

'What about our Air Quality, Gatwick Airport?'

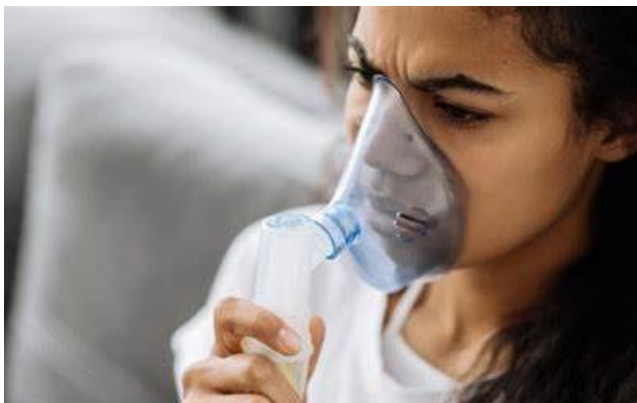


... with the proposals for expansion
with 1 and 2 runways



Public Health England

Health Matters

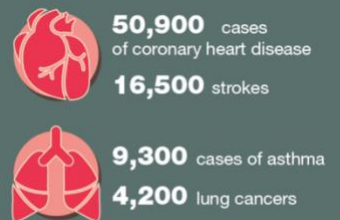


Scale of the problem

It is estimated that **long-term exposure to man-made air pollution in the UK** has an annual effect equivalent to:



Over the following 18 years a **1 µg/m³ reduction in fine particulate air pollution in England** could prevent around:



www.cagne.org

April 2023

What about our air quality?

Page	Index
3	Introduction
4	Prediction and Findings
8	Conclusions
10	Evidence of breaches in air quality
11	Evidence that the air quality improved when Gatwick was grounded
12	Scope 3 pollutants
13	Gatwick freight aspirations and the effect on air quality
13	Historic evidence of ultrafine particles from airports
15	Evidence of being disingenuous when it comes to air quality
16	Health impacts of poor air quality
18	Appendix A
20	Appendix B
21	Appendix C
22	References

Introduction

In 2016, CAGNE released a report '**What about our Air Quality?**', into the failings in air quality of Gatwick Airport as they competed for a second runway against Heathrow's third runway.

This paper is an update on that report, seeking to tackle the decline in air quality if Gatwick expands with either 1 or 2 runways.

In 2015, the government's appointed body, the Airport Commission, stated - '51,000 people would have worse air quality if Gatwick expands.' (final report July 2015).

At this time, the CEO of Gatwick Airport publicly stated, "*Gatwick Airport has never and will never breach air quality limits*".

The truth is that limits have already been broken around Gatwick **and continue to be**, whilst ignoring the impact that ultrafine particles (UFP) have on residents and the work force.

Monitoring and “working with” local authorities, as offered, is not good enough when it comes to the air we breathe – all in the interest of commercial gain, with the cost being passed to us and the NHS.

CAGNE
Communities Against Gatwick
Noise and Emissions
The umbrella aviation community and
environment group for Sussex, Surrey and Kent
Est Feb 2014
www.cagne.org
cagnetatwick@gmail.com
#pledgetoflyless
[Twitter](#) [Facebook](#) [Instagram](#) [LinkedIn](#)

Prediction and Findings

It is inevitable that air quality will decline further, as Gatwick Airport push ahead with increasing traffic from one runway through FASIS (modernisation of airspace) and by rebuilding the emergency runway as a second runway, both without the investment in on-site infrastructure and the sustainable transport links that an expanded airport requires (whether 1 or 2 runways).

Reigate and Bansted Council reported to the Gatwick Airport steering group in June 2012 airports have been identified as a significant source of ultrafine particulate pollution^{2,3} i.e. particles that are under 0.1 µm in aerodynamic diameter, and that a large proportion of these particles are generated during take-off with the resulting 'spike' in ultrafine particles detected at least 600 m from the airport based on studies at Los Angeles Airport (LAX).

