.04	0.04	7.46	48.22	0.63	0.00
2024	0.03	0.04	0.04	7.43	48.22	0.63	0.00
2025	0.03	0.04	0.04	7.41	48.21	0.63	0.00

Table 12 DMRB output for the Holloway Lane using 45.3 $\mu\text{g}/\text{m}^3$

Year	CO (mg/m^3)	Benzene ($\mu\text{g}/\text{m}^3$)	1,3- butadiene ($\mu\text{g}/\text{m}^3$)	NO _x ($\mu\text{g}/\text{m}^3$)	NO ₂ ($\mu\text{g}/\text{m}^3$)	PM ₁₀ ($\mu\text{g}/\text{m}^3$)	PM ₁₀ ($\mu\text{g}/\text{m}^3$)
	Annual mean						Days >50 $\mu\text{g}/\text{m}^3$
2019	0.00	0.00	0.00	0.55	45.62	0.07	0.00
2020	0.00	0.00	0.00	0.55	45.61	0.07	0.00
2021	0.00	0.00	0.00	0.54	45.61	0.07	0.00
2022	0.00	0.00	0.00	0.54	45.61	0.07	0.00
2023	0.00	0.00	0.00	0.54	45.61	0.07	0.00
2024	0.00	0.00	0.00	0.53	45.61	0.07	0.00
2025	0.00	0.00	0.00	0.53	45.61	0.07	0.00

Predictive outcomes from using the DMRB model suggest that the annual mean nitrogen dioxide concentrations likely to be experienced at the receptor site show a marginal decrease for the modelled period during this time of approximately 0.1 $\mu\text{g}/\text{m}^3$.

The model output also indicates that although the nitrogen dioxide concentration is predicted to continue to exceed the AQA Objective of 40 $\mu\text{g}/\text{m}^3$ for the foreseeable future the situation is not expected to be exacerbated by the introduction of a new garden centre in this location.

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 a number of known traffic-related substances is 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.

The vehicle industry is currently expecting vehicle production to increase from the 1.75 million recorded in 2015 to around 2.13 million by 2025; however it is also expected for the pace of technological change to accelerate throughout this time. This is expected to largely be driven by the UK government support and commitment to the development of electric, hybrid, and driver-less vehicles. As a consequence it is believed that vehicle-derived nitrogen dioxide will fall actually over the next 30 years.

5 Potential air quality impacts arising from the development

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.

In this specific instance, the disturbance of soil on the site during the undertaking of groundworks and excavations has a high potential for the release of particulate material into the air. Similarly the project will presumably see a noticeable amount of plant and vehicle activity in and out of a site. This brings not only a possible concern from heavy vehicle exhaust fumes but can also result in dirt, mud and dust deposition on nearby roads. The latter can readily become airborne during periods of dry and windy weather.

5.2 Vehicle emissions

The most potentially significant impact on air quality arising from any new development is likely to be from vehicle emissions due to an increase in road traffic. However, unless the development results in a significant increase in the number of vehicle movements for an area, the overall impact on that area is likely to be negligible. In this specific instance although the proposed development is expected to have parking for 165 vehicles, this report has suggested that overall the net increase in associated traffic journeys on the local roads should not be overly significant; with a predicted 2.5% daily increase along Holloway Lane, and a 5% increase along Sipson Road.

The UK Government guidance requires planning authorities to promote and exploit public transport as a means of accessing workplaces and shopping facilities. The guidance also requires local authorities to place the needs of people before the ease of traffic movement when designing the layout of new development. Proposed developments should therefore encourage sustainable modes of transport, such as buses, trains, cycling and walking.

To facilitate this, developments should make use of the most accessible sites, such as those in existing town centres, or those located close to public transport facilities. In this specific instance, the application site is ideally placed to conform to this guidance through its location, thereby potentially reducing the dependency on private vehicles, as it lies in good proximity to a number of public transport routes, including a railway station and bus routes.

