A6MARR:

An Evaluation of 1-Year Post-Opening Data from a Local Perspective

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on behalf of High Lane Residents' Association

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The A6MARR was the project name for the A555 "relief road" that connects the A6 to Manchester Airport. The new A555 opened to traffic on 15th October 2018.[1] Essentially, it is an extension at both ends of a shorter initial stretch of the A555 that had been completed in 1995[2] — which, at the time, had become widely known as "the road to nowhere".[3] The development of the newer A6MARR sections was part of a SEMMMS project, with "SEMMMS" originally being an acronym for *South-East Manchester Multi-Modal Study* but in more recent documentation, the final "S" stands for *Strategy*.

Other SEMMMS projects include the Poynton Relief Road (aka "Poynton Bypass", see map[4]), the linking of its northern end to the A555 being the reason for the current roadworks on the westbound A555: 26th September 2022 to early 2023.[5]

During the planning stage before construction of the A6MARR, the scheme's Business Case[6] (published in November 2012) included a proposal to evaluate the scheme in 3 phases:

- Phase 1: Pre-Construction Baseline Report (2014 data). Published June 2018.
- Phase 2: One Year After Evaluation Study (2019 data). Published July 2020.
- Phase 3: Five Years After Evaluation Study (2023 data expected).

In each phase, the aim was to measure a set of particular characteristics of the road systems to allow "before and after" comparisons to be made to help evaluate the success, or otherwise, of the scheme. The main characteristics involved were: traffic patterns (i.e. congestion and levels of traffic on particular roads during various periods of the day), journey times along particular routes, journey reliability (the inverse of the amount of variability in journey times) and levels of air pollution and noise.

The Business Case *Evaluation Milestones and Outputs* document also had wider ambitions, e.g. to examine the effects on road safety (the number and severity of accidents) and on any modal shifts, i.e. switching to other modes of transport, e.g. from private cars to public transport, or to walking or cycling. However, I cannot find any details relating to these wider ambitions in either of the Phase 1 or Phase 2 reports, other than a mention in the Phase 1 report (section 4.5) that bus data for Autumn 2014 had been *"requested*". There was also an ambition to assess the economic impact of the scheme, although the Business Case acknowledged that "*The One Year After opening evaluation is probably too early to identify any significant wider economic impacts but the Five Year After opening report will include a much greater focus on economic development and job creation.*"

Accordingly, in line with the 2012 Business Case, Baseline measurements (Phase 1) were made in 2014 for:

a. Traffic Flow data: September/October 2014 from traffic counts (ref. section 4.2 of the Baseline Report[7])
b. Journey Time data: 1st September 2013 to 31st August 2014 from satnav data gathered by TomTom (ref. section 4.3.2 of the Baseline Report[7])
c. Air Quality data: 14th August 2014 to 12th February 2015 from passive NO_2 diffusion tubes gathered by AECOM (ref. section 4.6 of the Baseline Report[7])
d. Noise data: 7th to 15th October 2014 (3 hours' continuous sampling per location; all locations visited during October 2014: weekdays between 10am and 5pm) (ref. Appendix K of the Baseline Report[8]). High Lane: 8th October 2014.

And for Phase 2, One Year [post-opening] measurements were made in 2019/2020.

e. Traffic Flow data: November 2019 from traffic counts (ref. section 2.2 of One Year Report[9])
f. Journey Time data: 1st October 2019 to 30th November 2019 (ignoring 21st Oct to 1st Nov because of flooding and school holidays) from satnav data gathered by TomTom (ref. section 3.2 of One Year Report[9])
g. Air Quality data: 16th December 2019 to 13th March 2020; and 9th July 2020 to 13th October 2020 from passive NO_2 diffusion tubes gathered by AECOM (ref. section 1.0 of One Year Post-Development Air Quality Monitoring Report[10])
h. Noise data: October 2019, January 2020 and October 2020 (3 hours' continuous sampling per location; all locations visited on weekdays between 10am and 5pm, excluding during school holidays) (ref. section 1 of Post-Completion Noise Survey (Year 1)[11]) High Lane: 18th October 2019.

Unfortunately, these Phase 2 measurements did not start exactly on the first anniversary — they were late. The traffic counts, for example, were mostly done during a 2-week period in November 2019. This was particularly regrettable because of the difficulty it poses in making direct comparisons with the baseline measurements. Indeed, DfT guidance[12] is to perform traffic counts on "neutral days" — weekdays between March and October, excluding all public holidays and school holidays. This is because traffic is expected to behave similarly on any of these days. There are usually 110 neutral counting days per calendar year.

The Phase 2 Air Quality measurements started significantly later on 16th December 2019 (compared to 14th August 2014) for what was then planned to be a continuous 6-month measuring period. With hindsight, this was unfortunate because as we now know, the COVID-19 pandemic (and consequent "lockdowns") interrupted this. However, had the measurements been made during the same Aug-Feb period as the Baseline measurements, not only would there have been no pandemic-related interruption; the datasets would have been inherently more comparable. So, because of the pandemic, measurements were paused between 14th March 2020 and 8th July 2020; they resumed between 9th July 2020 and 13th October 2020. Although the second period avoided national lockdowns, there were nevertheless isolation and quarantining restrictions in force, and many businesses operated with much higher levels of remote working than previously, prior to the pandemic. Indeed from a personal perspective, during the second of the measurement periods, I worked remotely (from home) for all but 3 days. Therefore it is to be expected that air pollution levels would be lower simply because of there being less traffic travelling on the road network.

The Phase 2 Noise measurements also started slightly later, on Monday 14th October 2019. But after completing measurements for some sites on their list on the Wednesday and Thursday of that week, they paused until 19th November 2019 to continue with 3 days of measurements on some remaining sites before pausing again to measure one site on 30th January 2020 and then another site on 2nd October 2020. For High Lane, the Phase 2 Noise measurements were made on Friday 18th October 2019.

a. Traffic Flows

Department for Transport dataset TRA8903[13] shows annual levels of motor vehicle traffic (in millions of vehicle miles) excluding trunk roads by local authority in England. From this, I have plotted the figures for the whole borough of Stockport to illustrate **general background trends** in the locality. Key points to note are the dip following the financial crisis of 2008, the subsequent slow recovery and the dramatic reduction in 2020, corresponding to the COVID-19 pandemic. The other prominent feature is the sharp increase just before that in 2019, the first full year after the opening of the A6MARR. Across England as a whole, in 2019, the corresponding graph[14] shows an increase that is an approximately linear extrapolation of the preceding few years, rather than the very sharp increase, below, for Stockport borough. I leave it open to the reader to make their own interpretation of this.

