

Appendix 3

Comparison of pollutant levels locally and nationally

Introduction

Within Hull there are 3 real time air quality monitoring stations capable of monitoring various pollutants and these are sited at key locations where it is believed that national pollutant level objectives could be exceeded or in areas where it is felt more detailed information on pollutant levels is required. However, a number of years' worth of data from air quality monitoring has shown that across the country it is one particular pollutant, Nitrogen Dioxide (NO₂), that is the main pollutant of concern and which regularly breaches national objective levels. This appendix therefore concentrates on this pollutant locally and nationally but also provides a brief summary two other pollutants, particulate matter smaller than 10 microns (PM₁₀) and particulate matter smaller than 2.5 microns (PM_{2.5}). More detailed information on all pollutants can be found in the Council's annual report that is sent to DEFRA known as the Annual Status Report (ASR).

It should also be noted that the recent announcement relating to recommendations from the World Health Organisation to reduce the levels for the objectives of pollutants such NO₂ and PM_{2.5}, while supported and welcomed are at present guidance for a future date, rather than current standards to be achieved.

It can be seen from the graphs and figures below that the good story we have to tell on air quality generally continues, and the longer-term trends for NO₂ and PM₁₀ is still one of improvement and remains below the values prescribed in the Air Quality Objectives. However, some sites have shown a slight increase in measured concentrations for the monitoring year.

As the results from the background sites are continuing to show reduced levels, it suggests that these are a consequence of localised emissions. Some are close to the A63, which will be affected by the ongoing roadworks. The reasons for others, such as Valetta St, are less clear at present, and investigations are ongoing in to the possible causes.

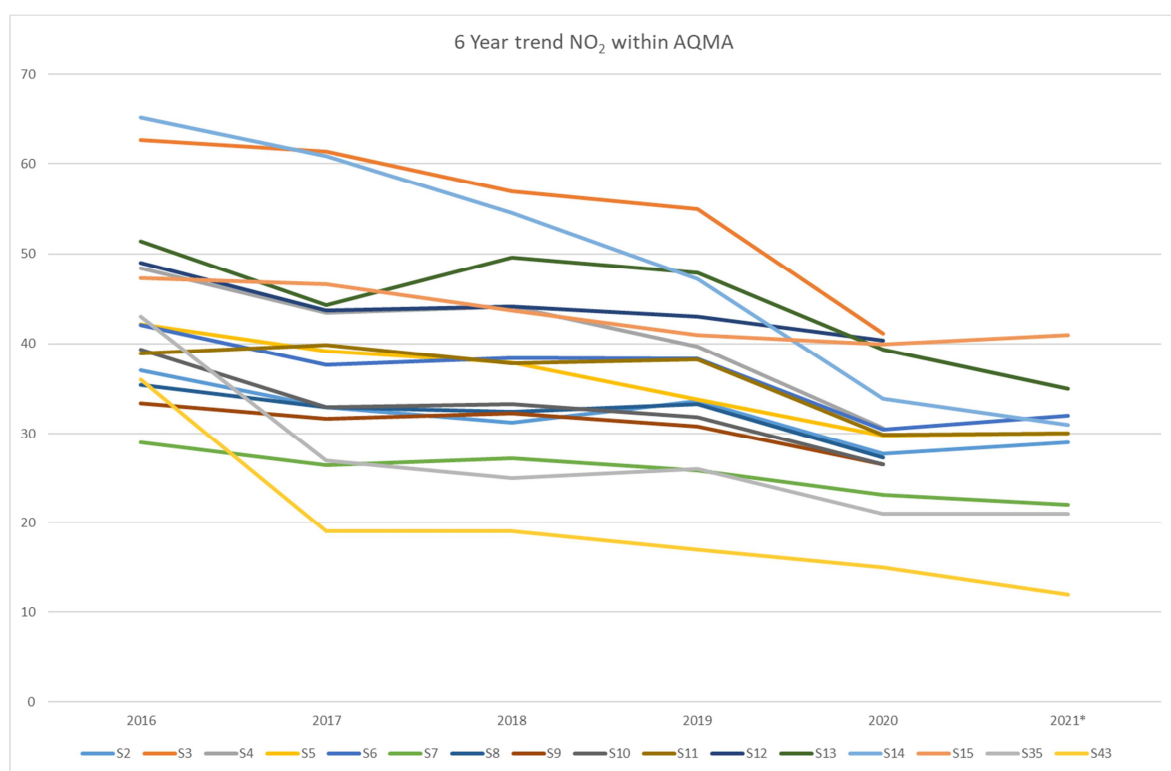
Five Year Comparison of NO₂ Trends in Hull