Dr Gary Fuller (Imperial College) on harmful ultrafine particles (UFP) and concentrating on particles based on traffic in 2018/19 (combined with noise), Gatwick is ignoring the cocktail of pollutants that will be generated by an expanded airport (however many runways) in reports to date. Additional research by Reigate and Bansted Council and Leicester University confirms the ongoing issues already being created by airport operations now.

Dr Gary Fuller found that the airport contributed 17% UFP directly from the airfieldⁱ and quoted – ***'The number of ultrafine particles 500 metres downwind of Gatwick Airport was greater than those at the kerb of London's busiest roads.'***

During the 2016 battle between Gatwick and Heathrow, Gatwick management stated that, "...onward surface access is not our problem" ('surface access' meaning road and rail transport for passengers).

It would seem this is still their attitude today. Traffic charges revenue at the airport in 2022 were £405.7m. Even if Gatwick were successful with their 2022 targets of 48% of passengers travelling by public transport, plus incentives such as Kiss & Fly schemes at 10%, staff parking reduced by 5% (with 5% reduction year-on-year) and staff travelling by bus as well as passengers – **no evidence has been seen to demonstrate that these targets have been met.** We find the sustainable transport plan poor, with little to assist those walking or cycling to work, now or with the new highway schemeⁱⁱ and does not address the problem of air quality decline.

The Environment Act of 2021 requires Local Authorities to tackle air quality. ⁱⁱⁱ

While onward surface access may not be Gatwick's problem, it will certainly be a problem for the area's residents, businesses, schools, local authorities and the NHS because, as CAGNE establishes below, there is no alternative access to a prospective Gatwick 2, other than by road. Even with electric vehicles, the concentration and number of polluting particles can only escalate from both the airfield and the roads, with much of the pollution being positioned to the north of the

airport – the worst polluted area today being north of Gatwick.

Gatwick has specified that cargo would increase to over 220,000+ tonnes with a 2nd runway. With that cargo also needing onward surface access, that would take the equivalent of nearly 8,300 three-axle artc lorries (using government lorry carriage figures^{iv}). This increase in not factored in when considering air quality. This additional movement of vehicles has not been included in any research to date.

The large increase in car parking, whether with a 1 or 2 runway airport, would suggest that Gatwick continues to see surface access as a major player (parking revenue for 2022 was £101.7m). With 39,000 parking spaces, a further 21,196 with off-site airport parking, and 6,200 for staff parking and cargo, we can expect to see a significant increase in polluting particles from the roads.

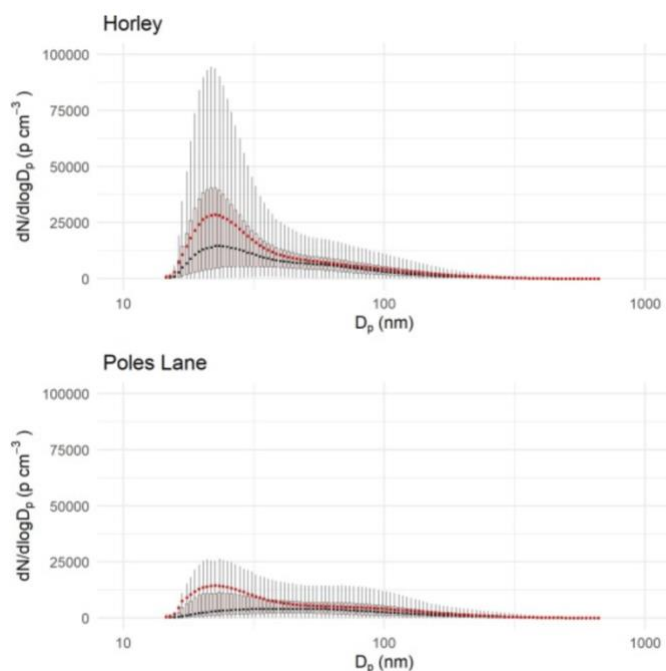
New offices and hotels will also contribute to increases in staff, suppliers, and travellers by road, the majority positioned in the pollution area.

Figures below are taken from the 2018/19 Imperial College study at Gatwick Airport for concentration of particles. The percentage expected from expansion are based on the study’s findings and Gatwick’s published increases in aircraft movements (ATM) and passengers alone.