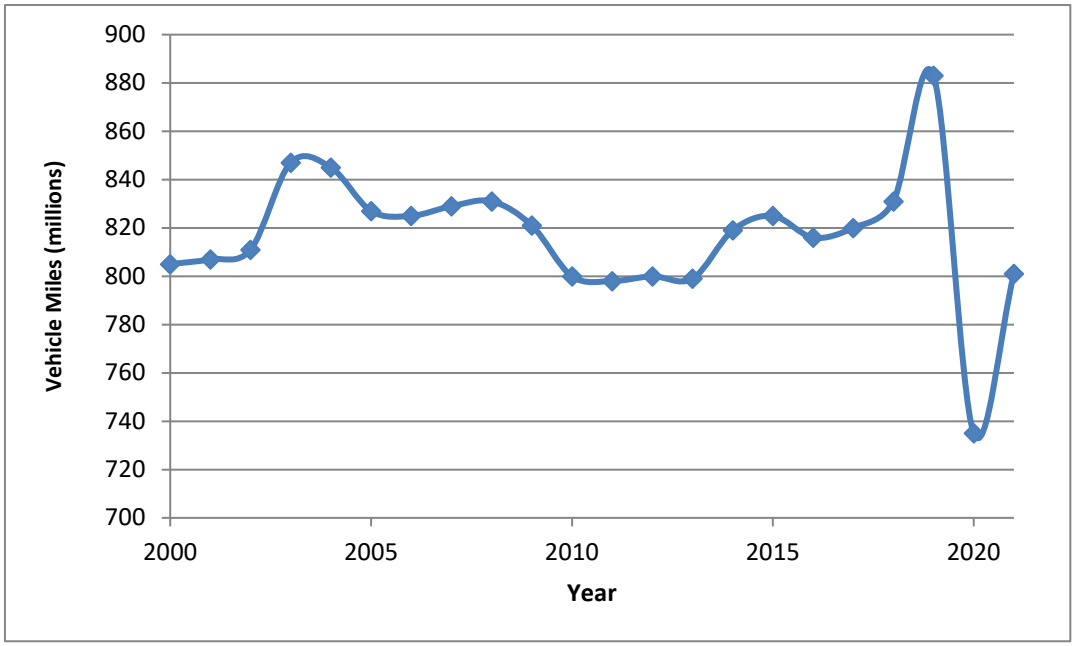

Figure 1: Annual Motor Vehicle Traffic, excluding trunk roads, in Stockport Borough

Road Classification and Terminology

Given that Figure 1 excludes "trunk roads", it may be worthwhile to remind ourselves of some relevant terminology and history. **Trunk roads**[15] are roads that are managed and maintained by national government, i.e. National Highways (formerly Highways England, and before that, the Highways Agency). National Highways manages the Strategic Road Network (**SRN**), which comprises motorways and some A roads — "*nationally significant roads used for the distribution of goods and services, and a network for the travelling public.*"[16] The A6 through High Lane used to be a trunk road until it was detrunked in May 2002;[17] it is now a **primary road**, so it is managed by the local authority, i.e. Stockport Metropolitan Borough Council (SMBC) for the A6 within its area. Primary roads are "*roads used for transport on a regional or county level, or for feeding in to the SRN for longer journeys*". They "*are coloured **green** on most maps, as opposed to the red of ordinary A roads.*"[15] In legislation, there is also the term **principal road** (meaning an A road or better), but this term is now generally avoided, otherwise.

So, because "any road on the SRN is known as a trunk road"[15], Figure 1 excludes motorways such as the M60, but *includes* most other roads such as the A6 and the A555. However, in general usage, motorways would *not* normally be regarded as trunk roads; motorways are generally referred to separately. Indeed, "*All motorways are **Special Roads**, together with some high-grade dual carriageways.*" [15]

For the sites at which traffic flows were measured in High Lane for the Phase 1 (2014 Baseline) and Phase 2 (One year after opening) reports, Table 1, below, compares the "before and after" data, with the "Diff" rows coloured according to the difference of Phase 2 compared to Phase 1.

Site Ref	Description	Phase	AADT	AADT HGV %	Morning Peak	am Peak HGV %	Inter-peak (IP)	IP HGV %	Afternoon Peak	pm Peak HGV %
43	Buxton Road (West of Carr Brow), High Lane	1	16,600	1.9	800	1.8	1,000	2.6	1,300	0.9
		2	16,800	1.6	600	2.7	1,100	2.5	1,400	0.7
		Diff	+200	-0.3pp	-200	+0.9pp	+100	-0.1 pp	+100	-0.2pp
49	Windlehurst Road, High Lane	1	4,400	0.1	400	0.1	300	0.1	400	0.1
		2	4,900	0.0	300	0.0	300	0.1	500	0.0
		Diff	+500	-0.1pp	-100	-0.1pp	0	0	+100	-0.1pp
55	Buxton Road (West of Windlehurst Road), High Lane	1	20,900	1.9	1,500	2.0	1,300	2.6	1,300	0.9
		2	21,000	1.4	1,400	1.6	1,300	2.1	1,500	0.7
		Diff	+100	-0.5pp	-100	-0.4pp	0	-0.5pp	+200	-0.2pp

Table 1: Traffic Flows in High Lane (Phase 1 and Phase 2 comparison)

Key

AADT: **Annual Average Daily Traffic** (Average, over a full year, of the number of vehicles (both directions added together) passing the location **each day**)

Red cells: Increase

Yellow cells: no change

Green cells: Reduction

The definitions of the peak and inter-peak periods (which seem rather narrow, in my opinion) referred to in the report are:

- Morning Peak: 8am to 9am
- Inter-Peak: 10am to 4pm
- Afternoon Peak: 5pm to 6pm

Phase 1 data: derived from traffic counts in Sep/Oct 2014

Phase 2 data: derived from traffic counts in Nov 2019

pp is an abbreviation for percentage points

To help visualise these figures and make comparisons, I have plotted the first two columns of this table (for total traffic, and also the Heavy Goods Vehicle component of that traffic) as bar charts, below.

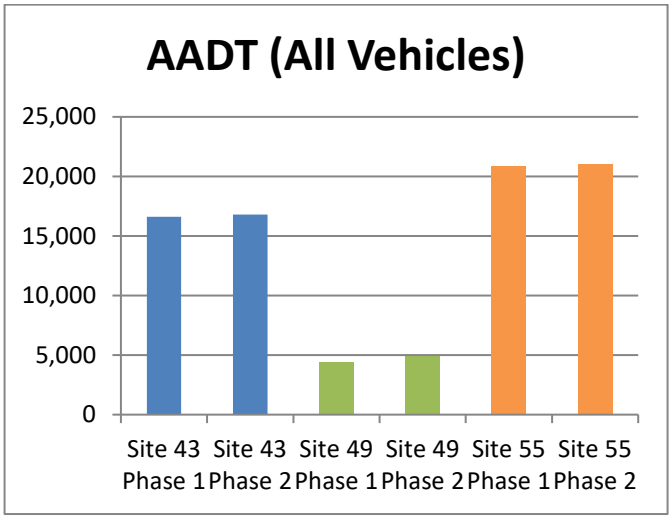

Figure 2: Comparison of Phase 1&2 traffic (all vehicles) in High Lane

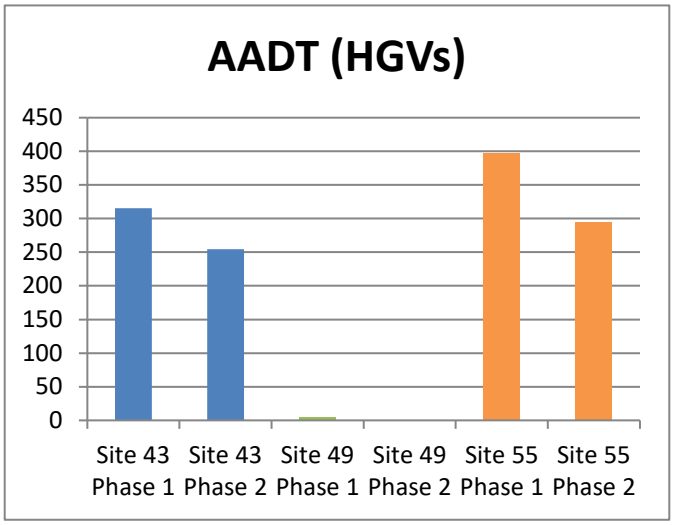

Figure 3: Comparison of Phase 1&2 traffic (HGVs) in High Lane

Figure 4: Site References of Traffic Count Sites

Overall, the Phase 2 figures show increases compared with Phase 1, the largest of which is 500 more vehicles per day measured on Windlehurst Road (Site 49). HGV traffic, meanwhile, was reduced at all three High Lane sites. However, as previously mentioned, the Phase 2 measurements (in 2019) were done in November (i.e. not on any neutral count days, *g.v.*) as opposed to the Phase 1 measurements (in 2014), which were done in October. This difference renders any direct comparison questionable, but it nevertheless provides some indication of the general levels.