In 2020 air quality monitoring of NO₂ was carried out at around 60 sites across Hull, however, this was increased by an additional 90 sites in 2021 meaning that monitoring is now taking place at approximately 150 locations in the City. The majority of this monitoring provides indicative levels of NO₂, which is the main pollutant of concern from road traffic, using diffusion tubes but also includes results from 3 fixed air quality monitoring stations, one which is owned by Hull City Council and two which are part of the National Air Quality Monitoring Network (AURN) operated by contractors on behalf of DEFRA. There is also historical data from many other indicative monitors that were previously located around the City, which were relocated once it was felt that a representative level of pollutants had been obtained for those locations and they were no longer areas of concern. In line with the Council's monitoring strategy, information continues to be reviewed, looking for any developments that may result in a change in pollutant levels which in turn could lead to the relocation of monitors where appropriate.

Comparison of Trends in the Air Quality Management Area (AQMA)

A graph of all the data for the full city would be difficult to present and, due to the amount of information it would contain, almost impossible to follow, therefore sites have been selected at key locations in the Air Quality Management Area (AQMA) to show the general year on year trends. This information is provided in Figure 1 below. The two sites which are labelled Castle St (Road) and Castle Street (Wall) show the difference in levels between the roadside and a site 10m away.

Figure 1. Six year trend within the AQMA



Comparison of Trends across the whole City

As detailed above a comparison of trends for the whole City would be extremely difficult to present in any meaningful way. However, Figure 2 below provides a snapshot comparison of nitrogen dioxide trends at 12 monitoring points across the whole City, rather than just monitoring sites located in the AQMA area as shown in Figure 1. Monitoring which is taking place at Wetherby Close and Fortune Close are background sites and are used as a base line to show the levels prior to the influence of local sources such as heavy road traffic and industry.

The results from all monitoring sites in the City are available to view in the Annual Status Report (ASR) for comparison¹.

