

# St Albans High Street Recovery Air Quality Report (December 2023 Update)

**Topline statement:** There is no evidence that the High Street trials have had a negative impact on air quality, including on potential displacement routes along Folly Lane and Catherine Street. There is some evidence that the road closures may have improved air quality at the Peahen Junction and for the St Albans AQMA, as well as other key sites in the centre of St Albans.

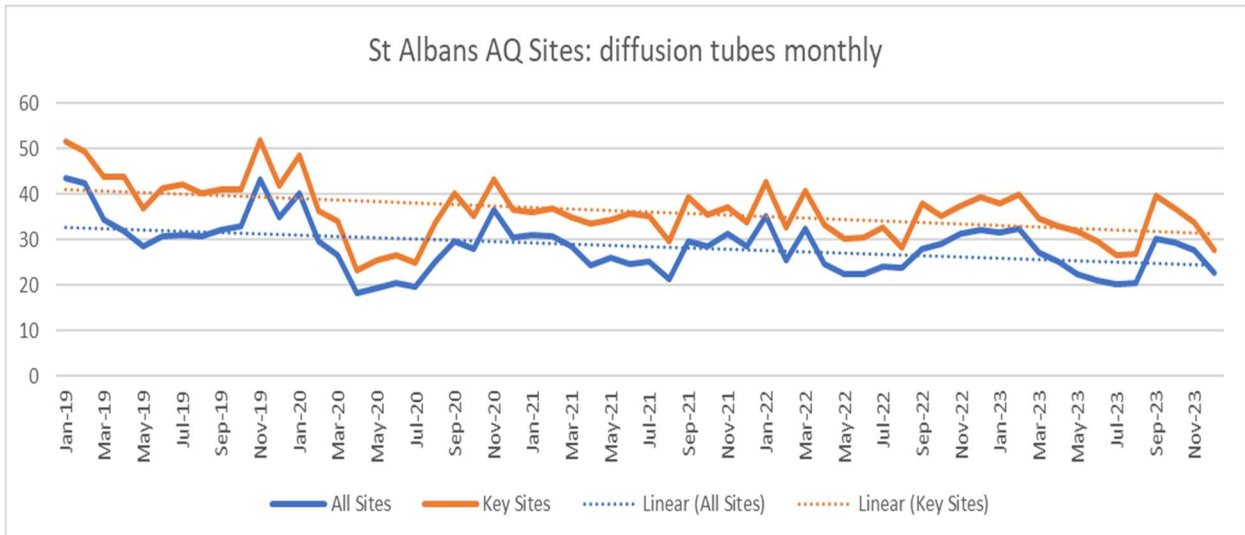
## 1. Introduction

- 1.1. This report assesses diffusion tube data for NO<sub>2</sub> levels between January 2019 and December 2023. Sensor data for NO<sub>2</sub> and PM levels at two key sites between February 2023 and early December are also assessed.
- 1.2. The diffusion tube data comes from an extensive network of sites in and around St Albans and provides a monthly average NO<sub>2</sub> level. There are intermittent gaps in data but overall it provides a comprehensive assessment of NO<sub>2</sub> level in and around the city.
- 1.3. The sensor data provides more data points allowing analysis of NO<sub>2</sub> and PM level variation throughout the day and by day. The sensor at Folly Lane has provided a continuous record. The sensor at Verulam Road only provided data between late 26 February and 4 April 2023. The data analysed in this report is just for the month of March. The sensor at Holywell Hill has had some periods where it has not recorded data, including November 2023, which was also when High Street was reopened to traffic. The sensor data has been adjusted down since the previous Air Quality Report in August 2023. The sensors are due for colocation in the new year, so these figures may change again.
- 1.4. This report assesses the impact, if any, of the High Street Recovery trials at High Street, George Street and Market Place has been in terms of air quality in the surrounding area. As time progresses, it will also assess the impact of the reopening of High Street to traffic at weekends.

## 2. Monitoring Data by Diffusion Tube Network

- 2.1. Chart 1 shows a comparison of the average NO<sub>2</sub> recorded at all sites in the St Albans diffusion tube collection network alongside key sites in the centre of St Albans that the trial schemes were considered likely to impact. It is possible to observe, for example, a reduction in NO<sub>2</sub> levels in spring 2020 coinciding with the outbreak of the Covid-19 pandemic. The key sites track higher than average as these are locations in the city centre where traffic congestion is in general more of an issue on the historic streets at the centre.
- 2.2. The Air Quality Standards Regulations 2010 requires that annual mean concentrations of NO<sub>2</sub> must not exceed 40 µg/m<sup>3</sup>. City centre sites were above this limit level for many years and is why an Air Quality Management Area exists in the centre of St Albans. Since 2019 trends have been downwards of which a significant proportion can be allocated to Covid, lockdown measures and subsequent recovery. City centre sites decreased at a faster rate than elsewhere in the network as these areas were most impacted by Covid measures (vehicle numbers, congestion impact etc).
- 2.3. Chart 1 would suggest that the trial schemes do not appear to have an adverse impact on air quality in the city centre.

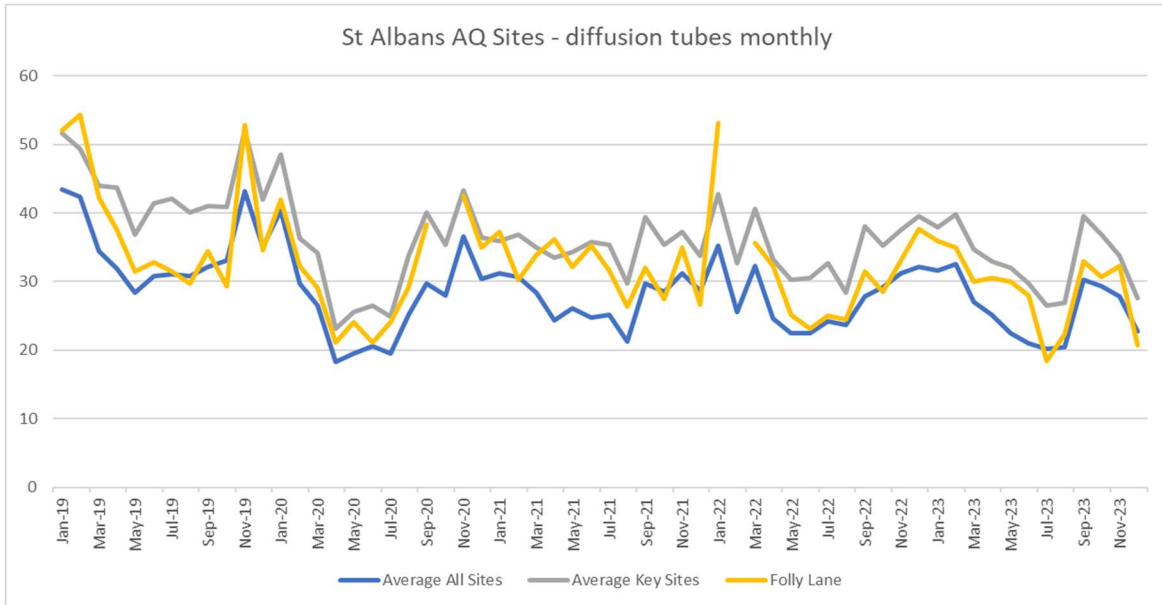
2.4. The Coefficient of Determination ( $r^2$ ) is a statistical method that can help predict future outcomes. At the key identified sites  $r^2$  since January 2019 is 0.18 indicating a trend for declining levels of NO<sub>2</sub> in the monitoring sites in the centre of St Albans. Between November 2022 (the start of Phase 2 of the trials) and June 2023,  $r^2$  has increased to 0.765, suggesting an increased rate of improvement in the NO<sub>2</sub> levels in St Albans. This is in comparison to a  $r^2$  of 0.29 for the equivalent period between November 2021 and June 2022.