Perhaps the most striking observation is that although the traffic levels are high, despite being measured [pre-pandemic] in November 2019, they are significantly lower than the predicted levels in the Planning Application's Transport Assessment[18] (written in 2013). That report acknowledged that although in many areas of the borough, the effect of the new road (A6MARR) would be to reduce traffic levels, in other areas of the borough — such as High Lane — it would ***increase*** traffic levels. Therefore, it included proposals for a set of local "mitigation measures" for High Lane aimed at limiting the increase, as well as an alternative set (called "Enhanced Mitigation Measures") aimed at improving upon the original mitigation measures, to allow modelling and assessment these different scenarios for 2017, the planned year of opening. (The actual year of opening was 2018 because of delays.) The scenarios were:

- Without A6MARR
- With A6MARR + No mitigation
- With A6MARR + Mitigation Measures
- With A6MARR+ Enhanced Mitigation Measures

Ultimately, the scheme went ahead with a plan to implement the Enhanced Mitigation Measures. Given these figures, I have plotted them below to give some context to the Phase 1 and Phase 2 measurements. Note that the measurement site for "Windlehurst Road" is at a *different point** along the road for Phases 1 & 2 ("Site 49" in Figure 4) compared to the earlier [planning application] data, which is further north (see Figure 7).

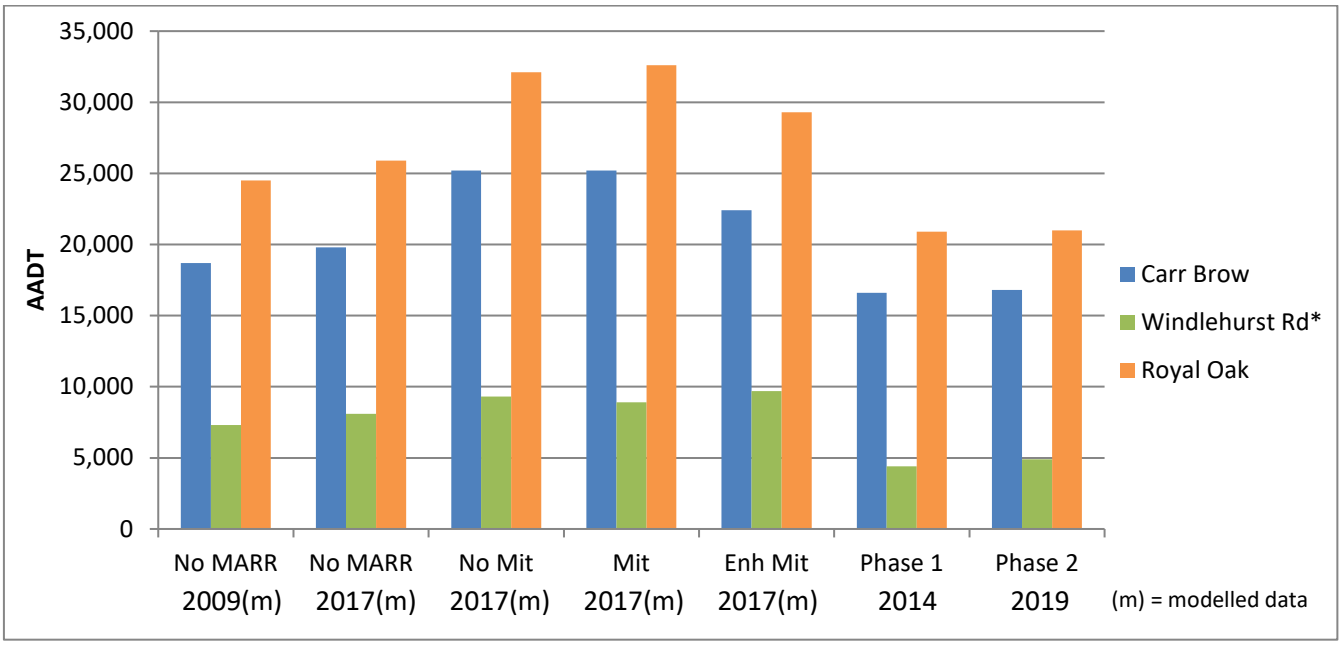

Figure 5: AADT in High Lane — predicted and actual for various scenarios

Looking at the first five scenarios (taken from the *Transport Assessment,*[18] written in 2013) in Figure 5, there was an expectation that traffic levels in High Lane would be much higher *with* the A6MARR than without it, and that the Enhanced Mitigation Measures would be an improvement on the original mitigation measures. But the Phase 1 and Phase 2 measurements also show that there is less traffic flowing through High Lane in those 2014 & 2019 measurement years compared to the predictions and also that the scale of the increases, post-opening, is much lower than predicted. To help understand the underlying annual variability in traffic volumes, in addition to the borough-wide graph (Figure 1), I have also plotted local traffic counts on the A6 using DfT (Department for Transport) data[19] (see Figure 6). Note that manual counts (i.e. based on actual measurements at the site) are shown in red; other values are DfT *estimates*. Also note that at Count Point 56154 there is no more data after 2017; however, in 2019, Count Point 91114 (at a different location along the A6 in High Lane) began to be used instead.