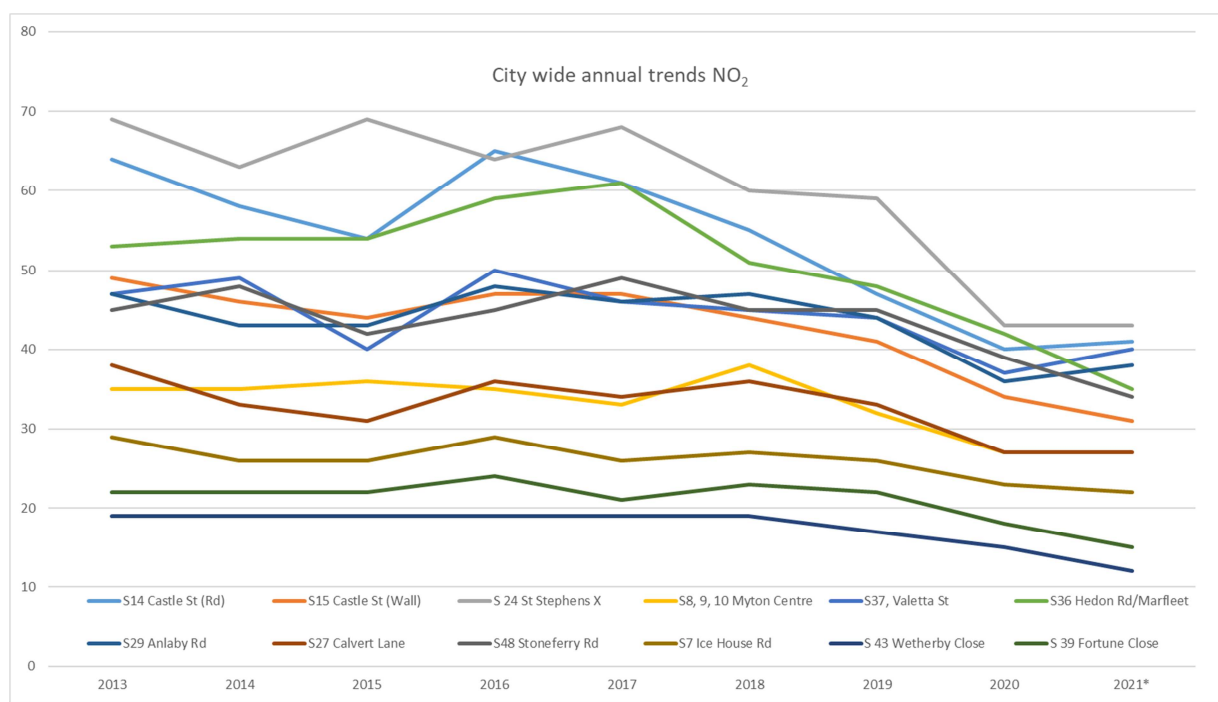
Table 1 - Tabulated Data for Figure 1.

NB Data is uncorrected for bias or distance.

	$\mu\text{g}/\text{m}^3$	2016	2017	2018	2019	2020	2021*
S2	Humber Dock Street	37	33	31	34	28	29
S3	Castle Street Hotel	63	61	57	55	41	-
S4	Spruce Road	48	43	44	40	31	-
S5	Tadman Street	42	39	38	34	30	30
S6	Hessle Rd	42	38	38	38	30	32
S7	Ice House Road	29	26	27	26	23	22
S8	Myton (Trailer)a	35	33	32	33	27	-
S9	Myton (Trailer)b	33	32	32	31	27	-
S10	Myton (Trailer)c	39	33	33	32	27	-
S11	Daltry St	39	40	38	38	30	30
S12	Earl De Grey	49	44	44	43	40	-
S13	Princes Dock Side	51	44	50	48	39	35
S14	Castle st (Road)	65	61	55	47	34	31
S15	Castle st (Wall)	47	47	44	41	40	41
S35	Blanket Row 2	43	27	25	26	21	21
S43	Wetherby Close	36	19	19	17	15	12
	<i>*To September, uncorrected.</i>						

¹ <http://www.hull.gov.uk/environment/pollution/air-quality>

Figure 2. Annual NO₂ Trends.



**To September, uncorrected.*

Comparison to other Local Authorities.

It can be seen from Figures 1 and 2 that the general year on year trend in Hull is one of improvement, and this is in line with the situation in other areas. Comparison with other areas can be problematic, as there are a number of factors that come in to play. For example, even when they fall under the same criteria for site location, i.e. roadside, urban background, industrial etc., these will have some local factors that differ between each site and these local factors can be a major influence in pollutant levels. There will also be other locations within an Authority where levels will be vastly different to those at the monitoring site.

Consideration was given to comparing Authorities by the number of AQMA's, but due to the variety of ways that different Authorities determine the boundaries of the AQMA, with some having one covering the whole borough, and others have several, where each could be the size of a single dwelling, or some, like York, representing a 'ribbon' stretch along several roads, it was felt that this would not give a clear comparator.

