
Project:	Cambourne to Cambridge		
Our reference:	392438-MMD-ENV-XX-TN-EN-0009	Your reference:	
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Subject:	Air quality information, with a focus on Hardwick		

1 Introduction

This fact sheet has been prepared to outline the existing baseline air quality in and around Hardwick and to provide an initial assessment of the potential air quality effects should the Cambourne to Cambridge Public Transport scheme be aligned near the village.

A scheme specific air quality monitoring study has recently commenced, and the results will be incorporated into the schemes Environmental Impact Assessment (EIA). The information presented here is based only on data currently available from local authorities and DEFRA. There is currently no air quality monitoring undertaken by the local authority in or near Hardwick, which is an indication that the area is not one with any air quality concerns and is not at risk of exceeding ambient air quality objectives.

The national air quality objective¹ for annual mean levels of both NO₂ and PM₁₀ is 40µg/m³ at sensitive locations such as people's homes, schools and hospitals. For PM_{2.5} there is a target of 25µg/m³.

2 Background to Air Quality from Traffic

Nitrogen dioxide (NO₂) is the key health-related pollutant of concern from road traffic. The highest pollutant concentrations associated with road traffic can be found in congested urban areas. NO₂ concentrations on busy roads in Cambridge are generally higher than in surrounding areas, especially within a rural setting.

Emissions of particulate matter (both PM₁₀ and PM_{2.5})² from road vehicles are also a concern for public health but generally these pollutants are emitted at much lower rates compared to oxides of nitrogen (NO_x) and as such have less of an impact on ambient pollutant concentrations.

Where concentrations of NO₂ are low and road traffic is the primary source of emissions, such as in Hardwick, the concentration of particulate matter (PM₁₀/PM_{2.5}) would also be low. If the NO₂ levels are within the air quality objectives then PM₁₀ and PM_{2.5} are also likely to be within air quality objectives. As such, local authorities do not tend to monitor PM₁₀ and PM_{2.5} in as many locations as NO₂ as NO₂ monitoring equipment

¹ DEFRA. UK and EU Air Quality Limits. National air quality objectives and European Directive limit and target values for the protection of human health. Available online at: https://uk-air.defra.gov.uk/assets/documents/Air_Quality_Objectives_Update.pdf To meet the objective air quality parameters need to be lower than the threshold for each parameter.

² PM₁₀ and PM_{2.5} refer to particulate matter with a diameter less than 10 and 2.5 micrometres.

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provides a good proxy for potential areas of exceedances of PM objectives, using relatively low cost equipment.

As has been the subject of media debate, PM levels are a growing concern because in heavily congested areas such as city centres, NO₂ levels are predicted to reduce as the number of hybrid and electric vehicles grow whereas such vehicles still emit particulates albeit in very small quantities. Where there is no current traffic related NO₂ exceedances of ambient air quality objectives, it is unlikely that there would ever be a traffic related PM₁₀ or PM_{2.5} exceedances of ambient air quality objectives unless the traffic levels increased very dramatically.

3 Air Quality around Hardwick

Information on current air quality monitoring by Cambridge City Council and South Cambridgeshire District Council is available on their websites. Available information shows there are no air quality monitoring stations within Hardwick. The closest monitoring station to Hardwick is an NO₂ diffusion tube located on Madingley Road (A1303) between Wilberforce Road and Storey's Way. This site is located within the Cambridge urban area and is very close to Madingley Road. It is approximately 6 kilometres from Hardwick.

This diffusion tube has been monitoring annual mean NO₂ since 2001 at a distance of less than one metre to the road. The results (see Table 1) show that at this location annual mean NO₂ levels are below the national objectives and it also shows that air quality has been improving in recent years. Air quality away from congested busy roads and urban areas is typically better in villages on the outskirts of cities, air quality in Hardwick at the side of the St Neots road is likely to be better than that presented in Table 1 (this assessment is supported by DEFRA projected backgrounds presented in Table 2).

Table 1: NO₂ monitoring data at Madingley Road

Year	Annual mean NO ₂ level (µg/m ³)	Annual mean air quality objective (µg/m ³)
2009	41	
2010	53	
2011	43	
2012	41	
2013	36	
2014	40	40
2015	38	
2016	37	
2017	33	
2018	30	

Source: Cambridge Review and Assessment diffusion tube results available at <https://www.cambridge.gov.uk/media/3446/air-pollution-data-diffusion-tubes-2001-onwards.pdf>

Government guidance provided by Highways England³ explains that after a distance of five metres from the roadside road pollutants rapidly decline, and cannot be distinguished from background levels beyond 200m.