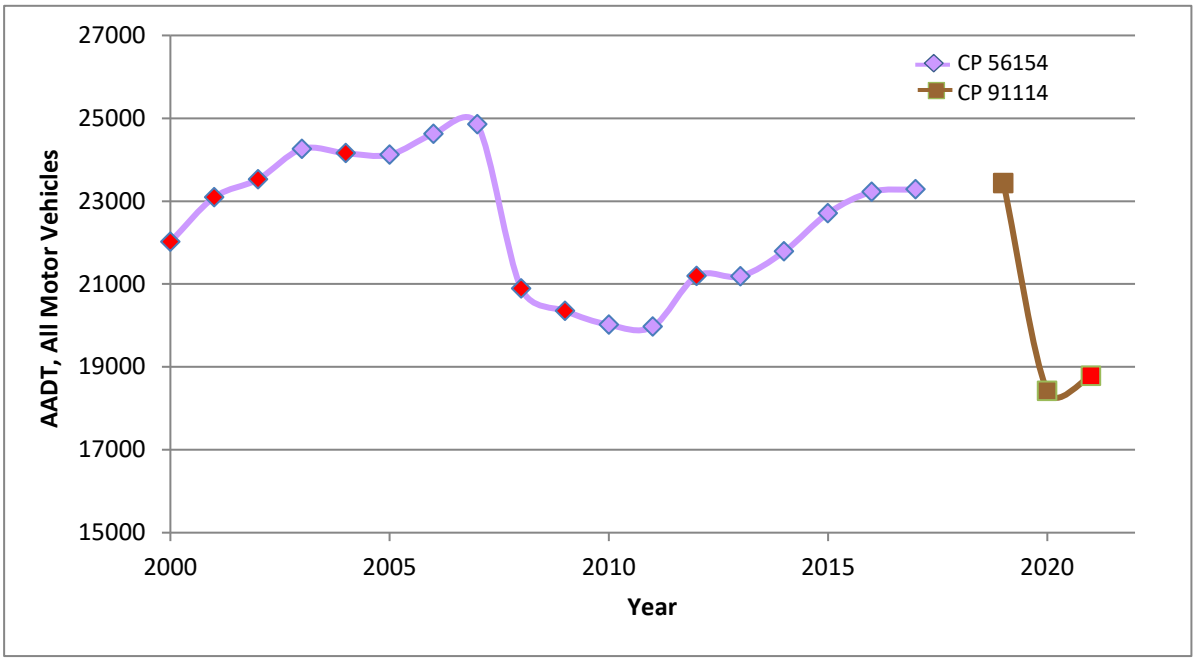

Figure 6: AADT at Count Points on the A6 in High Lane

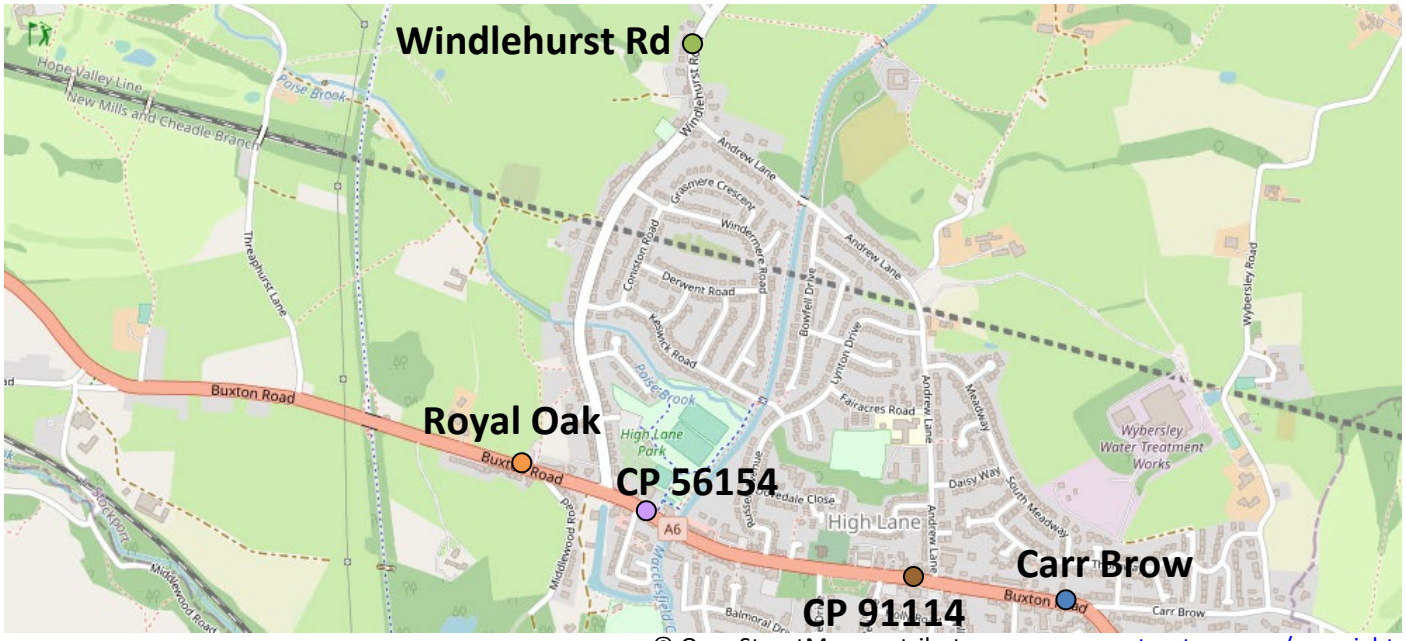

Figure 7: Locations of Count Points used in the Planning Application and for DfT Counts

Given the absence of multiple years of direct measurements made under consistent conditions, I think that a large amount caution needs to be applied to any initial conclusions drawn from the data presented in Figure 5. For example, whereas in 2019 all the count sites in that Figure have *lower* traffic levels than in 2009, the DfT counts in Figure 6 show the average daily total to be *higher* by over 3,000 (i.e. 20,354 at CP 56154 in 2009 compared to 23,437 at CP 9114 in2019).

b. Journey Times

As previously mentioned, journey times were derived from satnav data gathered by TomTom in Sep 2013 to Aug 2014 for the Baseline Report and in Oct 2019 to Nov 2019 for the One-Year Report.

For High Lane, the Baseline Report[7] (Table 4.2) looked at journey times to/from Manchester Airport via the A6, M60 and M56 at various times of the day and on different days of the week. The fastest average time from the airport was just under 23 minutes (**22'56"**) at night (10pm to 6am), compared with 23'29" in the opposite direction (to the airport) in the same night-time period. The slowest average time from the airport on this route was **45'04"** during the weekday evening peak (5pm to 6pm), compared with 39'21" in the opposite direction during the weekday *morning* peak (8am to 9am).

In the One-Year Report[9] (Table 3.1), as expected, by using the A6MARR instead (for a shorter and more direct route), journey times to and from Manchester Airport are significantly less. The fastest average time from the airport was **13'03"** at night (**43%** improvement, compared to 2014), and 13'08" in the opposite direction, also at night. The slowest average time from the airport was **23'52"** on weekdays between 4pm to 5pm, i.e. *before* the traditional "evening peak" (**47%** improvement, compared to 2014). But in the opposite direction, the 8am to 9am traditional morning peak remains the slowest at 19'03", which is also a significant improvement (52% improvement, compared to 2014).

Perhaps a more interesting question is, "What are the corresponding journey times ***along the original route*** (A6, M60, M56) now that the new road is open (and with any other changes, associated or otherwise, that have happened since 2014)?" It's bad news during the daytime — the slowest average time from the airport increased to **59'22"** (14'18" more, i.e. **32% slower**), which applies to the weekday afternoon "pre-peak" period (4pm to 5pm). In the opposite direction, the slowest average is 47'10", which is now moved to the weekday evening peak period (5pm to 6pm) and is an increase of 7'49", i.e. 20% slower. These are significant changes. However, at night after 10pm with much less traffic around, as might be expected there is much less of a change, with the fastest average time from the airport increasing slightly by 38 seconds to **23'34"**, and in the opposite direction, there's a slight reduction by 41 seconds to 22'48".

In the One-Year Report, much higher percentage daytime improvements (up to 64%) are quoted in support of the using the new A6MARR for that journey, but that's because their comparison is done for 2019 conditions, which include the significantly longer daytime journey times along the old route, rather than a "before-and-after" comparison (2019 journeys compared to 2014 journeys), so the differences are greater. Although it may well be valid to include a comparison of the different routes in the same year, it surely makes more sense for the main comparison to be a "before-and-after" one, rather than an "after-and-after" one because it will always be easy to create a route that has a bigger time difference (i.e. faster) relative to another route if that other route is made significantly slower — which is what has apparently happened in this case with the "old" A6, M60, M56 route, where it's up to 32% slower in 2019 than in 2014.

The only set of journey time comparisons in the Phase 2 Report to be highlighted in a contrasting colour [green] are those figures in Table 3.2, which are those "after-and-after" comparisons. However, in fairness, "before-and-after" comparisons are also listed (in Table 3.3), but they are not given as much prominence and are not as detailed as those in Table 3.2.