		% increase	Particle Number Concentration
2018/2019	ATMs: 280,700 Passengers: 46m	N/A	17% from airfield 94,000 p/cm ³
1 Runway expansion (from 2018/2019 figures)	ATMs: 318,000 Passengers: 62m	13.33% 34.47%	126,402 p/cm ³
2 Runways expansion (from 2018/2019 figures)	ATMs: 390,000 Passengers: 75m	38.94% 63%	153,220 p/cm ³

The Imperial College study of two sites found wind direction as follows –

- *At Horley (north), the campaign was dominated by south-westly wind (40–45% of the time) with wind speeds up to 9.8 m s⁻¹.*
- *During the campaign in Poles Lane (south), the prevailing wind direction was also from the south west (25–30% of the time) with wind speeds up to 10.3 m s⁻¹ but the wind direction varied more than during the campaign in Horley (north).*



Box and whisker plot with mean (red) and median (black) of PNC size distribution during the sampling campaigns in Horley (top) and Poles Lane (bottom).

Evidence - Horley showed higher concentrations than the London background site (mean: 6142 p cm^{-3} , median: 4218 p cm^{-3}) and the rural site (mean: 3102 p cm^{-3} , median: 2463 p cm^{-3}). **Maximum concentrations were generally highest at Horley which reflects the influence of the airport as the site is downwind of the airport and major roads for the majority of the time.**

Further work was undertaken by Reigate and Banstead Borough Council (RBC) and Leicester University up until 2019. The main findings were that:

- when winds were off-airport, residential exposure (at 350m from A23, 610m from the airport) was far higher than that measured 1.5m from the six-lane road in central London, but the average exposure was lower than the roadside site,
- the average exposure at the north site was around double the average exposure at the London background site,
- there was preliminary evidence that residents closer to the airport than the north site, for example, were exposed on average (not just when winds were off-airport) at levels similar to those seen at Marylebone Road.

Table below is based on the new WHO guidance produced by RBC which clearly illustrates the wind direction carrying particles north from the airport over residential areas to the north of the airport -

	2018 Data	2019 Data
No. of days in period	84	205
No. of days with daily average over 10,000 counts / cm ³ (days HIGH)	46	73
% of days over 10,000 counts / cm ³	54.8 %	35.6%
No. of days with minimum of 1 hour over 20,000 counts / cm ³	53	110
% of days with minimum of 1 hour over 20,000 counts / cm ³	63.1 %	53.6 %
No. of days over 10,000 counts / cm ³ or minimum 1 hr greater than 20,000 counts / cm ³	57	114
% of days over 10,000 counts / cm ³ or minimum 1 hr greater than 20,000 counts / cm ³	67.8 %	55.6 %
No. of days with daily average under 1,000 counts / cm ³ (days LOW)	0	0

Table 2: RG1 Ultrafine Particle counts measured in 2018 and 2019 – comparison to WHO guidelines.

Wind Direction	Days	No. Days with Daily Average over 10,000 particles / cm ³	No. Days with min. of 1 hour over 20,000 particles / cm ³
North	13	0	1
East	43	1	5
South (from the airport)	66	51	56
West	83	21	48

Table 3: Distribution of High ultrafine particle concentrations at RG1 by Wind direction in 2019 data.

- RG1 is Horley, north of the airport

RBC have been unable to secure sufficient funding from Gatwick (or other sources) to continue monitoring this pollutant in Horley (north of the airport).



Conclusions

- Gatwick Airport continues to breach air quality limits of NO_x, with COVID offering a unique research opportunity into the reduction of particles when the airport is not operating.
- Research has found that peak times produce peak distribution of particles. As Gatwick seeks continual growth throughout the daily period, rather than at just peak times of the day as at present, we can expect peak distribution of particles to be spread continuously throughout the day.

It is therefore anticipated that the concentration of particles with a 2-runway airport will increase by 63% to 153,220 particles/cm³ throughout the day. We have been unable to calculate the exact increases caused by service vehicles, airside vehicles, taxiing and passengers accessing the new Gatwick rail station.