For completeness, Figure 6 shows a map of Local Authorities that have at least one AQMA. This is taken from the Defra website, which allows this to be interrogated further to show the location and extent of the areas declared, but it can be seen that the areas without an AQMA are predominantly rural, with almost all urban areas of a similar nature to Hull having at least one AQMA. <https://uk-air.defra.gov.uk/aqma/maps/>

A separate page on the Defra site shows that there are currently 730 AQMA's declared for all relevant pollutants in the UK, with Hull being included in the 633 of those that have been for an exceedance of the annual mean for nitrogen dioxide. <https://uk-air.defra.gov.uk/agma/summary>

Looking ahead, when the works on the A63 are complete we are expecting the picture for Hull and indeed the whole of our region will be very positive compared with urban areas in the rest of the Country.

It is accepted by experts that the best way to assess changes in pollutant levels is to look at local trends, and by comparing local levels to the Air Quality Objectives² (AQO's).

With the above caveats in mind, Table 2 below has been produced to provide a comparison of pollutant levels from selected Air Quality Monitoring Network (AURN) stations that meet the same criteria, in this case ones that are designated Urban Background Sites³, such as the one in Hull⁴ which gives a reasonable indication of trends. Figure 3 provides a graphical representation for eight of these sites.

It should also be noted that where areas are subjected to levels in excess of the AQO's and relevant receptors are there for an appropriate period of time, Local Authorities must declare an AQMA.

An AQMA can only be revoked when the situation has improved sufficiently. The current works to the A63 in Hull are designed to improve air quality and ensure that the AQMA can be revoked.

Table 2 Annual Trends in NO₂ – AURN Urban Background Sites⁵.

µg/m ³	2016	2017	2018	2019	2020	2021*
Hull	23	24	22	22	18	21
Plymouth	22	20	19	19	14	11
Bristol St Pauls	27	24	24	23	15	16
Portsmouth	20	19	19	17	17	12
Coventry	23	22	20	20	15	14
Newcastle	30	29	32	32	23	27
Leicester	28	26	23	24	19	19
Southampton	34	30	29	28	24	23
Leeds	33	32	30	28	21	21
Stoke	28	26	23	24	17	18
Sheffield	26	27	27	28	22	22
Cardiff	23	20	18	22	15	14

*To September, uncorrected. Source: https://uk-air.defra.gov.uk/data/exceedance?f_group_id=4&action=exceedance&go=Step+1

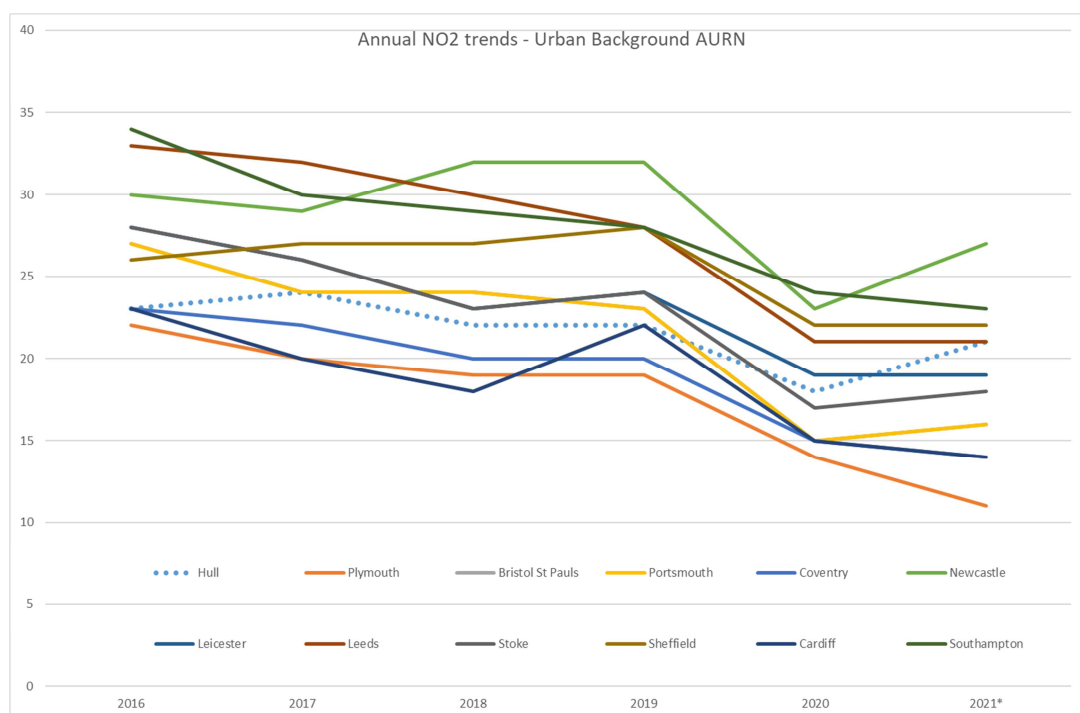
² http://uk-air.defra.gov.uk/assets/documents/National_air_quality_objectives.pdf