Two other routes from / to High Lane to / from Manchester Airport are also considered in the report:

- via Poynton, the (old) A555 and Heald Green
- via Davenport, Cheadle Hulme and Heald Green

The results for these routes are broadly similar to the comparisons above with the A6, M60, M56 route, i.e. the A6MARR is obviously much quicker than these two routes, and these two routes are generally slower in 2019 than in 2014.

It is worth noting that all the "High Lane" journey times relate to a start/end point on the A6 / Windlehurst Road junction (see the description on p.34 of the Phase 2 Report[9] [which has three instances of a typo: Windlehurst "Lane"] or the map on p.31), so for most High Lane residents, their journey time will be **longer than this** because the Windlehurst Road junction is not included. This is not a just a minor point because delays on the A6 in High Lane itself, particularly for westbound traffic, need to be considered too. Indeed on pages 50-51 of the Phase 2 Report, it says:

> "*There is anecdotal evidence to suggest that as the rat-running vehicles re-join the A6, the re-joining process contributes to the increase in journey times along the mainline A6 i.e. as existing traffic along the A6 allows traffic from the side roads to turn onto it, queues along the A6 are exacerbated and delays are thereby increased. This area will be subject to* ***a separate investigation***"

The only route included in the report that covers the A6 through all of High Lane is "Route 11", which runs from what I understand to be the junction of the A6 with the A6MARR (or its equivalent on the A6, pre-A6MARR) described as "between Mill Lane and Norbury Hollow Road", through High Lane and Disley to Newtown at the junction of the A6 with the A6015 Albion Road (which goes to New Mills). The quickest average time for this journey before the A6MARR in 2014 was at night (between 10pm to 6am), where it was 7'55" westbound (just 2 seconds faster than the eastbound journey to Newtown at 7'57"). For the same journey during the same night-time period in 2019, there was still a 2 second difference in the times between the directions (although it was the eastbound journey that was quicker). However, the main point to note is that these best-case average times have increased to 8'18" and 8'16", i.e. westbound is now 23 seconds slower and eastbound is 19 seconds slower.

But what about the more typical daytime journeys? In 2014, the slowest average journey time for Route 11 was 12'10" in the weekday period between 7am to 8am in the westbound direction; eastbound, the slowest time was 11'36" between 5pm to 6pm on weekdays. In 2019, the slowest average was 23'40" westbound during the peak 8am to 9am weekday period — **a massive 95% increase** compared to 2014! And in the opposite direction, the slowest average was 14'16" for weekdays between 4pm to 5pm.

This near-doubling of the average journey time for this route through High Lane in the mornings supports the anecdotal evidence quoted above from the Phase 2 Report about there being a serious problem with traffic congestion along the A6 in High Lane during the weekday morning peak, in particular. It is hoped that the "separate investigation" will take place and will lead to some action(s) to mitigate the problem.

The Phase 2 Report further acknowledges the problem on p.50:

> "*…there is a significant increase in the AM peak westbound journey times along route 11, from the A6/ A6015 Albion Road in New Mills to the A6 in High Lane (between Mill Lane & Norbury Hollow Road), as evidenced by average journey times typically now being more than 10 minutes longer than the Baseline/ pre-scheme journey times, with time reliability data showing similar patterns. The cumulative journey time graphs indicate that the* ***majority of this increase is occurring between Disley and High Lane****, with delays starting south of Carr Brow in the vicinity of Park Road. It is understood that this increase in the journey time along the A6 between Disley and High Lane has resulted in the school bus, servicing Poynton High School from Disley, being unreliable with journey timings for this service being reviewed.*"

And on the subject of journey timings, average journey times are, of course, only one aspect to consider when allowing time for travelling along a particular route; another is **reliability**, i.e. how much variability in journey times is there likely to be for a given route at a particular time of day? How has this changed since the opening of the A6MARR?

Journey reliability is considered in section 3.3 of the Phase 2 Report,[9] with the results from Table 3.8 plotted in Appendix C. (Table 3.8 is just a summary, and includes only the two so-called "peak" 1-hour periods, whereas the plots in Appendix C show more time periods, which in the case of the evening "peak", shows that the hour before that is the actual peak, i.e. slower and less reliable times.) The report assesses reliability in terms of "percentile journey times" and thereby using the size of the "interquartile range", in particular, as an indicator of reliability — the narrower the range, the more reliable the journey.

For those who may not be familiar with this statistical terminology but are nevertheless interested, here's my attempt at a quick explanation in simple terms. When considering a set of journey-time measurements, if they are arranged in order from fastest (lowest time) to slowest (highest time), the middle one in the series is called the "**median**". Most of us will probably already know this. But another name for the median is the "**50th percentile**". That's because it splits the list of journey times in half: 50% of the times are the same or below this value and 50% are above it. Now imagine if that ordered list of two halves were instead divided into four equal pieces (quarters), with the same number of journey times in each piece. The **25th percentile**, which is also known as the **first quartile** or **lower quartile**, represents the middle time between within the first half of the list of times, i.e. the fastest 25% of the times (i.e. times in that lowest quarter of the list) will be at or below the 25th percentile. In other words, the 25th percentile journey time can be thought of as the time taken to travel that route that only 1 in 4 (i.e. 25%) vehicles matched or went faster than. Similarly, the **75th percentile**, which is also known as the **third quartile** or **upper quartile**, splits off the fastest 75% of times from the slowest 25%. The **interquartile range** (**IQR**) contains the times between the lower quartile and upper quartile (i.e. the "middle 50%" of times in the list), and as previously mentioned, is used in the report as an indicator of journey-time reliability because sets of measurements with a low interquartile range mean that the middle 50% of times are close together, indicating good reliability, whereas a high interquartile range indicates poor reliability because of a wide spread of journey times.

So, Appendix C of the Phase 2 Report presents journey reliability in the form of box-and-whisker plots that show the interquartile range enclosed within a box, together with "whiskers" that stretch out from the 5th percentile to the 95th percentile, to illustrate the range of journey times measured — by definition, 90% of those journeys were on that line and 95% were at least as fast as shown at top of the whisker. In the Baseline Report, the corresponding plots for 2014 can be found in Appendix H (p.62 onwards), which are in a separate document[2] from the table of reliability figures (Table 4.3 on p.27) in the main report. [7] Fortunately, however, the Phase 2 Report includes some of the baseline plots next to the Year One plots, making a comparison easier.

For Route 2 (A6, M60, M56, Manchester Airport), all of the IQRs have increased post-A6MARR, meaning less reliable journey times, and many of the 95% percentiles have more than doubled their journey times. But, of course, for *that* journey, the new A6MARR (Route 1) would be a far better option — the largest IQR (approx. 14½ minutes, eastbound, 4pm-5pm) from *this* route is much lower than that from Route 2 (36' 29", eastbound, 5pm-6pm), and the largest 95th percentile time for Route 1 is 50'35", compared to 2h 38'24" for Route 2 (p.46 of the Phase 2 Report[9]), where these largest 95th percentile periods happen to be the same as for the largest IQR periods, i.e. eastbound evening pre-peak or peak.

For Figure 8 and Figure 9 below, I have plotted selected box-and-whisker diagrams using data from the Phase 2 Reports, but note that because not all of the quartile figures are available in numeric form in the report, I have drawn the boxes by visual comparison with the plots in the report; however, all the other points were plotted using a spreadsheet program.