³ Highways Agency (now Highways England) (2007), Volume 11, Section 3, Part 1, Design Manual for Roads and Bridges (HA207/07)

Taking these factors into account it is likely that the annual average NO₂ concentrations at sensitive receptors in Hardwick are likely to even better than indicated by Table 1, because, as stated above, the effects of road traffic emissions on air quality are worst within a few metres of the roadside (which is where the monitoring data in Table 1 is recorded). This helps to explain why the A428 has a limited effect on air quality in Hardwick, where residences along St Neots Road are typically about 40m from the A428 and the majority of the village is over 200m from the A428.

There is predicted to be growth in traffic along the A428 in response to committed developments, natural traffic growth due to increased population and car ownership and increasing numbers of people commuting to and from Cambridge for work or leisure activities. This could affect the improvement in recent years reported in Table 1.

The proposed scheme is intended to contribute to congestion relief within the city and therefore improve air quality in areas of the city which currently experience relatively higher concentrations of NO₂, PM₁₀ and PM_{2.5} than surrounding areas. The scheme should help reduce the rate of growth in traffic more widely on the commuter routes into the city from the west. As such the scheme should assist in maintaining air quality in areas near to commuter routes with high traffic levels (such as the A428).

4 Background air quality around Hardwick

DEFRA provide regional modelled NO₂, PM₁₀ and PM_{2.5} concentrations for every square kilometre across the UK which is based on data from the National Atmospheric Emissions Inventory. The highest modelled 2019 background concentration in Hardwick is presented in Table 2 which shows modelled annual mean background levels are well below the relevant air quality objective for each pollutant. This supports the assessment that air quality in Hardwick is within acceptable objectives and is good.

Table 2: DEFRA projected background level in Hardwick

Location	Projected annual mean background level (µg/m ³)			
	NO _x	NO ₂	PM ₁₀	PM _{2.5}
Hardwick background pollutant concentrations	10.8	8.2	15.0	9.5
Road contribution to background concentrations	1.6	0.9 ^(a)	0.01	0.01
Air quality objective / target value	-	40	40	25

Source: DEFRA Air Information Resource available at <https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2017>

Note: ^(a) 3.4 calculated using DEFRA NO_x to NO₂ Calculator available at https://laqm.defra.gov.uk/documents/NOx_to_NO2_Calculator_v7.1.xlsm

5 Commentary on the need for air quality assessment of C2C

The number of buses using the proposed scheme is currently estimated at approximately 220 movements per day.

The Environmental Protection UK and Institute of Air Quality Management guidance on 'Land Use Planning & Development Control: Planning for Air Quality'⁴ defines when an air quality assessment is required for any new development. The requirement to carry out an air quality assessment is a matter of professional judgement and should consider

⁴ Environmental Protection UK and Institute of Air Quality Management (2017), 'Land-use Planning & Development Control: Planning for Air Quality. v1.2.

- How many public transport vehicles would result from any development (the C2C scheme (at about 220 vehicle movements a day) is above the threshold of 100 vehicle movements per day (for areas not in an AQMA) meaning the completion of an air quality assessment should be considered).
- the current background and future background air quality of a project site (which in the case of Hardwick is assessed by Defra as being good, as discussed above)
- the presence of any air quality management areas (which in Hardwick is not relevant as the closest AQMA is along the M11 and A14 north of the M11 junction 13 (over 3kms away))
- whether it is likely that the air quality objectives would be approached or exceeded (the absence of either an AQMA or monitoring in Hardwick, is evidence that the local authority believe air quality is good in this area and not likely to approach or exceed objectives)

The route passing close to Hardwick would be along the existing alignment of the St Neots road. Considering the bus movements proposed, a significant change in air quality at receptors along the St Neots road would not be expected to occur. However, a full assessment of the air quality effects of the final preferred scheme will be undertaken as part of the EIA in due course.

The differences in air quality arising from the three options being assessed would each have a minimal effect on air quality in the area. The fact that there are no immediate reasons to believe air quality objectives would be breached in future, and that there is no AQMA in the area, confirms that it would not be proportionate to undertake a more detailed assessment of air quality at this stage of the project development.

6 Further air quality assessments

As there is no air quality monitoring currently undertaken in Hardwick, an NO₂ diffusion tube has been located on St Neots road within the Village as part of the scheme surveys being carried out.

The location near to the pet store has been chosen as it is representative of the closest sensitive receptors to the St Neots road. Monitoring at this site has commenced and the results from this monitoring site will be shared with the Hardwick Parish Council when it is available.

The assessment of the preferred scheme during the EIA will be in accordance with applicable best practical guidance from a range of bodies including Defra, DfT and the Institute of Air Quality Management.

The assessment will adopt a conservative approach and, unless confirmed otherwise, assume that all buses using the scheme would be conventionally powered and meet the minimum emission standard of Euro VI. The assessment will determine what the significance on air quality is across the wider area, and if required, practical mitigation measures will be recommended and implemented in the scheme design.

The results of the air quality EIA will be reported in the final Environmental Statement.