6 Mitigation measures

6.1 Rationale

In view of the fact that any new development has the potential to result in some degree of risk to both existing and future receptors, measures would need to be put forward in order to minimise any impact from such, along with measures to minimise the effect of the development itself on local air quality. This may be either as part of the design process, or due to the proposed location of the development, or through site management during construction.

6.2 Construction phase

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

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, logs and record keeping;
- 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;
- operation and use of machinery and vehicles, including the introduction and enforcement of site-specific policy requirements; and
- waste management.

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

6.3 Reduction of car dependency and vehicle movements

As described above in Section 6.2, the site is within easy access of public transport links, thereby making it a favourable location compliant with the UK Government target of reducing personal vehicle use. Despite this, it is recognised that the majority of visitors to a garden centre may still need to make use of their private vehicles for the transportation of purchased items.

6.4 Exposure of human receptors to vehicle pollution

This report has shown that despite the fact that future users of the site could be exposed to unacceptable levels of nitrogen dioxide, the exposure time for most visitors is expected to be comparatively short, thereby highly unlikely to put people at risk during their visit.

With regards to the garden centre workers, it is apparent that they could be exposed to a nitrogen dioxide concentration in the region of $45\mu\text{g}/\text{m}^3$ throughout their working day; however through reference to HSE Workplace Exposure Limits (EH40/2005 (2018)) the safe workplace limit expressed as an 8-hour time-weighted average is $900\mu\text{g}/\text{m}^3$. Consequently therefore, once again there is little to suggest that the workers here would be at risk from exposure to nitrogen dioxide either.

In addition to this, as discussed above in this report, the proposed facility 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.

It is imperative that consideration of air quality should form an integral part of this planning application in order to minimise exposure to airborne traffic pollution within nearby residential properties. However, as these dwellings already exist, and the introduction of a new garden centre here is not expected to make the existing situation any worse, there would appear to be no viable mechanism within the planning process to address any existing air quality concerns in this area.

7 Conclusion

A qualitative assessment has been undertaken on the potential impact of local air quality from traffic-related pollution for both the future visitors/workers of the proposed garden centre, as well as any existing residents in this area.

In doing so, pollutant data and statistics from local authority sources and UK national databases have been used in conjunction with the DMRB model to identify the projected nitrogen dioxide concentration from the present day to 2025. Other pollutants have also been considered, but dismissed.

The findings highlight the fact that the NAQS objective (annual mean) value for traffic-related nitrogen dioxide is currently being exceeded; and potentially will continue to be exceeded at this location in future years; although it is expected to slowly decrease in concentration year-on-year.

The report has also made reference to the potential for air quality to be adversely 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. Through consideration of appropriate measures during the design and construction stages of the development, the associated risk could be adequately lessened.

Overall therefore, there is little to suggest that anyone visiting or working within the proposed garden centre would be at risk from vehicular pollution, and similarly little evidence to suggest that any increase in road traffic would have any significant impact on existing receptors.

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	Sipson Road	Receptor number	7	Step 6	CALCULATE																																																																																																																																																																																																																			
Step 2	Year	2025	Step 7																																																																																																																																																																																																																						
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DMRB Output

DMRB: Assessment of Local Air Quality

OUTPUT SHEET

Current receptor

Receptor Name	Sipson Road	Receptor number	7
Assessment year	2025		

CLEAR RESULTS - CURRENT RECEPTOR

CLEAR RESULTS - ALL RECEPTORS

Results

Pollutant	Annual mean				For comparison with Air Quality Standards		
	Background concentration	Road traffic component	Total	Units	Metric	Value	Units
CO	0.00	0.03	0.03	mg/m ³	Annual mean*	0.03	mg/m ³
Benzene	0.00	0.04	0.04	µg/m ³	Annual mean	0.04	µg/m ³
1,3-butadiene	0.00	0.04	0.04	µg/m ³	Annual mean	0.04	µg/m ³
NO _x	0.0	7.4	7.4	µg/m ³	Not applicable		
NO ₂	45.3	2.9	48.2	µg/m ³	Annual mean*	48.2	µg/m ³
PM ₁₀	0.0	0.63	0.63	µg/m ³	Annual mean	0.6	µg/m ³
					Days >50 µg/m ³	0	Days