Both plots show the 95th percentile journey times were quite large compared to the average, indicating a small proportion of journeys were experiencing significant delays. Also, in all cases, the median journey time was lower than the average (i.e. mean) journey time, which indicates that the average journey time was larger because a relatively small proportion of significantly delayed journeys.

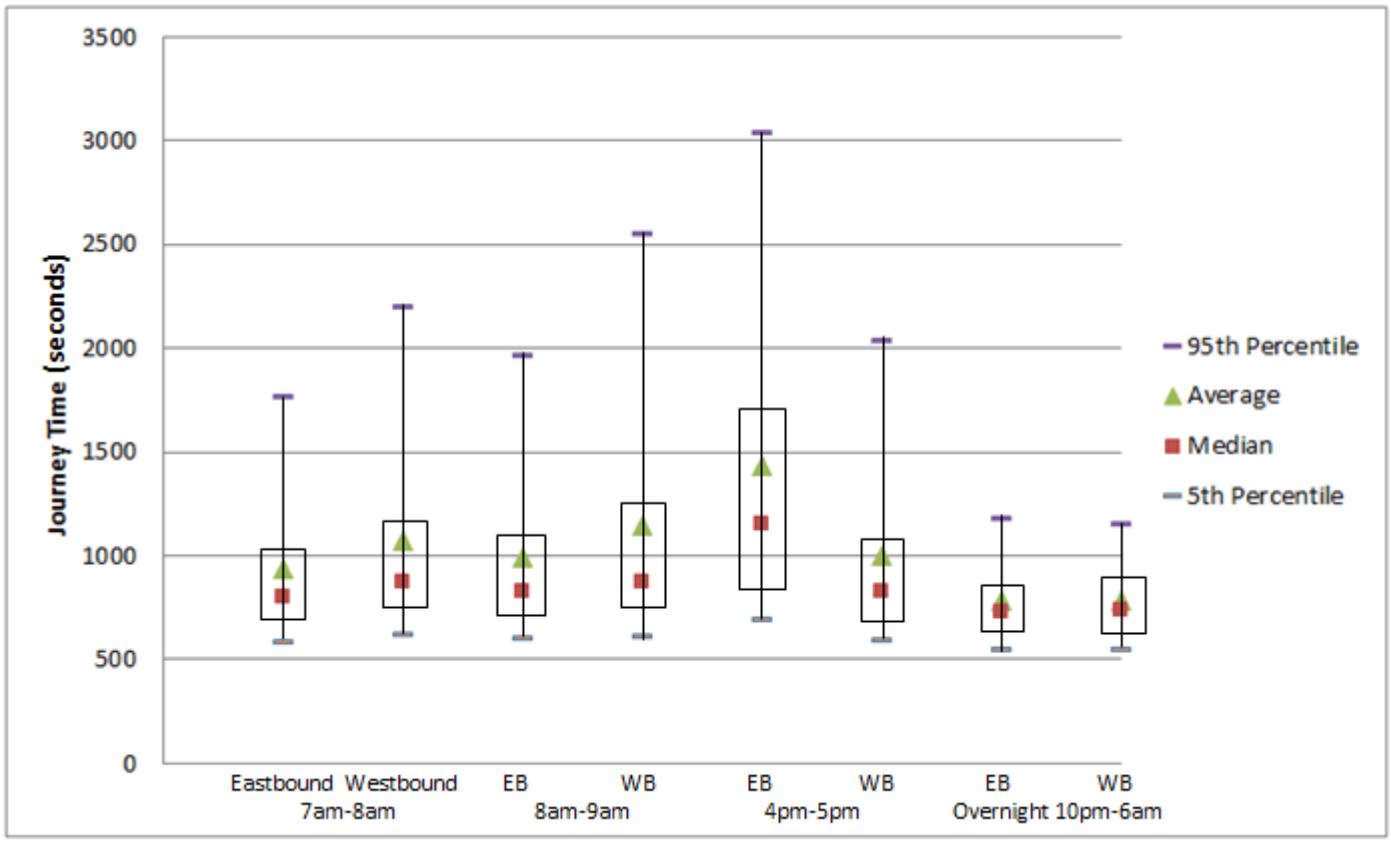

Figure 8: Box & Whisker Diagrams for Route 1 (A6MARR, 2019) Journey Reliability

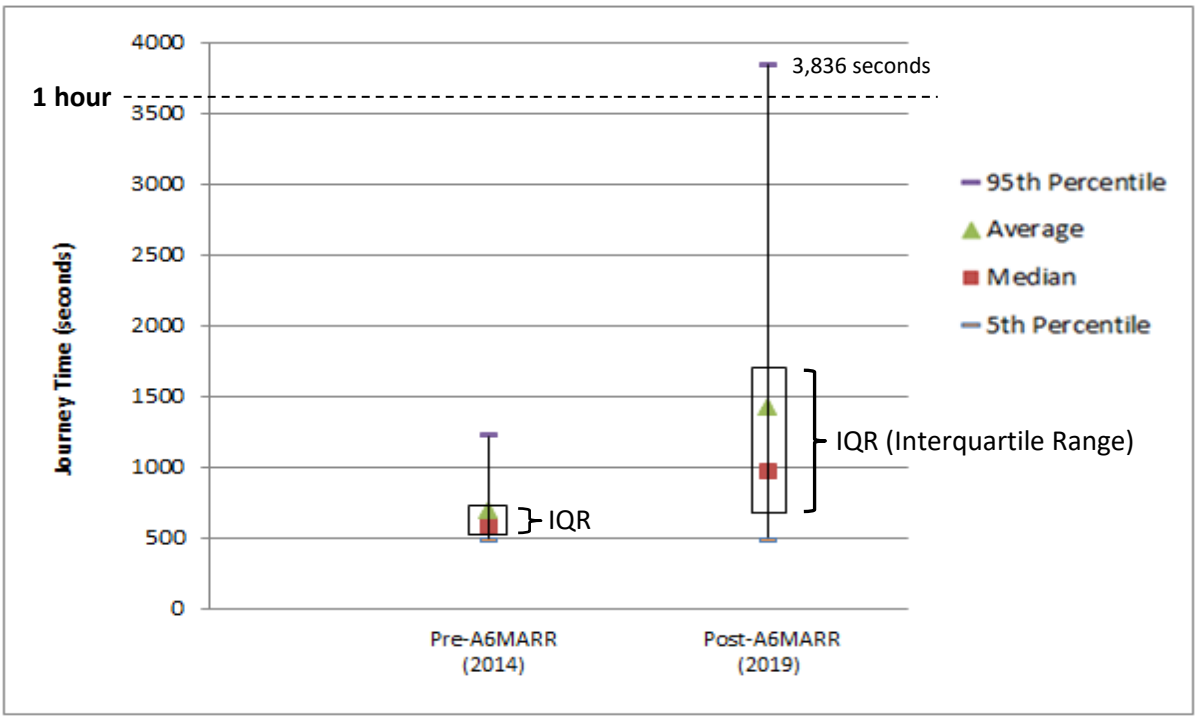

Figure 9: Box & Whisker Diagrams for Route 11 (Newtown - A6MARR) 8am to 9am westbound, Journey Reliability

From Figure 8, the worst-case IQR (of approx. 900 seconds, i.e. 15 minutes) is less than that for alternative routes (not shown, but is approx. 1200 seconds, i.e. 20 minutes for Route 2), indicating more reliable journey times with the new A6MARR — but this should not be a surprise, as this new route was always intended to improve this A6 / Manchester Airport journey.