**Chart 1 – Average NO<sub>2</sub> recorded in the St Albans diffusion tube collection network**

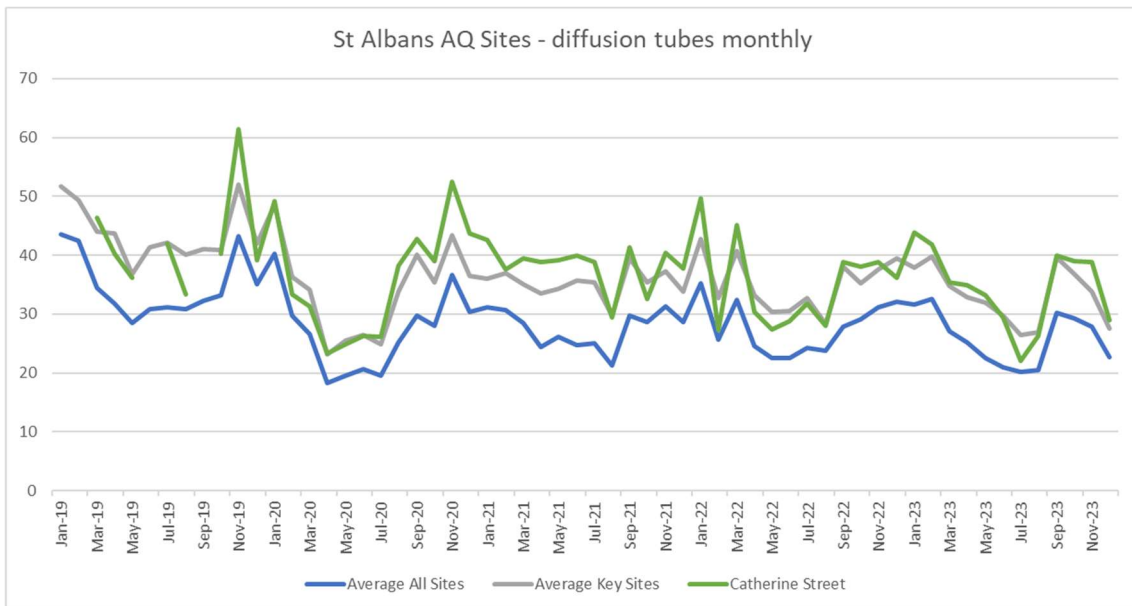
2.5. Chart 2 shows a site that was thought might be adversely affected by the weekend closure of High Street in particular – Folly Lane (yellow line). This is because traffic that might ordinarily travel along Verulam Road is diverted along Folly Lane and Catherine Street during the weekend hours of operation of the trial. Folly Lane appears routinely affected by monthly spikes in increased NO<sub>2</sub> levels sometimes peaking higher than usual for the centre of St Albans. At other times it tracks closer to the average for the whole district area. This may suggest this site is particularly sensitive if there is traffic disruption in the surrounding area.

2.6. Folly Lane NO<sub>2</sub> levels increasingly track city centre averages more closely during late 2020 and into 2021, which was when Covid measures were in place and High Street was closed to traffic all week. Since the current trials (from October 2022) this trend has continued, and NO<sub>2</sub> levels are tracking at slightly lower than City Centre averages. The post-winter reduction in NO<sub>2</sub> is not as marked as for non-City Centre sites.



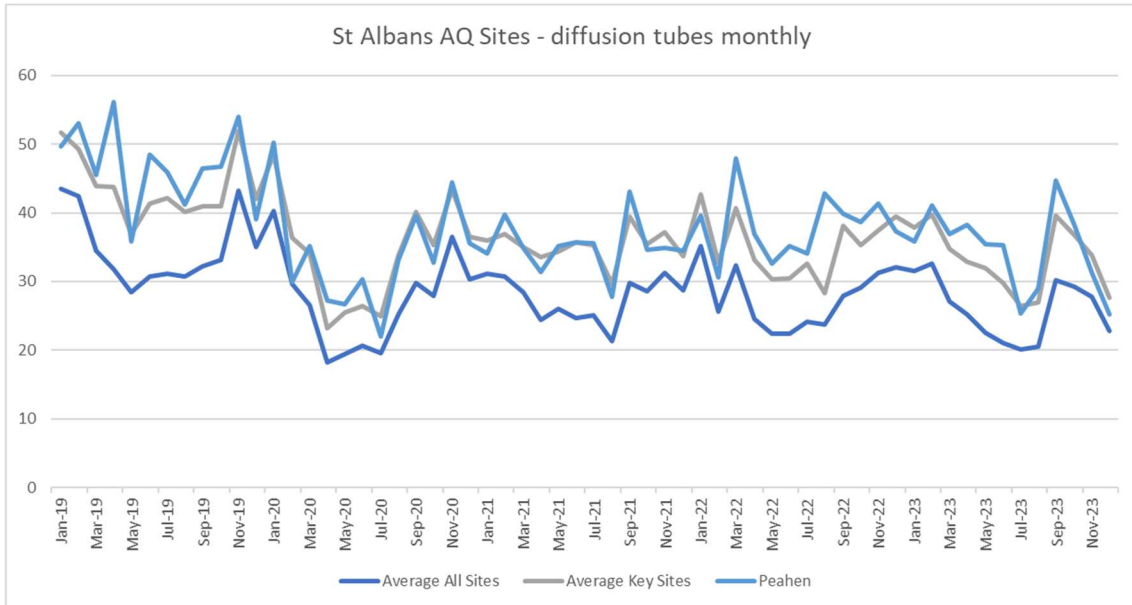
**Chart 2 – NO2 recorded at Folly Lane**

2.7. Chart 3 shows NO2 levels for Catherine Street (green line), which tracks more commonly along or above the city centre site average. After implementation in October 2022, it is now tracking more or less at the same levels and dropping together with City Centre averages in 2023. This could be within reasonable error for diffusion tube data.



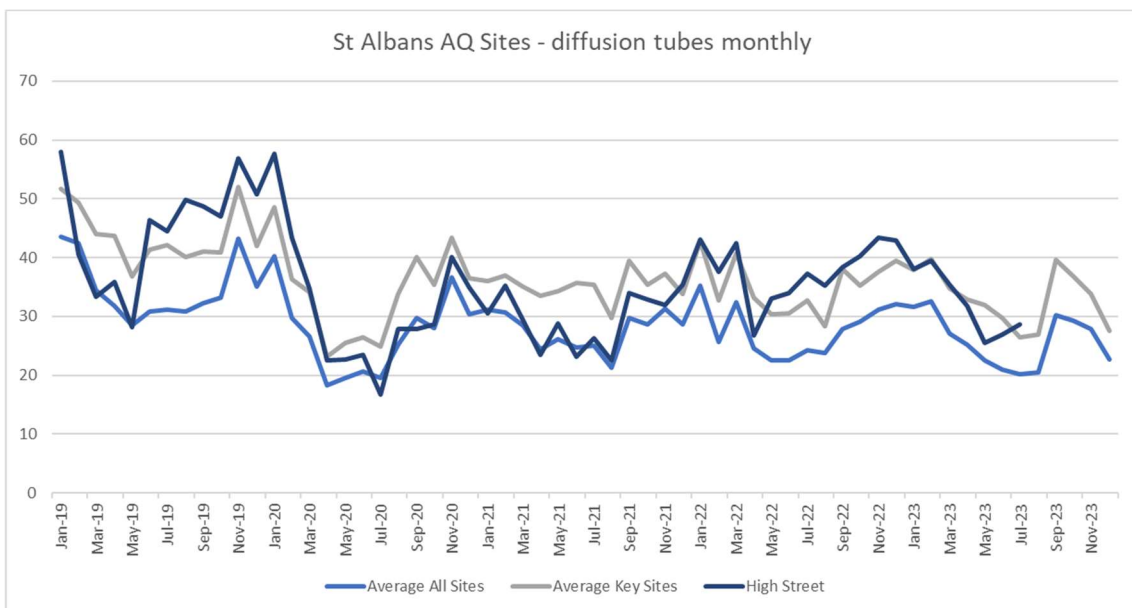
**Chart 3 – NO2 recorded at Catherine Street**

2.8. Chart 4 shows NO2 levels at the Peahen pub (light blue line). Interestingly, the winter peaks from previous years are not evident in 2022 and 2023. NO2 levels are more consistent and do not drop after winter. While monthly averages are still below those for 2019, they are close to 40  $\mu\text{g}/\text{m}^3$ . While NO2 has decreased since the introduction of Phase 2 trial measures, that decrease hasn't been as marked as for other City Centre sites between March and June 2023, and is now tracking noticeably above these. Having said that, annual means remain below 40  $\mu\text{g}/\text{m}^3$ , which is good news for management of the AQMA.



**Chart 4 – NO2 recorded at Peahen pub**

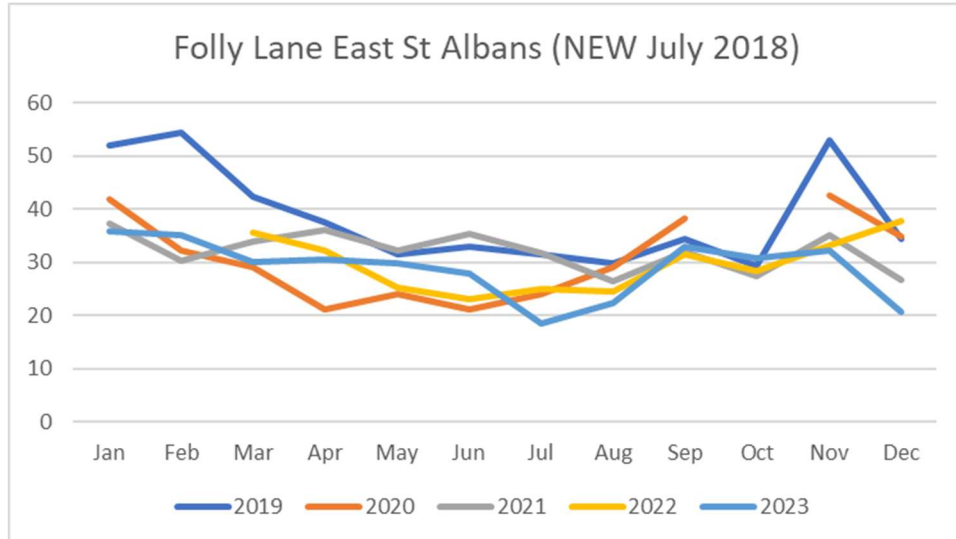
2.9. Chart 5 shows NO2 data for High Street (dark blue line). High Street was closed to traffic towards the end of 2020 and reopened to traffic at the end of 2021. A much lower NO2 (around the St Albans District average) is noted during this time, suggesting the closure did have an impact in keeping NO2 levels at around that experienced during the first few months of the pandemic. The reopening of the road to traffic coincides with an increase in NO2, peaking at over 40  $\mu\text{g}/\text{m}^3$  during winter 2021-22 and autumn 2022. Since the trial has been in place there is a gradual decline in NO2 levels at this site so it is below the City Centre average. While it is noted that traffic still uses this area Monday to Friday, so it is not exactly comparable to the situation in 2020-21, the trial measures and limiting traffic along High Street does appear to have had an impact on reducing NO2 levels at this site.