- Gatwick seeks only to “work with” local authorities to monitor and mitigate (no details provided on how this would be undertaken) but not to address the inevitable decline in air quality due solely to increase in vehicle traffic to and from the airport and newly-built amenities.
 - To ‘work with’ is not good enough when it comes to known air pollutants created by the airport operations.
- Gatwick Airport seems to ignore the concentration of particles, especially the ultrafine particles, from 1- and 2-runway expansion in proposals -
 - In construction
 - In operating with 1 and 2 runways
- The increase in taxiing, airfield vehicle movements, and departures and arrivals will inevitably lead to a significant increase in particles, which are not seen as being addressed in proposals (Scope 3).
- The design of the new layout of the airfield, with 1 and 2 runways, places new pollutants directly in the existing areas of pollution to the north of the airfield.
- The added hotels, car parks, hangers, incinerator, terminal (expected to replace the staff car park later), drop off zones and offices all add to the cocktail of potential pollution for individuals (residents, passengers, and workers), as well as further afield due to the dominant wind direction that research shows disperses particles to the north beyond of the airport boundary towards London. Note that EV vehicles wear tyres more than current dispersal. (Appendix B)

In view of the Environment Act of 2021, and the studies undertaken to date that give clear indications of the pollution potential of an expanded Gatwick Airport (whether 1 or 2 runways), CAGNE does not see how local authorities can support such growth, as the burden will be too great upon the local environment, the local purse, residents and the NHS.

We do not see how the planning inspectorate can accept the proposals offered by Gatwick Airport that do not give stringent criteria on how this pollution is being addressed now, or how it would be prevented with expansion, whether 1 or 2 runways.

Evidence of Breaches in Air Quality

- The Airports Commission report states 20,000 homes will experience greater Nitrogen Dioxide (NO₂) pollution if a second Gatwick runway is built.

The Airports Commission identified that *'substantially more people will be put "at risk" by poor air quality at an expanded Gatwick, than at an expanded Heathrow'*.

Evidence of air quality breaches, historic and now –

Gatwick stated in 2015 that air quality limits have never been breached. This may have been misleading, as was demonstrated by Crawley Borough Council (the local council for Gatwick), which has recorded that the limits have already been breached close to the airport in recent years. This original evidence has now been removed from the internet, but there is further evidence from 2016.^v

According to RBC, Gatwick air quality monitors were breached in 2015 – GATCOM (Gatwick advisory committee) documentation (14 July 2016).^{vi}

RBC monitored annual mean levels of NO₂ on the A23 (Gatwick's main access road), Brighton Road in Horley (RB149), reporting a level of 45ug/m³ (micrograms per cubic metre) in 2015, which is a breach of the 40ug/m³ limit.^{vii}

4.5.20 - Gatwick Airport recognise in the 2019 Master Plan details that there are areas where the 40 µg/m³ maximum permissible annual mean concentration for NO₂ is exceeded. Two areas:

- at Hazelwick roundabout in Crawley.
- on the A23 Brighton Road in Horley.

Additional monitoring close to the junction of Massetts Road and the A23 in Horley recorded an annual average NO_x/ NO₂ concentration of 46µg/m³ in 2017. (This is a residential area near the road junction). Modelling indicates that, at this location, 22.9% of the NO_x pollution is attributable to the airport's operation.

Additional housing for staff for 1 and 2 runways: Homes England base much on their plans for building 3000 houses for cycle-to-work, identifying Gatwick Airport as a potential employer even though Gatwick 1 and 2 play down the number of new jobs to 18,000 (FIGURE 5.19 Master plan). As we highlight in this report, walking and cycling to the airport is unrealistic – see evidence Appendix A^{viii}. With no funding for any Crawley relief road, this number of new houses must add at least 2000 cars to existing roads.

The Horsham District Council response to the summer G2 consultation identified Ifield as an area of particular concern, when it came air quality issues.

Evidence that air quality improved when Gatwick Airport was grounded (due to COVID)

Reigate and Bansted Council (RBC) has monitored the air quality surrounding Gatwick Airport, for Nitrogen Oxides (NO_x) – 2022 results released in March 2023.