* See Footnote 32 in DMRB Volume 11 Chapter 3

Contribution of each link to annual mean

Link number	CO (mg/m ³)	Benzene (µg/m ³)	1,3-butadiene (µg/m ³)	NO _x (µg/m ³)	PM ₁₀ (µg/m ³)
1	0.03	0.04	0.04	7.41	0.63
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/m ³	Annual mean µg/m ³	Annual mean µg/m ³	Annual mean µg/m ³	Annual mean µg/m ³	Annual mean µg/m ³	Days >50µg/m ³
1	Sipson Road	2019	0.03	0.04	0.04	7.78	48.33	0.64	0.00
2	Sipson Road	2020	0.03	0.04	0.04	7.65	48.29	0.64	0.00
3	Sipson Road	2021	0.03	0.04	0.04	7.56	48.26	0.63	0.00
4	Sipson Road	2022	0.03	0.04	0.04	7.50	48.24	0.63	0.00
5	Sipson Road	2023	0.03	0.04	0.04	7.46	48.22	0.63	0.00
6	Sipson Road	2024	0.03	0.04	0.04	7.43	48.22	0.63	0.00
7	Sipson Road	2025	0.03	0.04	0.04	7.41	48.21	0.63	0.00

DMRB: Assessment of Local Air Quality							OUTPUT SHEET						
Current receptor							CLEAR RESULTS - CURRENT RECEPTOR			CLEAR RESULTS - ALL RECEPTORS			
Receptor Name		Holloway Lane		Receptor number		7							
Assessment year		2025											
Results							Contribution of each link to annual mean						
Pollutant	Annual mean				For comparison with Air Quality Standards			Link number	CO (mg/m ³)	Benzene (µg/m ³)	1,3-butadiene (µg/m ³)	NO _x (µg/m ³)	PM ₁₀ (µg/m ³)
	Background concentration	Road traffic component	Total	Units	Metric	Value	Units						
CO	0.00	0.00	0.00	mg/m ³	Annual mean*	0.00	mg/m ³	1	0.00	0.00	0.00	0.53	0.07
Benzene	0.00	0.00	0.00	µg/m ³	Annual mean	0.00	µg/m ³	2					
1,3-butadiene	0.00	0.00	0.00	µg/m ³	Annual mean	0.00	µg/m ³	3					
NO _x	0.0	0.5	0.5	µg/m ³	Not applicable			4					
NO ₂	45.3	0.3	45.6	µg/m ³	Annual mean*	45.6	µg/m ³	5					
PM ₁₀	0.0	0.07	0.07	µg/m ³	Annual mean	0.1	µg/m ³	6					
					Days >50µg/m ³	0	Days	7					
* See Footnote 32 in DMRB Volume 11 Chapter 3													
All receptors							Pollutant concentrations at receptor						
Receptor number	Name	Year	CO *	Benzene	1,3-butadiene	NO _x	NO ₂ *	PM ₁₀					
			Annual mean mg/m ³	Annual mean µg/m ³	Annual mean µg/m ³	Annual mean µg/m ³	Annual mean µg/m ³	Annual mean µg/m ³	Days >50µg/m ³				
1	Holloway Lane	2019	0.00	0.00	0.00	0.55	45.62	0.07	0.00				
2	Holloway Lane	2020	0.00	0.00	0.00	0.55	45.61	0.07	0.00				
3	Holloway Lane	2021	0.00	0.00	0.00	0.54	45.61	0.07	0.00				
4	Holloway Lane	2022	0.00	0.00	0.00	0.54	45.61	0.07	0.00				
5	Holloway Lane	2023	0.00	0.00	0.00	0.54	45.61	0.07	0.00				
6	Holloway Lane	2024	0.00	0.00	0.00	0.53	45.61	0.07	0.00				
7	Holloway Lane	2025	0.00	0.00	0.00	0.53	45.61	0.07	0.00				