³ <https://uk-air.defra.gov.uk/networks/site-types>

⁴ https://uk-air.defra.gov.uk/networks/site-info?site_id=HUL2

⁵ <https://uk-air.defra.gov.uk/data/exceedance>

Figure 3 Annual Trends in NO₂ – AURN Urban Background Sites.



PM₁₀ and PM_{2.5}

Particulate matter has been discussed previously in this report, and particular mention given to the change in levels during the Pandemic, which showed the reduction in traffic during the first lockdown, did not result in the same degree of reduction as Oxides of Nitrogen (NO_x).

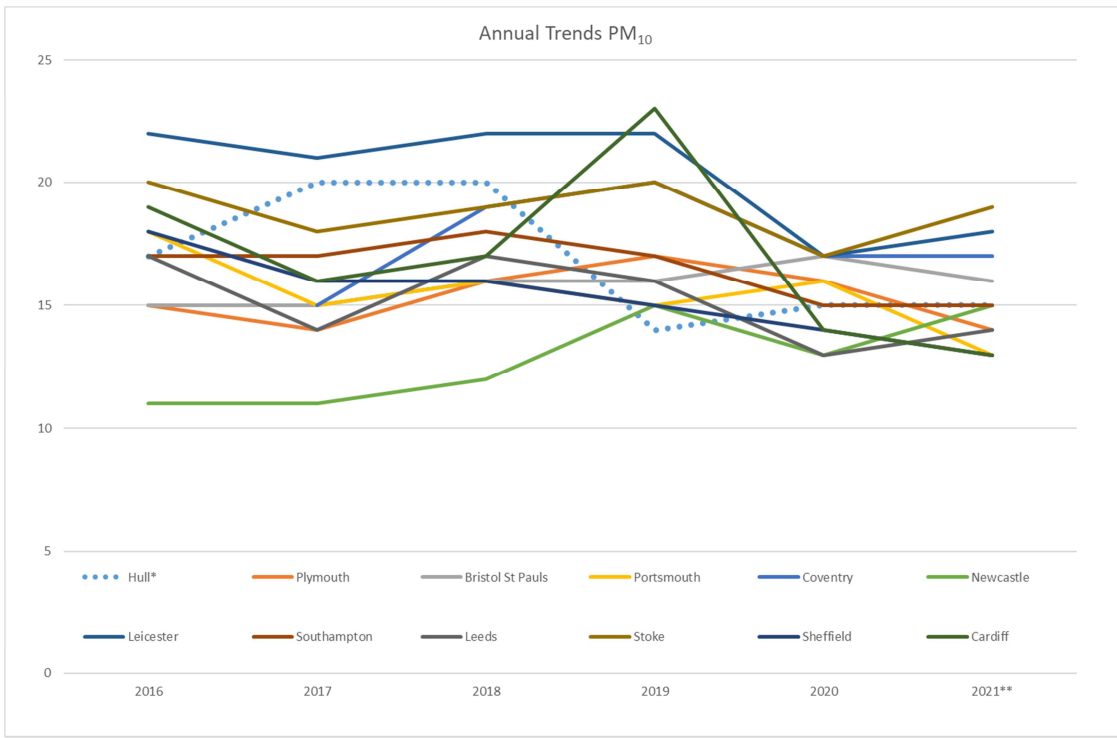
The exact reasons for this are still subject to investigation, but it seems reasonable to suggest that this indicates that the tailpipe emissions from vehicles are not the major source of particulate, and secondary reactions, such as sunlight reacting with other volatile components in the air as well as re-suspended road dust and other sources need to be investigated further.