Given the restrictions on movement in place during 2021 due to the COVID pandemic, at a local, national, and international level, it is perhaps not surprising that NO₂ concentrations remained below the UK annual average limit of 40µg/m³ at sites normally assessed on the Horley Gardens Estate, on Victoria Road, and at the A23 site (RB149) – which has historically exceeded the limit – where the annual average concentration was 33.1µg/m³ in 2021 (31.4µg/m³ in 2020) down from 43µg/m³ in 2019.

On Victoria Road (RB151), NO₂ concentrations were 24µg/m³ in 2021 (23µg/m³ in 2020) down from 33µg/m³ in 2019, while the highest concentration measured on the Horley Gardens Estate was 17µg/m³ (in both 2020 and 2021) down from 26µg/m³ in 2019.

However, in both 2020 and 2021, the highest concentrations were on the feeder roads into the estate, and not at the sites in the vicinity of RB59 which are normally associated with the highest concentrations. At the RB59 'worst case' receptor, concentrations were around 15µg/m³ in both 2020 and 2021, which is only just over half the highest concentration in previous years, with 26µg/m³ in 2019 and 27µg/m³ in 2018.

Passenger numbers at Gatwick fell by 38.5% in 2021 compared to 2020 (which were down 86.5% on 2019), while aircraft movements fell by 30.5% over the same period (down 80.5% on 2019). See Appendix A.

Traffic flows on the M23 spur were difficult to determine in 2020, as there is no data available on the Highways England website, but in 2021 traffic was around 65% lower than in 2019.

The results from 2021 are in line with the predicted distribution of NO₂ concentrations for the Horley Gardens Estate and are largely unchanged on 2020. **However, the ongoing COVID restrictions continued to result in some of the largest reductions in NO₂ (10 to 11µg/m³) occurring at sites closest to the airport (e.g. RB59),** while elsewhere on the estate, concentrations have fallen by 5 to 8µg/m³ compared to 2019. To put these changes into context, at suburban residential sites elsewhere in the borough, NO₂ concentrations are down by 4µg/m³ in both 2020 and 2021, compared to 2019.

NO₂ concentrations in Charlwood and Hookwood were unchanged on 2020 but still 3 to 4µg/m³ lower than in 2019, while concentrations in Smallfield increased by 1µg/m³ in 2021 but still 4µg/m³ lower than in 2019.

Scope 3 pollutants – surface access to the airport?

Why does Gatwick underestimate, in fact ignore, the significant increase in UFP that will be generated by such substantial increases in aircraft movements, vehicle movement on the airfield (including increased taxiing), the predominant wind patterns, and the fact that such air pollution cannot be mitigated? Gatwick is only offering to “work with” local authorities to “monitor” and “mitigate” (no definition or budget is provided on how this would be achieved).

Heathrow Airport, with an aim of becoming carbon-neutral, includes Scope 3 pollutants in its reporting, whereas Gatwick Airport does not. **It is hard to understand how Gatwick Airport can be allowed to ignore surface access pollution, especially as they aim for a significant increase in freight – from 102,000 tonnes a day to 220,000 by 2032.**

These ultrafine particles are inflicted by Gatwick Airport on the surrounding areas as well as further afield, with a predominantly westerly wind transferring particles from the airfield northwards. They are, and will be, created by aircraft on the runway as well as traffic on the roads to and from the airport, both now and with expanded operations (impending Development Consent Order to achieve a second runway due in Spring 2023).

Heathrow began short-term on- and off-airport monitoring of ultrafine particles in 2016, which continued in 2019 and has since been published, while to date, Gatwick have not even undertaken any on-airport monitoring.