**Chart 5 – NO2 level recorded at High Street**

2.10. Chart 6 looks at comparative, year-by-year analysis of the Folly Lane diffusion tube data. There are only a few months that exceed 2019 NO2 levels (dark blue line), one of which is December 2022. There is a gradual uptick after the trial was introduced

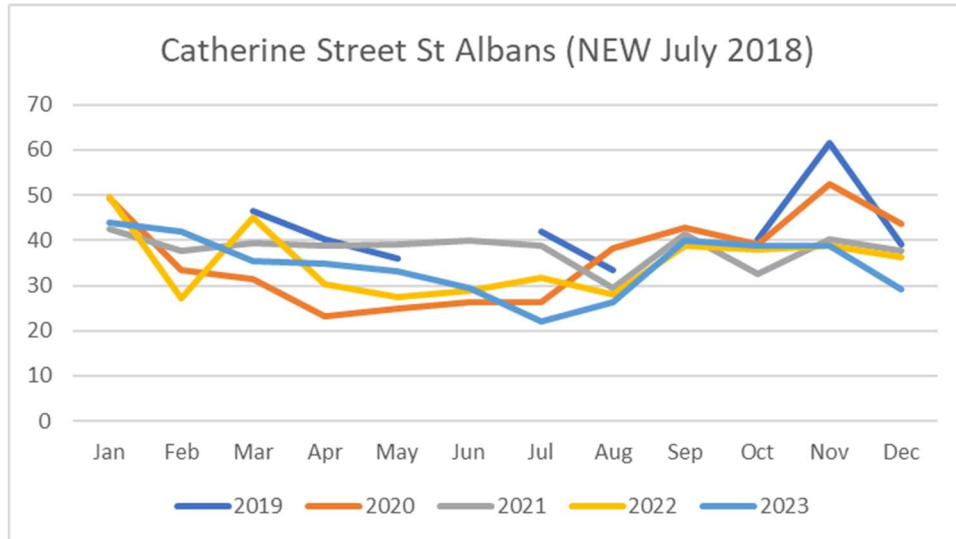
affecting NO2 levels at Folly Lane, but this now appears to have stabilised at below 2019 figures. Red figures in the table indicate where monthly NO2 exceeds 40 µg/m3, the last time this happened being January 2022, before the onset of the trial measures. Annual averages are continuing a slow decline since 2021 and are several points below 2019 levels.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	AVE
2019	51.99	54.35	42.22	37.49	31.52	32.85	31.44	29.78	34.37	29.31	52.82	34.5	38.6
2020	41.9	32.32	29.11	21.1	24.09	21.08	24.11	29.13	38.3		42.48	34.95	30.8
2021	37.22	30.2	33.95	36.19	32.12	35.24	31.66	26.37	31.95	27.47	35.02	26.63	32
2022	53.12		35.68	32.32	25.16	23.17	24.97	24.51	31.43	28.47	33.15	37.69	31.8
2023	35.93	35.01	30	30.51	29.93	27.98	18.39	22.39	32.95	30.69	32.31	20.76	28.9

**Chart 6 – Year-by-year analysis of NO2 level at Folly Lane**

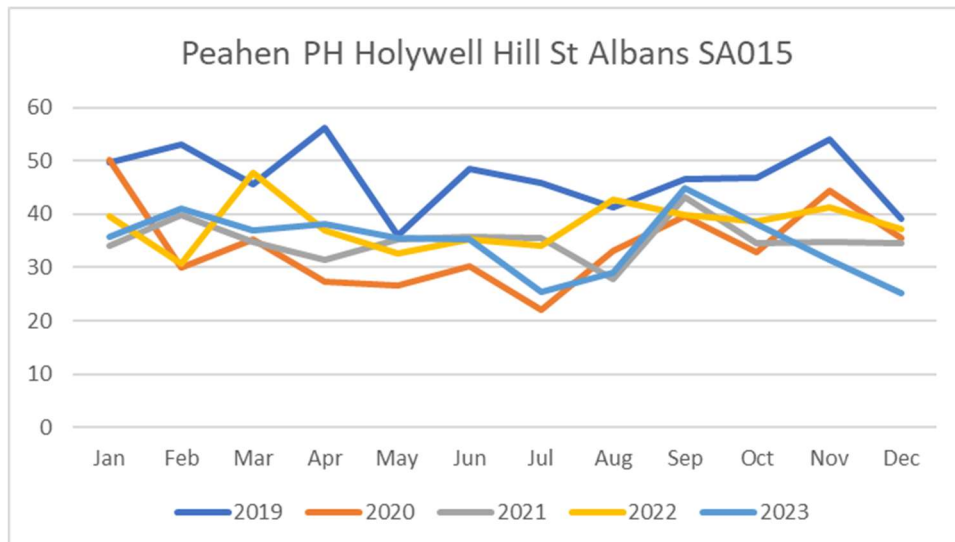
2.11. Chart 7 looks at NO2 diffusion tube data for Catherine Street. Figures are consistently higher than for Folly Lane. As with Folly Lane, there appears to be an upturn in NO2 levels at the end of 2020, possibly coinciding with a combination of a rebound in traffic levels and Covid social distancing measures that were put in place around the High Street, but this settled down into 2021. This is the pattern we might expect following a traffic reduction measure: traffic first temporarily displaces and then evaporates. Since the start of 2023, there has been a steady decline, so that by June, NO2 levels are equivalent to those from 2022.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	AVE
2019	56.49		46.4	40.23	36.11		41.9	33.3		40.22	61.46	39.17	43.9
2020	49.24	33.4	31.31	23.25	24.93	26.23	26.19	38.26	42.72	39.01	52.5	43.68	35.9
2021	42.57	37.65	39.5	38.89	39.17	39.9	38.77	29.42	41.41	32.59	40.37	37.69	38.2
2022	49.58	27.19	45.13	30.38	27.39	28.83	31.79	27.99	38.82	37.97	38.88	36.22	35
2023	43.87	41.83	35.31	34.87	33.21	29.35	21.99	26.22	40	38.94	38.82	29.02	34.5

**Chart 7 – Year-by-year analysis of NO2 level at Catherine Street**

2.12. NO2 levels at the Peahen Junction (Chart 8) were variable but high in 2019, exceeding the government’s threshold targets. Much lower levels were experienced during 2020 and 2021, averaging 34 and 35 µg/m3 respectively. 2022 showed possibly worrying signs that the variability and higher NO2 levels were returning, however, since late 2022 and the introduction of the trials this looks to have stabilised. The trials appear to have had a positive air quality impact, not just for High Street (see below) but also at this notorious air pollution black spot.