It's worth noting that when we have closely examined the air quality results during lockdown, in some instances this has revealed some unexpected outcomes. For example, there was a recorded increase in ground level ozone, which is thought to have occurred as a consequence of the lower prevalence of NO₂ in conjunction with very bright and sunny weather conditions.

This demonstrates that initiatives aimed at improving in one area, may have an unexpected impact on another, which highlights the importance of a co-ordinated, strategic approach.

The results from selected similar sites in the national monitoring network are presented in Figures 4 and 5 below. Care must be taken when comparing different regions, as there may be localised differences that could account for changes in monitored values.

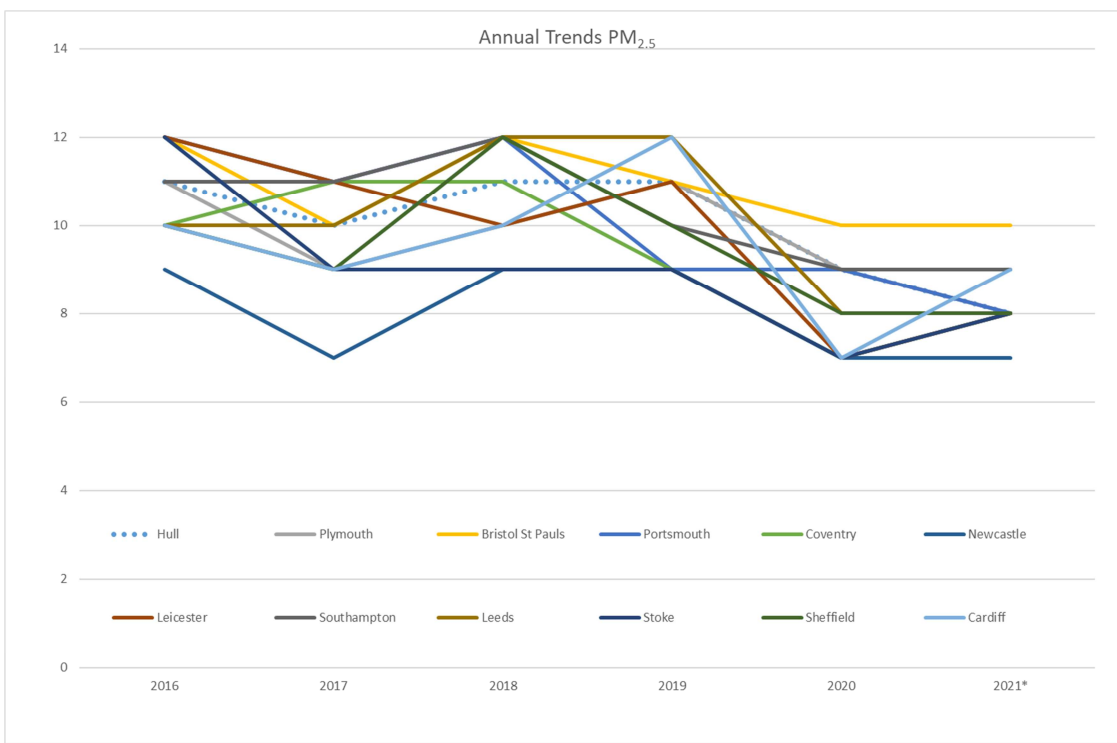
Figure 4. Annual Trends in PM₁₀ at AURN Sites.



*Data from Urban background used from 2019 for direct comparison

**To September, uncorrected.

Figure 5. Annual Trends in PM_{2.5} at AURN Sites.



*To September, uncorrected.

Figure 6. Local Authorities in the UK with an AQMA