Heathrow report that illustrates Scope 3 emissions –

Net Zero Plan	Emission source	Greenhouse gas emissions		
Objective		2019	2020	2021
Net zero on the ground	SCOPE 1 (tonnes CO ₂ e)	26,998	23,209	29,091
	Fuel consumption utilities	21,942	18,903	23,525
	– Market based	24,335	18,903	23,525
	– Location based	(134,288.9 MWh)	(162,578 MWh)	(125,326 MWh)
	Operational vehicles	1,668	1,121	1,023
		(6,732 MWh)	(4,597 MWh)	(5,324 MWh)
	LPG for fire training	35	–	–
		(4.9 MWh)	(0 MWh)	(0 MWh)
	Refrigerants	2,871	2,777	2,968
	De-icer	482	407	1,575
	SCOPE 2 (tonnes CO ₂ e)	–	–	–
	Grid electricity consumption	–	–	–
	– Market based	71,163	52,392	49,066
	– Location based	(283,229 MWh)	(224,722 MWh)	(231,082 MWh)
	SCOPE 1 and 2 carbon intensity (kg CO ₂ e/passenger)	0.33	1.05	1.50
	SCOPE 3 (tonnes CO ₂ e)	20,782,605	8,845,765	8,125,487
	Passenger Surface Access	632,348	195,040	130,699
	Colleague Surface Access	115,531	66,428	78,537
	Business Travel	1,070	245	28
	Waste	563	1,407	176
Water	2,068	980	434	
De-icer	4,584	1,517	3,267	
Operational Vehicles & Equipment	33,015	18,075	12,204	
Construction Vehicle Fuels	–	771	1,299	
Third party grid electricity consumption	–	–	–	
– Market based	146	125	69	
– Location based	43,706	28,790	23,785	
Fuel Consumption – Utilities	272	266	173	
Net zero in the air	Aircraft in the landing and take-off cycle (LTO)	1,250,648	511,056	505,552
	Cruise Emissions from all departure flights	18,742,505	8,049,981	7,393,049
	Total (tonnes CO ₂ e)	20,809,603	8,868,974	8,154,578

Gatwick freight aspirations and the effect on air quality

Freight increases could see significant increases in heavy goods vehicles –

“Although freight vehicle trips represent only circa 6% of all Heathrow-related vehicle trips, they are estimated to generate around 36% of vehicle-related emissions... While some of this freight activity is associated directly with airport operations, for example through catering deliveries for flights or the removal of waste, the majority of freight trips are associated with the movement of cargo in and out of the airport.”

Evidence - Gatwick specify that cargo would increase to over 200,000 tonnes with a 2nd runway. That would require the equivalent of nearly 8,300 three-axle artic lorries (using government lorry carriage figures^x). If we take the next figure of 320,000 tonnes of cargo by 2038, that could involve nearly 12,800 three-axle rigid lorries on the roads. **And the last figure is even more concerning for air quality, as Gatwick proudly announces 350,000 tonnes of cargo by 2047, which could add over 46,600 seven-and-a-half tonne lorries a year, in addition to the predicted 80.2m passengers.**

If Gatwick was successful, we can expect to see a huge increase in freight carriers on our roads. UK domestic freight is mostly moved by **road (79%)**; the remainder moved by shipping (13%) and rail (9%). ^x

Van traffic has doubled since the early 1990s, and emissions have increased by 67%.

For tyre impacts – see Appendix B.

Historic evidence of ultrafine particles from airports

- **Traffic increases with one and two runways**

Paragraph 3.2.9 Summer DCO consultation explains that the Development Consent Order (DCO) is seeking permission for additional provision of up to 12,025 parking spaces, of which 7,780 would replace spaces that would be permanently lost where existing parking areas are changed to accommodate alternative uses. Gatwick explains this translates to a net increase of 4,245 spaces to cater for passenger growth.

Total additional spaces now proposed by Gatwick Airport equal 4,245, increasing until 2038 with a 2nd runway. All predominantly positioned to the north of the airport where air quality issues continue.

Gatwick has already achieved planning for a multi storey automated car park for 2,500 spaces, which is not included in these figures.