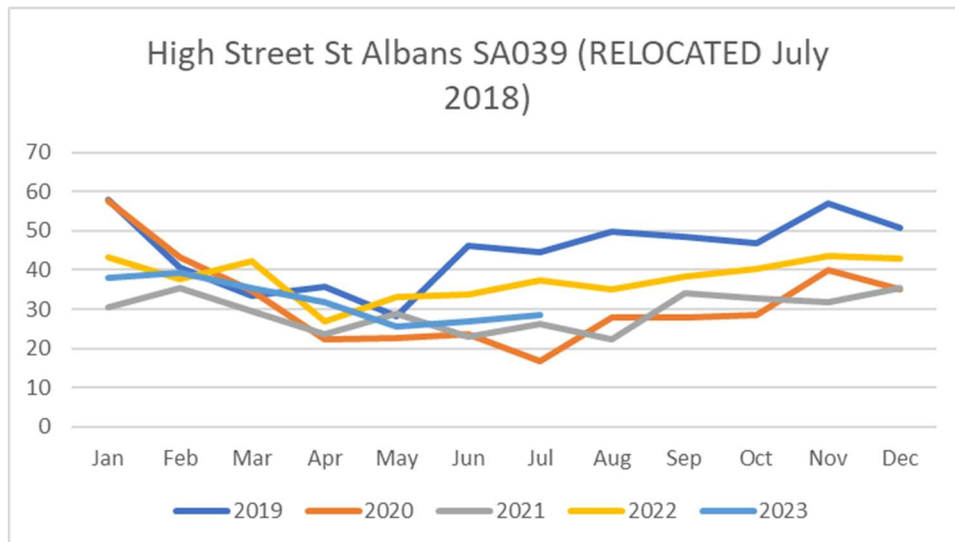


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	AVE
2019	49.63	53.08	45.57	56.16	35.89	48.53	45.92	41.24	46.49	46.74	54.03	39.06	46.9
2020	50.2	29.91	35.17	27.23	26.63	30.33	22	33.12	39.66	32.8	44.43	35.54	33.9
2021	34.03	39.74	34.87	31.39	35.16	35.72	35.63	27.72	43.15	34.58	34.84	34.46	35.1
2022	39.6	30.59	47.9	36.88	32.56	35.18	34.08	42.83	39.86	38.64	41.38	37.28	38.1
2023	35.84	41.03	36.91	38.21	35.48	35.31	25.31	28.96	44.78	38.27	31.31	25.28	34.7

**Chart 8 – Year-by-year analysis of NO2 level at Holywell Hill**

- 2.13. What is particularly noticeable for NO2 levels in High Street (Chart 9) is how low levels are in 2020 and 2021 (orange and grey lines) immediately in comparison with 2019 and 2022 (dark blue and yellow), which shows the potential impact an ambitious High Street scheme might have in improving air quality. During Phase 2, there was traffic flowing through High Street Monday to Friday. Although NO2 levels did rise steadily from October to December 2022, there has been a subsequent and noticeable reduction since.
- 2.14. What is clear though is, as with Peahen, High Street has gone from a position which exceeded government air quality thresholds in 2019 to currently being below legal limits but within the level of uncertainty which requires continual consideration of this site (anything within 10% of the legal limit is still of concern due to accuracy of diffusion tubes).



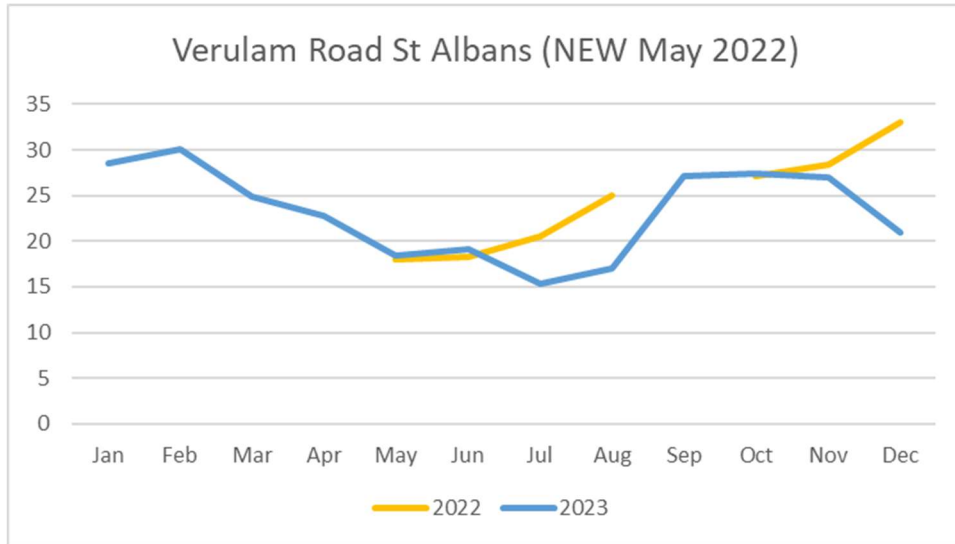


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	AVE
2019	57.95	40.55	33.3	35.79	28.2	46.29	44.48	49.78	48.64	46.98	56.87	50.7	45.0
2020	57.67	43.43	34.77	22.47	22.74	23.46	16.73	27.82	27.92	28.65	40.03	34.92	31.7
2021	30.51	35.3	29.45	23.46	28.75	23.09	26.31	22.46	34.02	32.93	31.95	35.37	29.5
2022	43.12	37.61	42.44	26.74	33.01	33.89	37.3	35.2	38.43	40.25	43.45	42.87	37.9
2023	38.07	39.45	35.32	31.78	25.51	26.96	28.6					31.35	32.1

**Chart 9 – Year-by-year analysis of NO2 level at High Street**

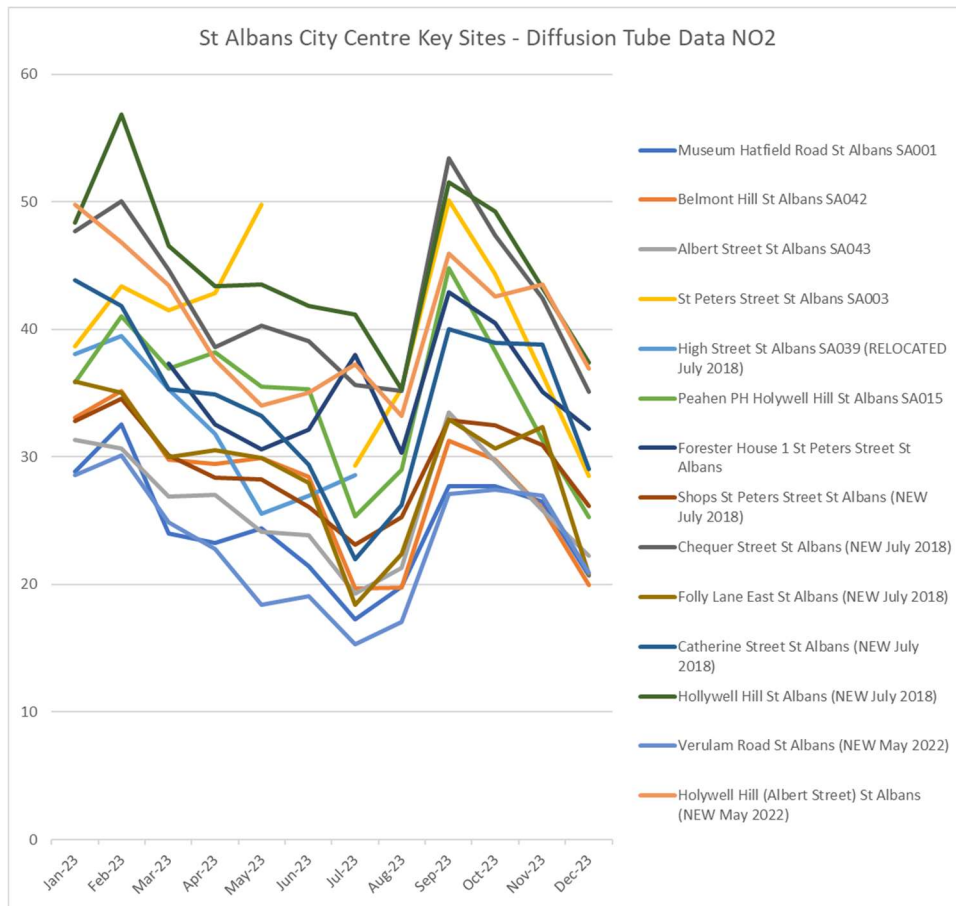
2.15. Some additional diffusion tube monitoring sites came online in St Albans in May 2022. One of these is at Verulam Road (Chart 10). Concerns have been raised that traffic continues to use the road when the High Street is closed and it is also used as an informal drop-off point at the weekends. There may also be potential problems with idling engines from delivery drivers or takeaway pickups waiting here. While it is an incomplete data set (only a few months' data available and with no comparable previous years' data, though we now have a full year of data) we present the data for completeness. After the start of the trials, there is an increase in NO2 levels at Verulam Road (and we may have expected this anyway, as elsewhere there has often been observed an increase in NO2 levels going into winter). Since then, NO2 levels have reduced to similar levels as those in 2022. Air quality is consistently within government air quality thresholds.





**Chart 10 – Analysis of NO2 level at Verulam Road**

- 2.16. Chart 11 identifies the key City Centre sites identified and used for the analysis above. The peak in February 2023 of 56.86 µg/m<sup>3</sup> at Holywell Hill can be noted. For most sites there is an overall declining trend after winter peaks excepting St Peter Street where there is a gradual increase.
- 2.17. The annual average 40 µg/m<sup>3</sup> level is exceeded during this time period at four sites: Holywell Hill, St Peter’s Street, Chequer Street and Albert Street. It should be noted that the levels were exceeded (and to a greater degree) in the equivalent periods for 2019-20 and 2021-22 for Holywell Hill, St Peter’s Street and Chequer Street. Albert street is a new site, introduced in 2022, so there is no comparable data for the previous years.