But as previously mentioned, a consequence of the new A6MARR is that the existing alternative routes for this journey, which now have additional junctions as a result of the scheme, have led to increased journey times along those alternative routes. In addition to these increases in the average journey times, the journey reliability along those alternative routes has worsened, too. For example, with the A6MARR open, the IQR in 2019 along Route 2 increased to 2189 seconds, i.e. 36'29" minutes, compared to approx. 20 minutes in 2014 — much less reliable now.

Looking at Figure 9, which shows the journey reliability for Route 11, i.e. a journey along the A6 through High Lane itself, it is clear that the reliability for the morning peak period has significantly worsened after the opening of the A6MARR (from the 2019 measurements, one year after the new A6MARR had opened). And as previously mentioned, most of the measured journey times along that route have hugely increased too.

c. Air Quality

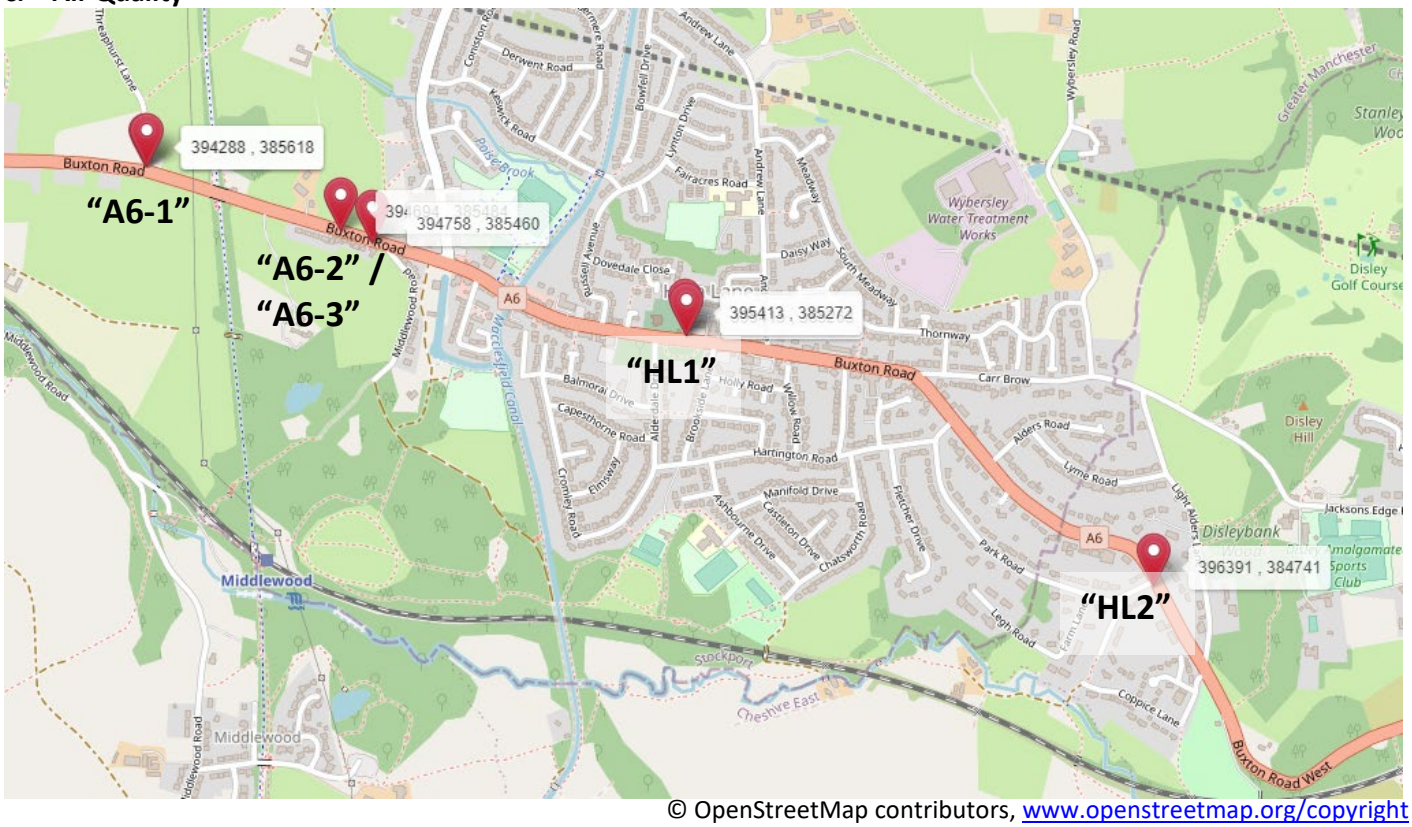

Figure 10: Location of NO_2 Diffusion Tubes near High Lane

In Figure 10, I have shown the locations of all the nitrogen dioxide diffusion tubes in the High Lane locality along the A6 from Tables 2, 3 and 4 of the Phase 2 Air Quality Report[10]. According to the report, only location HL2 was unchanged between the Baseline (2014) and Phase 2 (2019/2020) reports, and A6-3 was a new site for 2019. However, the location differences are so small that effectively, the only change is A6-2's new location (which is virtually the same as the "newly added" A6-3 by the Royal Oak) compared to its old location, which is slightly further west along the A6, before Station Farm.

Location	2014 Annual Mean NO_2 (µg/m³)	2019 / 2020 Annual Mean NO_2 (µg/m³)
A6-1	32.7	29.0
A6-2	31.9	23.4
A6-3	-	26.3
HL1	**49.9**	39.1
HL2	21.7	17.6

Table 2: Annual Mean NO_2 Concentrations: Baseline / Phase 2 Comparison

Table 2 shows that in 2014, the annual mean at location HL1 (in red) exceeded the UK annual mean objective of keeping below **40 µg/m³** of nitrogen dioxide, and that after the A6MARR opened, the air quality at that site (HL1) reduced to a level just below that threshold. It also shows that concentration levels at all these locations reduced post-A6MARR.

However, although this may seem like good news, I would repeat the caution I mentioned earlier, namely, that I do not believe these post-A6MARR results represent comparable or typical measurements for all the reasons previously stated. Nevertheless, I think the HL1 result, in particular, strongly confirms the need for a follow-up study — the "separate investigation" previously quoted in the Phase 2 report regarding the severe peak-time congestion, which is likely to have significantly adversely affected the air quality near to this route.

d. Noise

Originally, High Lane was not included in the set of the A6MARR scheme's 15 monitoring point sites (MP01 to MP15) for measuring of ambient acoustic noise. This initial set of sites is listed in section 13 of the Environmental Statement[20] within the Planning Application for the A6MARR scheme. Perhaps the omission of High Lane from this list may have been because the new road itself is outside the boundary of High Lane and even though it was predicted there would be more traffic travelling through High Lane as a result of the new road, the results of the modelled noise levels showed the impact would be low for High Lane, with the possible exception of Wybersley Road. These results are presented in Figures 13.2 and 13.7 of the Section 13 Figures document[21] associated with the Environmental Statement.

However, after taking into account feedback from public consultations, a site in High Lane was added to the list, referenced as Site ID 5 in Table 4-8 of the Baseline Report[7], which I have shown on a map in Figure 11. The detailed results from 2014 are presented in Appendix K of the Baseline Report as part of the "Appendices J to L" document[8] from page 71 of the PDF (marked as page 39) onwards. It states the location as having a shortest distance of "approximately 290 metres" from the main road (A6). (This compares with approximately 314 metres (more than 1000 feet) when I tried using Google Maps[22] myself.)