Gatwick Airport 2nd runway summer 2022 proposals see additional traffic areas added to the north of the airport, the areas already identified to be major air quality concern zones –

- All drop off zones and parking are to the south of the airport.
- Changes to highways to ease flow of traffic to Gatwick Airport (North and South terminals) – all road additions/ increases are to the south of the airport. The M23 is to the east of the airport.
- The CARE centre (incinerator with pollution concerns) and ancillary facilities plus new hotels and offices are also to the south of the airport.
- River Mole and open water storage is also to the south of the airport.
- Biodiversity areas are also to the south of the airport, some adjacent to car parks – it must therefore be assumed that this area would collect particles.
- Proposed active travel is subjective, as few facilities exist to make it safe and feasible to cycle or walk to the airport. These are all to the south of the airport. Cycling and walking are made less feasible with the current 2nd runway highways changes, as detailed in the summer 2022 G2 consultation.

Gatwick has been working with local authorities on locations north of the airport but still they breach air quality.

- Expansion of electrical vehicle use on the airfield will not reduce the particles from tyres.
- The holding of aircraft will increase due to the traffic-light system as aircraft from Runway 1 will have to cross Runway 2.
- Taxiing will also significantly increase the number of particles, as the distance substantially increases for both ground traffic and aircraft.
- No bunds are planned for the north of the airport, only to the north west corner to reduce noise.

Evidence of being disingenuous when it comes to air quality

The Gatwick Airport Summer 2022 Consultation - There is a lack of detail surrounding the reduction of UFP, in fact no details are given about the wind direction that would disperse particles from increases in aircraft movements or traffic generated on the airfield.

It is suggested that a significant increase in UFP will be evident once the new runway is built but also during its construction, as well as larger particles from construction traffic, subsequent freight carriers, increases in transportation of staff and passengers to the airport and associated business in the proximity of the airport.

Provision of EV vehicles do not remove the UFP or larger particles from tyres – a point that is missed – see Appendix B.

Air Quality Damage Cost and Air Quality Mitigation 10.61

The costs calculated by the Transport Analysis Guidance (TAG) method in The Economic Impact Assessment (EclA) of the PEIR were estimated at £114.6m. **This figure seems relatively conservative, in view of the nearly 40% increase in aircraft movements and 63% increase in passengers, plus freight and workers.**

- The master plan only offers to “work with” local authorities and “monitor”, which is simply not good enough.

4.5.21 We will continue to work with the local councils to monitor local air quality conditions.

Carbon is heavily linked to poor air quality.

The existing main runway

5.5.3 The carbon emissions produced by Gatwick in 2017, along with estimates for 2028, are shown in Figure 5.7. The largest component is the Landing and Take-off (LTO) cycle which measures carbon produced by aircraft approaching or departing the airport, below an altitude of 3,000ft. This and the passenger surface access elements account for the majority of Scope 3 emissions. (Scope 1, 2 and 3 emissions were explained in paragraph 4.5.12).

Scope 1. Direct emissions from sources which we own or control (e.g. the use of fuel and gas at the airport).

Scope 2. Indirect emissions from the generation of electricity which we purchase and use at Gatwick.

Scope 3. Other indirect emissions at the airport, e.g. aircraft landing and taking off, third party tenants' energy and fuel use, passenger surface access and staff commuting.

Master Plan - 4.5.16 Figure 4.3 shows that emissions associated with aircraft operations and surface access trips to and from the airport account for a very large part of the total Scope 3 emissions. While these have increased since 2010.....'

Health impacts of poor air quality

- **Public Health England (PHE) in March 2019 published a review of evidence on how to improve air quality in the United Kingdom.**

'Air pollution is the biggest environmental threat to health in the UK, with between 28,000 and 36,000 deaths a year attributed to long-term exposure. There is strong evidence that air pollution causes the development of coronary heart disease, stroke, respiratory disease, and lung cancer, and exacerbates asthma.'

Between 2017 and 2025, the total cost to the **NHS and social care of air pollution, where there is more robust evidence for an association, is estimated to be £1.60 billion for PM_{2.5} and NO₂ combined, increasing to £5.56 billion.** ^{xi}

Official estimates of deaths (for adults over 30) attributed to air pollution in 2019 are, in England: 26,000-38,000, and in the whole of the UK: 29,000-43,000 (up from 28,000-36,000 in 2013). ^{xii xiii}

Health Risk - The strongest evidence for effects on health is associated with fine particles (PM_{2.5}), which:

- Infiltrate deeply into the lungs.
- Cross the membrane barrier and enter the bloodstream, potentially affecting all organs and body systems.
- Pass up the olfactory nerve and enter directly into the brain.
- Pass through walls and ceilings into homes.