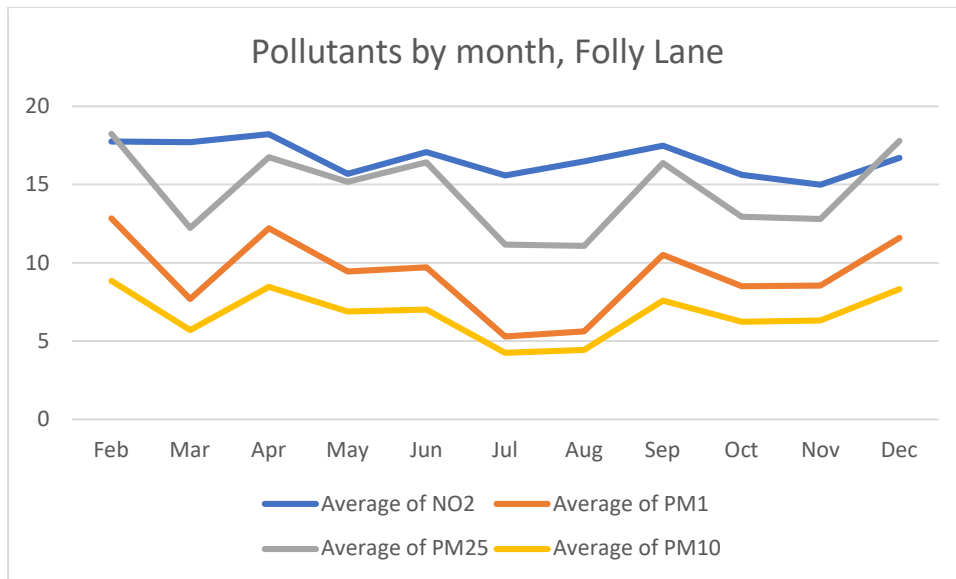
**Chart 11 – Analysis of NO2 levels at Key Sites (January 2023 to December 2023)**

### 3. Sensor Data

3.1. Three air quality sensors were fitted in February 2023. The sensors provide a continuous feed so it is possible to analyse this in different ways. There is limited cross-comparison opportunities between the sensor data and the diffusion data, so it might not be appropriate to speculate using both the historic diffusion tube data and the more up-to-date sensor data. Recording methods and location may also contribute to the differences between the data sets. Hence they are not readily cross comparable.

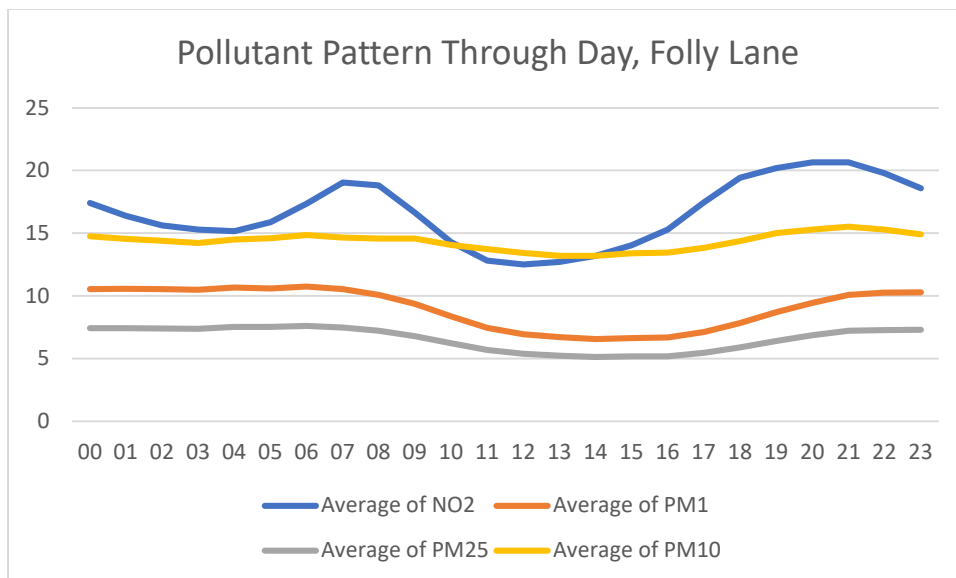
### 4. Folly Lane

4.1. Chart 12 shows pollutants for Folly Lane. Monthly NO2 levels seem settled and below 20 µg/m3. PM levels show a drop off over the summer months.



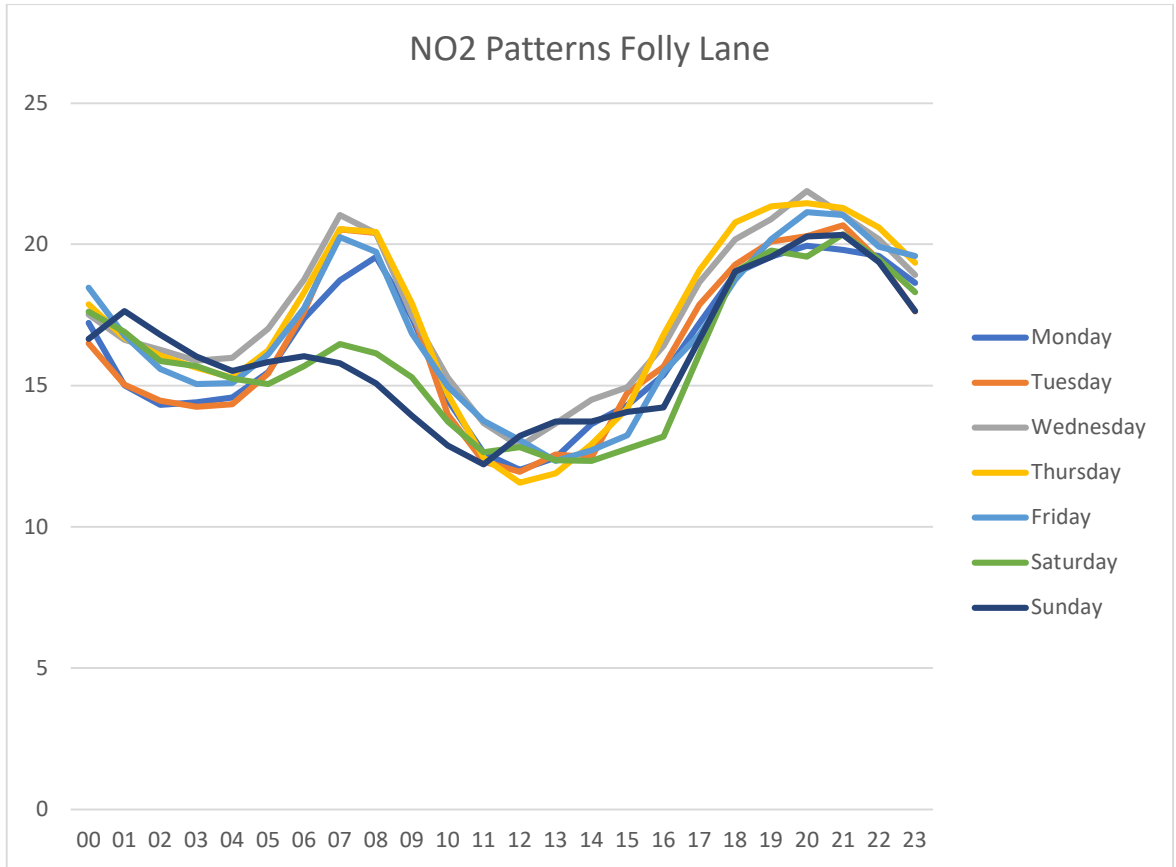
**Chart 12 – Analysis of pollutant level at Folly Lane (2023)**

4.2. Chart 13 shows the average pollution pattern through the day from midnight to midnight for Folly Lane. NO2 is more reactive to peak periods (blue line). It is gaseous rather than solid, so can disperse quicker and undergo air chemistry interactions meaning that it is converted into other substances. Particulates demonstrate less variation across a day and are more susceptible to regional air mass movement, particularly in the southeast.



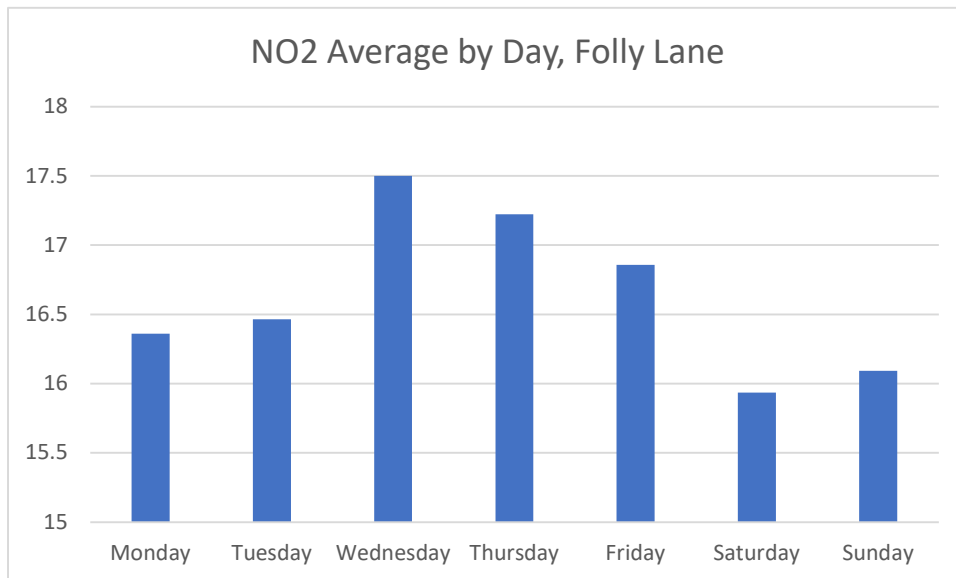
**Chart 13 – Pollutant Pattern Through Day at Folly Lane (2023)**

4.3. There are clear weekday peaks at Folly Lane (Chart 14). Saturday (green) and Sunday (dark blue) lack the morning peak. There is no evidence of increased NO2 levels on a Saturday when the city is expected to be busy and the High Street area is closed to traffic for the trial.