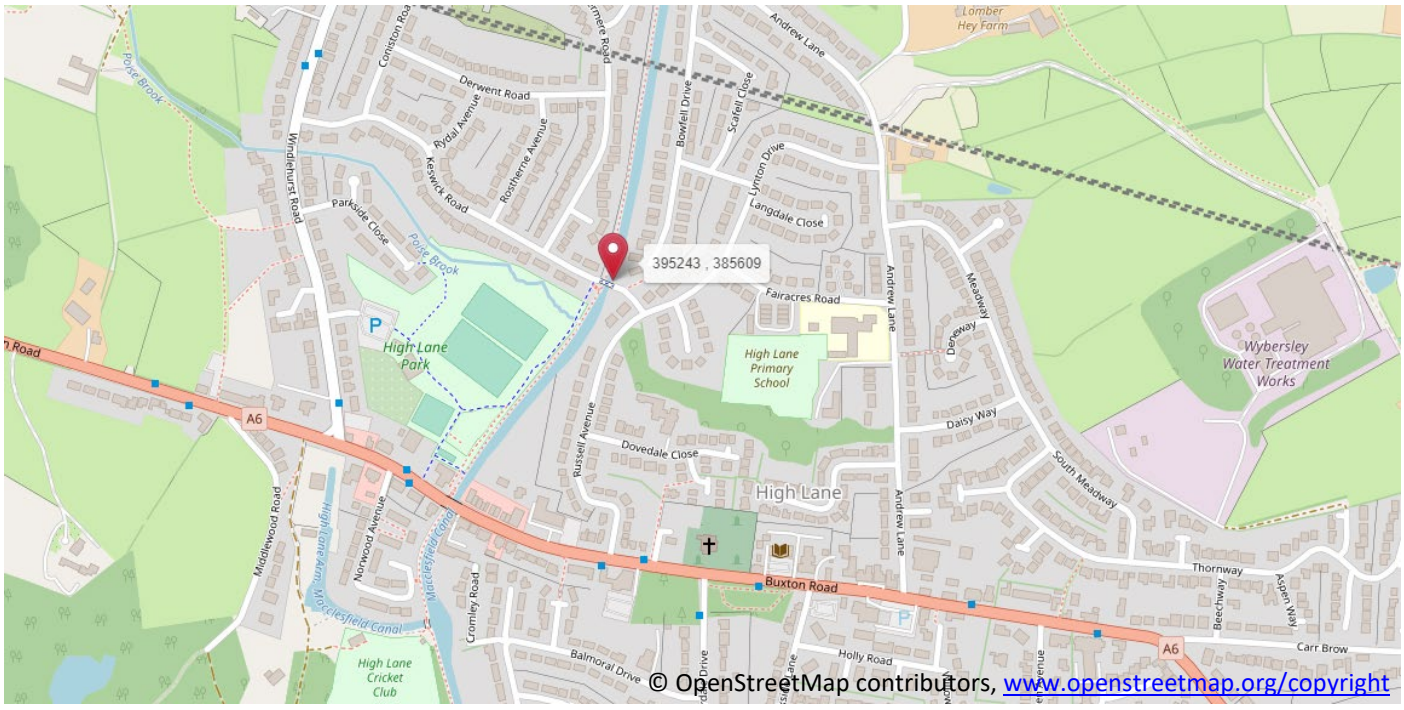

Figure 11: Noise Monitoring Location 5, near Keswick Road

The noise monitoring results in High Lane from Phase 2 (measured on 18th October 2019) are similar to those from the Baseline Report (using measurements made on 8th October 2014), being slightly quieter (by 1 decibel) in 2019, and are comparable with the predicted range (of 0 to +1 dB) in the Environmental Statement, published in 2013.

The actual figures are **51.6 dB(A)** (pre-construction) and **50.6 dB(A)** (post-construction), where these figures can be thought of as representing the average, over an 18-hour period (6 am to midnight), of the loudest 10% of sound level

measurements, after adjusting for the fact that human hearing is more sensitive to some sound frequencies than others. More formally, these are measurements are $L_{A10,\ 18h}$, i.e. the arithmetic mean value of the 'A' weighted noise levels, which are exceeded for 10% of the time in each of the 18 one-hour periods between 06:00 hours and 00:00 hours. In practice, these so-called 18-hour measurements are actually extrapolations using a standard (and simple) method that involves monitoring during a continuous 3-hour period (starting between 10 am and 2 pm), averaging and then subtracting 1 dB.

As there are mistakes in these formulae in both the Baseline Report and the Phase 2 report, I have shown the intended formulae below. The mistake in Eq. (2), where the upper bound of the range of times to start from was shown with a **greater**-than-or-equals sign instead of a **less**-than-or equals sign (p.33 of Appendix K the Baseline Appendices[8] and p.6 of the Phase 2 Noise Report[11]) is clearly nonsense, and has obviously not been used for the calculations, and so can be safely ignored.

$$L_{10}(\text{18-hour}) = L_{10}(\text{3-hour}) - 1\ \text{dB(A)} \qquad \textbf{Eq. (1)}$$

$$L_{10}(\text{3-hour}) = \frac{1}{3} \sum_{10 \le t \le 14}^{t+2} L_{10}(\text{hourly}) \qquad \textbf{Eq. (2)}$$

Both companies that produced these reports had exactly the same error as each other! Also, the Phase 2 report introduced a further error in Eq. (1) by using a minus sign with spaces (instead of a hyphen) in "18-hour", and it should be noted that the 21 instances of "$L_{Aamx,\ 15min,\ dB}$" are a repeated typo for the parameter "$L_{Amax,\ 15min,\ dB}$".

Conclusions

For traffic flows in High Lane, the One-Year Post-Development measurements confirm there is more traffic on the A6 and on Windlehurst Road compared to the baseline measurements prior to construction. They also show that the actual increases in traffic were **less** than predicted. However, although these November 2019 results were pre-pandemic, they should nevertheless be treated with some caution because they were made at a different time of year to the baseline measurements — and outside the period that is normally used for such measurements, i.e. "neutral days" between March and October, excluding school holidays and public holidays.

For the journey times, the results showed significant improvements when using the new road to and from the A6 and Manchester Airport. However, this seems to have been at the expense of journey times of alternative routes involving nearby roads. Also, these journey times to/from "High Lane" do not include the majority of the A6 through High Lane — only Route 11 does this, and those results point to significantly increased journey times and congestion, particularly during the morning peak, where the average journey time had **nearly doubled** in 2019 compared to 2014.

For the air quality results, I think there were too many differences in the measurement conditions to draw any definite conclusions, other than highlighting a need to repeat these measurements using conditions that are more similar to those of the baseline. Nevertheless, even with some mid-pandemic "post-lockdown" measurements included from 2020, the annual mean concentration of nitrogen dioxide being within 1 µg/m^3 of the maximum at location HL1 points to a traffic congestion problem that is also evident from other measurements in 2019 listed in the Phase 2 report, such as journey times and reliability data on Route 11.

For the noise results, given the distance of the High Lane measurement site from the A6, and given the other traffic-related measurements in the report, it is not surprising that the noise levels are broadly similar those before the A6MARR was built.

Overall, I think, as the Phase 2 Report itself acknowledges, there is an urgent need to further investigate the severe congestion on Route 11 (which includes the A6 through High Lane) during busy periods.

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