**Chart 14 – Analysis of NO2 pattern by hours of the day at Folly Lane (2023)**

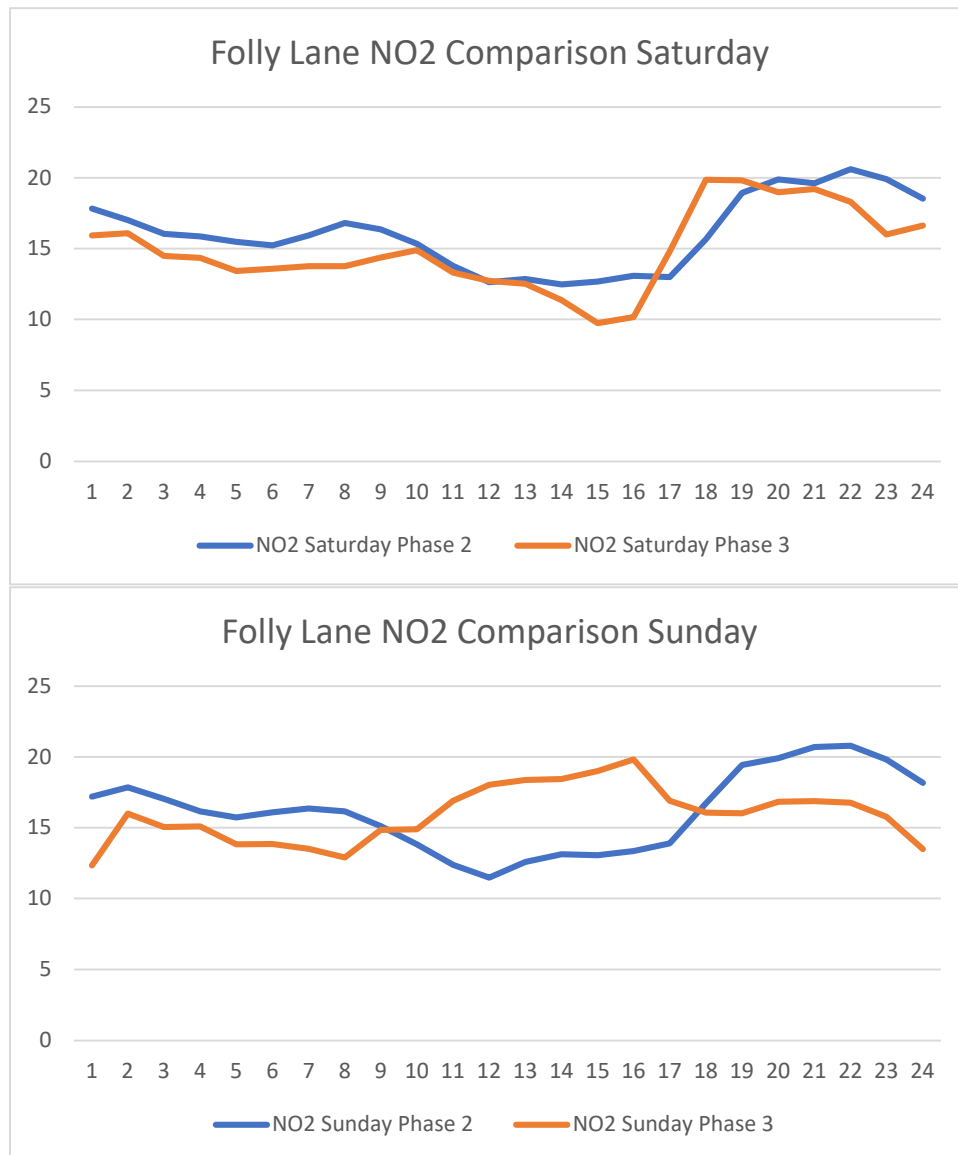
4.4. Chart 15 shows that on Saturday and Sunday (when the High Street was closed for Phase 2 trial measures) Folly Lane experienced the lowest overall daily average NO2 levels. Wednesday and Thursday were highest.



**Chart 15 – Analysis of NO2 level by days of the week at Folly Lane (2023)**

4.5. It is possible to compare daily variations between Phase 2 and Phase 3 measures at Folly Lane, though it must be noted it is not comparing like-for-like as there may be

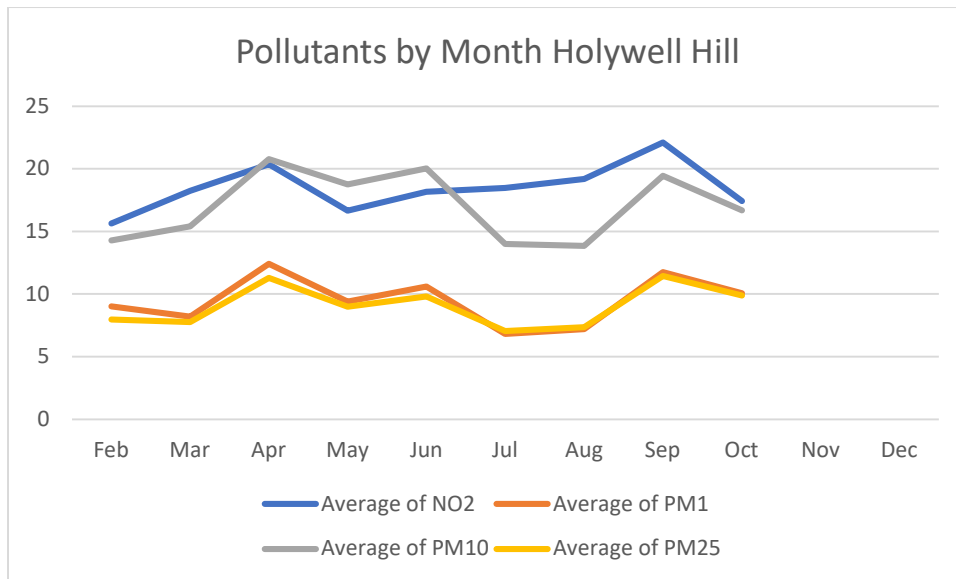
seasonal variations. More accurate comparisons should be possible in the spring when we will hopefully be able to compare March and April 2023 with March and April 2024. Chart 16 shows that for Saturday through most of the day, Phase 3 is tracking under Phase 2 excepting for a small time period around the evening peak when this is reversed. For Sunday, there is a more significant period during the day when Phase 3 NO2 exceeds NO2 during Phase 2.



**Chart 16 – NO2 Comparison of Phase 2 and Phase 3 Measures Saturday and Sunday**

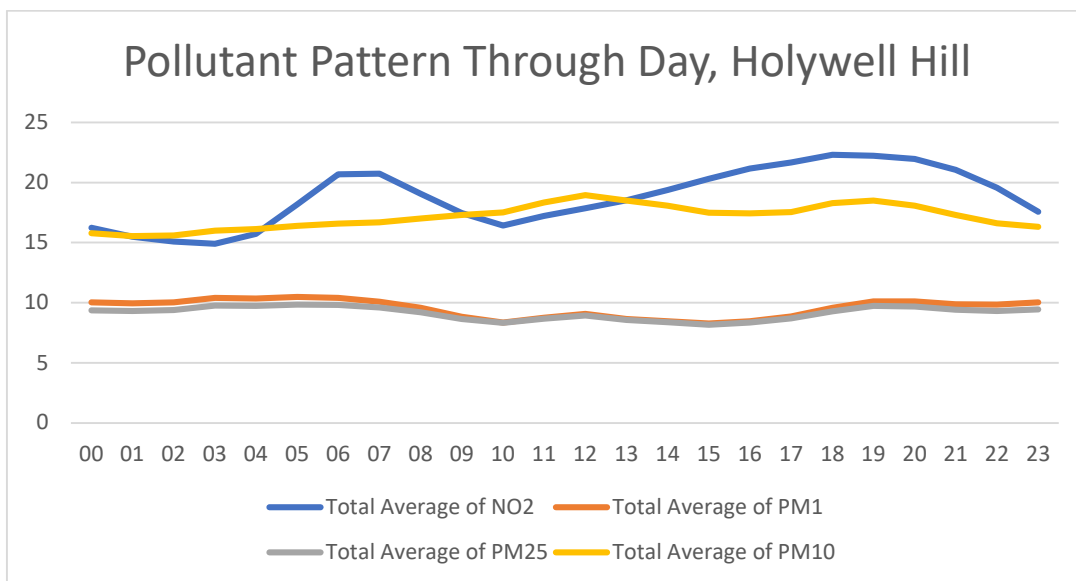
## 5. Holywell Hill (Peahen Junction)

- 5.1. The sensor at Holywell Hill (traffic lights by Cote, Chart 17) shows a similar pattern to that at Folly Lane, peaking in April and September and with PM levels reduced during July and August. The sensor was inactive during November and the 10 days of data from December is not included here.



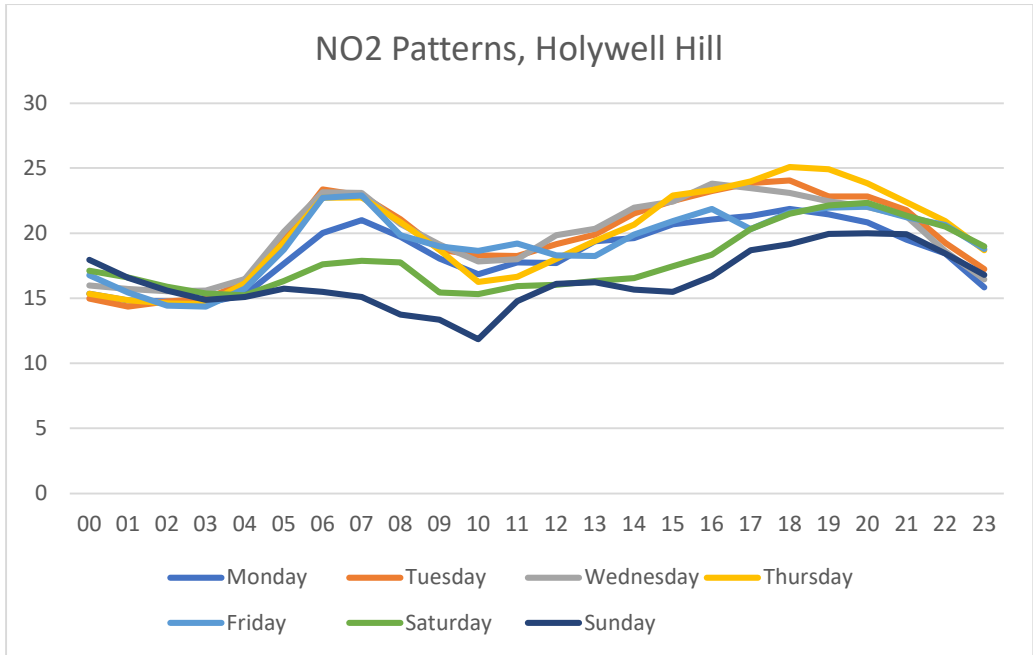
**Chart 17 – Analysis of pollutant level at Holywell Hill (2023)**

5.2. The pollution pattern through the day for Holywell Hill (Chart 18) and is similar to that for Folly Lane, though with less pronounced peaks of NO2 during the peak and an elongated evening peak.

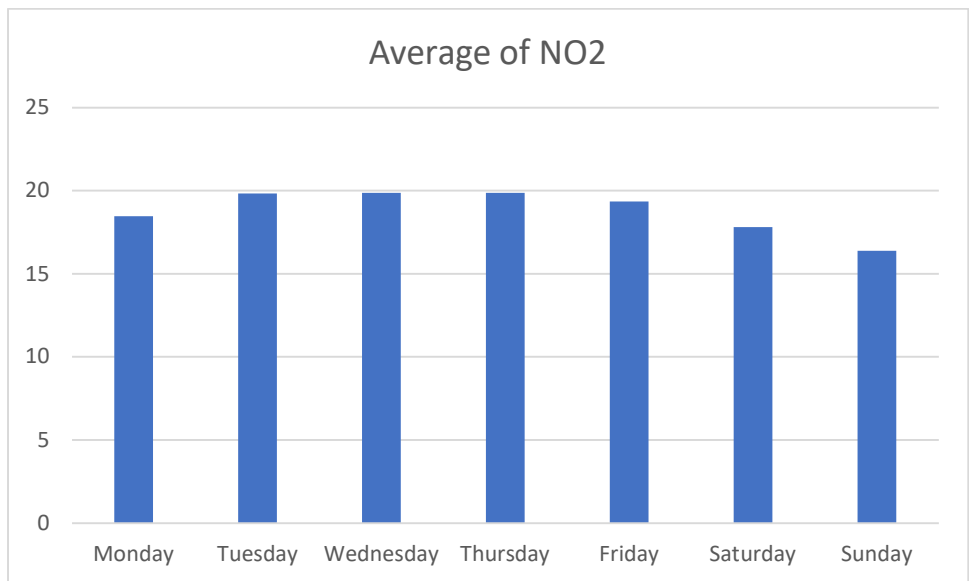


**Chart 18 – Pollutant Pattern Through Day at Holywell Hill (2023)**

5.3. NO2 levels for Saturday and Sunday are lower than for other days (Chart 19 and 20). However, they do tend to exceed other days ever so slightly between 11pm and 3am over the weekend. This could suggest that, with simpler traffic light phasing the Phase 2 trial had an impact in improving air quality at this pollution black spot and improving things for shoppers at the weekend in St Albans.

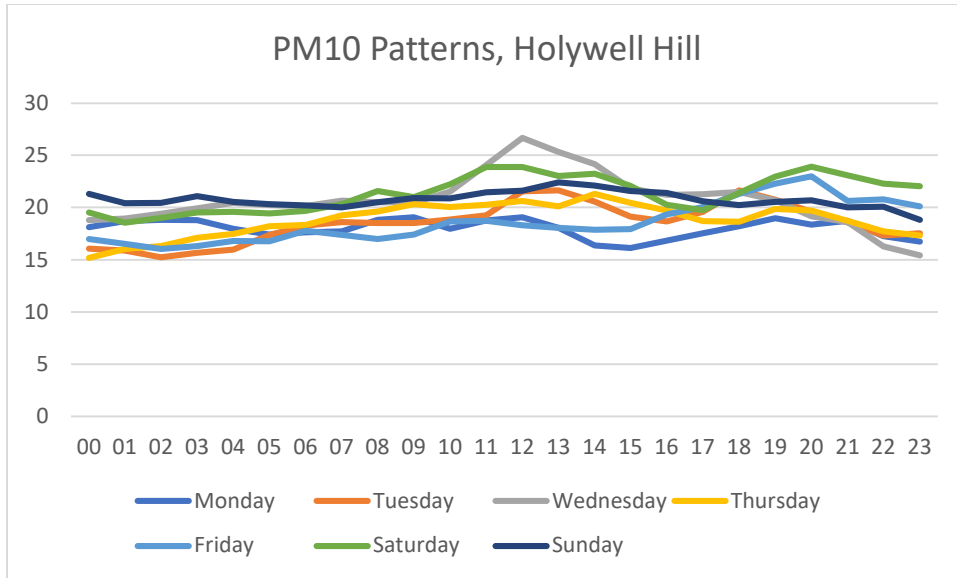


**Chart 19 – Analysis of NO2 pattern by hours of the day at Holywell Hill (2023)**

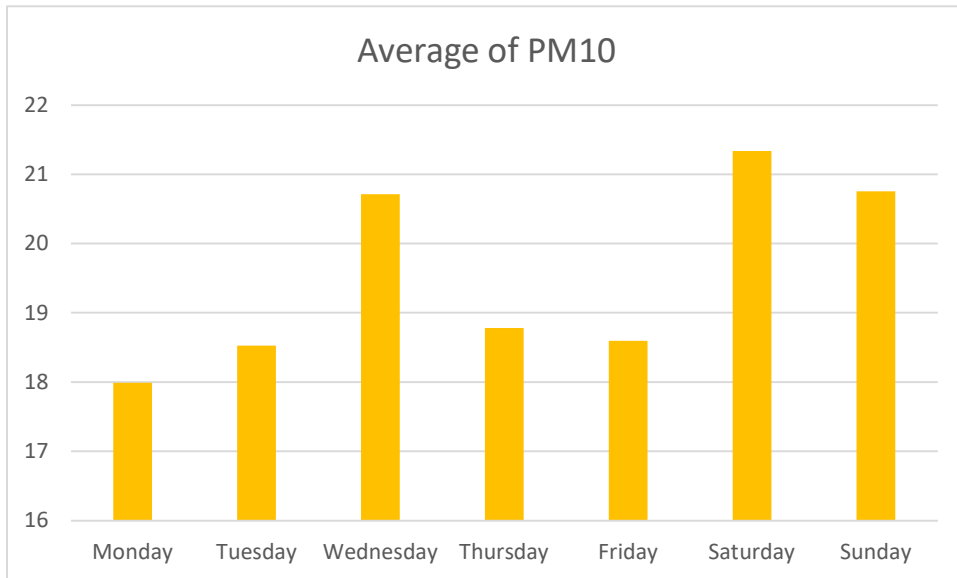


**Chart 20 – Analysis of NO2 level by days of the week at Holywell Hill (2023)**





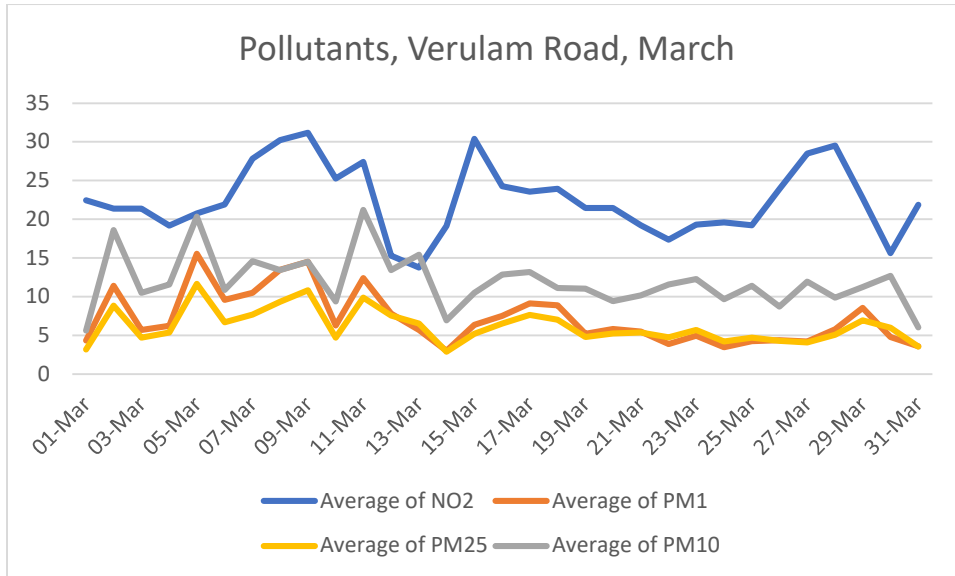
**Chart 21 – Analysis of PM10 level by hours of the day at Holywell Hill (2023)**



**Chart 22 – Analysis of PM10 level by days of the week at Holywell Hill (2023)**

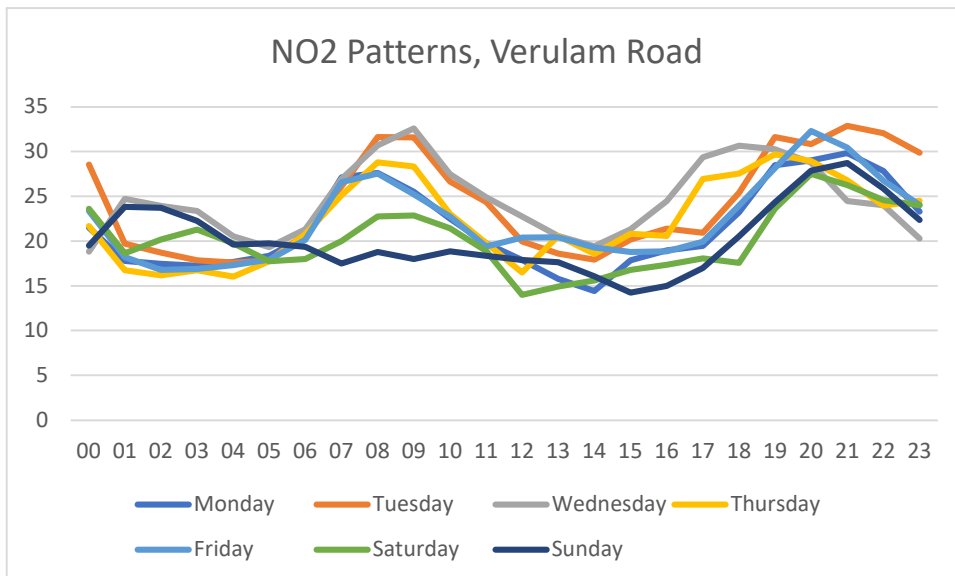
## 6. Post Trial Focus at High Street (Verulam Road)

6.1. There is limited data for the sensor located at High Street as it malfunctioned from early April 2023). It is only practical to look at data for March (Chart 23).

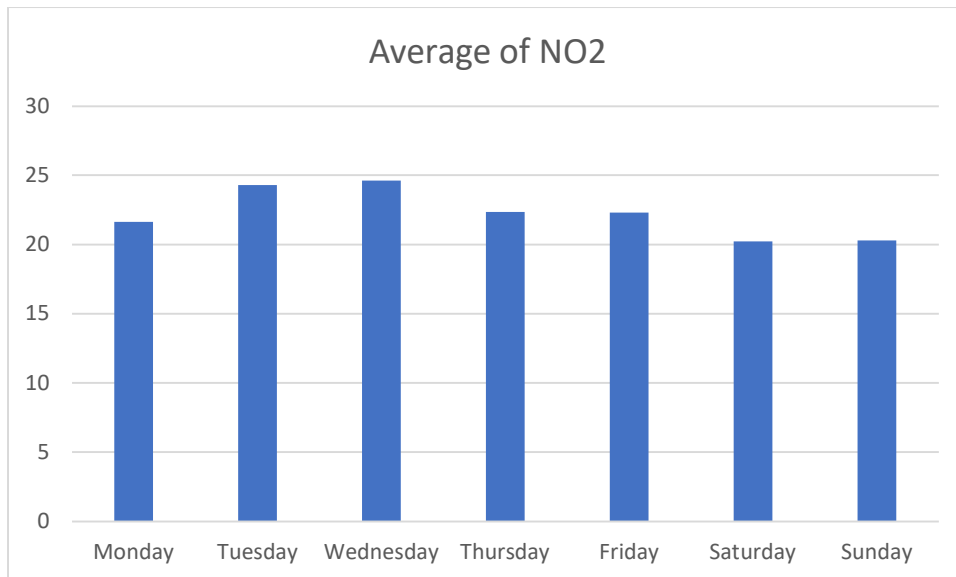


**Chart 23 – Analysis of pollutant level at Verulam Road**

6.2. As might be expected from an area closed off to traffic, NO2 is suppressed for Sunday in particular but also to a degree for Saturday (Chart 24). Access to George Street to traffic is between 7 and 11 and this is clearly articulated in the morning peak on Saturday. Highest average NO2 levels are found on Tuesday and Wednesday (Chart 25), and Saturday and Sunday have the lowest overall levels. Arguably, on Friday night, Saturday and Sunday NO2 levels are not as suppressed as might be expected. This could be a result of vehicles turning, waiting or idling by the turning circle with Verulam Road close to take away venues or dropping off at restaurants.



**Chart 24 – Analysis of NO2 pattern by hours of the day at Verulam Road**



**Chart 25 – Analysis of NO2 level by days of the week at Verulam Road**

## 7. Conclusions

- 7.1. Air pollution issues in the centre of St Albans have improved since 2019. Comparing NO2 levels from diffusion tube data, there has been a reduction of 28.3% in core City Centre sites comparing Jan-Jun 2019 to Jan-Jun 2023. This is alongside a reduction in traffic volumes through the City Centre of approximately 6% over the same time period. **There is some evidence to suggest that Phase 2 of the trials improved air quality at key locations during the course of the trial.** There are clear declining trends for most of the monitoring sites in Central St Albans following implementation in October 2022 (aside from the winter peak and perhaps a settling in period). More data that will be collected over the coming months will further support or disprove this assertion. **There is no evidence that the High Street trials have had a negative impact on air quality, including on potential displacement routes along Folly Lane and Catherine Street.** Weekend traffic volumes did increase along this route during the course of the Phase 2 trial, though only to approximate typical weekday traffic volumes. There are still some sites that exceed the 40 µg/m<sup>3</sup> annual mean threshold currently set in legislation as an annual average considered by the government to be an acceptable health impact on the population. However, there is no safe level for exposure and there is no presumption that anything under the current legal threshold is fine. Legislation may change in future.
- 7.2. While road closures may impact air quality on a local level, it has to be remembered that causes of poor air quality are multi factored and improving air quality is not likely to be down to one factor alone. As well as vehicle tailpipe emissions, poor air quality in St Albans may also be attributable to construction, wood burners (and other domestic combustion for heating) and cooking/heating at hospitality venues. Air quality improvement since 2019 is also attributable to more homeworking, post-Covid traffic reduction, changing travel patterns and potentially a reduction in NO2 (particularly) due to less polluting cars and a gradual transition to an electric fleet.
- 7.3. There is a statutory duty for Hertfordshire County Council to work with St Albans City & District council to reduce pollution levels below legal limit levels. As such this intervention is promoted as a key intervention for consideration in any future St Albans action plan.