The World Health Organisation (WHO) have released updated guidelines in relation to ultrafine particles. While they have been unable to give a numerical standard, due in part to the lack of monitoring for researchers to use, they have defined what can be considered high and low values:

- High concentrations - more than 10 000 particles/cm³ (24-hour mean) or more than 20 000 particles/cm³ (1-hour).
- Low concentrations - less than 1000 particles/cm³ (24-hour mean).

Nitrogen dioxide (NO₂) is one of a group of gases called nitrogen oxides (NOx) formed in the combustion of fossil fuels.

The majority of nitrogen oxides emitted from a vehicle exhaust are in the form of nitric oxide (NO), which is not considered harmful to health. However, this gas can react with other gases present, both in the exhaust and the atmosphere, to form nitrogen dioxide (NO₂).

NO₂ is harmful to health and is also an important component in the formation of ozone.

Road transport is estimated to be responsible for about 50% of total emissions of nitrogen oxides (NO_x), power stations contributing another 25%.

The calculation of how much of this NO is converted to NO₂ is an important, but extremely difficult, factor in the reduction of pollution levels. Because of the domination of traffic sources, mean NO₂ levels are highest close to busy roads and in large urban areas, as well as surrounding commercial operations such as Gatwick Airport.

A shift from coal to gas-turbine power stations and the increased use of catalytic converters during the 1990s should have led to a decrease in NO₂ levels over recent years.

However, it is possible that increases in traffic volume have cancelled out these improvements, which will continue with airport expansion, whether 1 or 2 runways.

At very high levels, NO₂ gas irritates and inflames the airways of the lungs. This irritation causes a worsening of symptoms for those with lung or respiratory diseases.

The pollutant NO_x has been identified as a problem over numerous years in certain areas close to Gatwick, mostly to the north of the airport.

Appendix A – Evidence

Gatwick's broken promises on green travel, mean more cars on our roads, say local people who cycle rather than drive.

- **Overgrown and unsafe cycle paths currently ignored by Gatwick Airport**
- **Gatwick 2nd runway new road networks make it harder for workers and flyers to cycle to the airport to reduce emissions**

Residents raise concerns about the lack of safe cycle paths to and from Gatwick Airport. The planned new road network for Gatwick Airport's 2nd runway will make it even harder for people to cycle to and through the airport safely.

“Gatwick can't continue to blame local authorities for maintaining the cycle paths. The airport places so much importance on these roads, claiming that the airport encourages cycling and walking to work, so why will they not commit to their upkeep?” asks CAGNE, the umbrella aviation community and environment group, who have collaborated with residents to highlight the current deficiencies with the cycle paths and the flaws in the new major road network proposed for Gatwick 2.

Cycling UK (the national cycling organisation) representative for Crawley, Peter Smith said: *“The existing cycle lanes on the main A23 between Longbridge roundabout and Gatwick South and North terminals are overgrown with vegetation, they are full of potholes and rubbish, the road markings have faded away, there is little or no signage and the expectation that people will access the airport along these routes, being forced to cycle alongside 60mph traffic is frankly ridiculous. Gatwick say that they wish to encourage sustainable transport use for the local community and so they should be prepared to fund proper routes between these points that are compliant with contemporary design standards.”*

“Gatwick claims they encourage staff to cycle and walk to work, but this seems to be total greenwashing. While currently half of their staff live within walking or cycling distance of the airport, little has been done by the airport to encourage this,” said Peter Smith. *“The new major road plans for Gatwick 2 are all about making it easier to drive, and to drive at speed. Walking and cycling are simply made more difficult under the planned proposals for G2”.*

The airport claims to have already spent £1.6m on cycling and walking, but in fact, most of this money was spent on funding the lifts to access the bus stops on the A23.

The National Cycle Network Route 21 is the famous 'Avenue Verte' London to Paris route and yet it is an embarrassment as it passes through the airport and resembles a muddy mistake rather than part of this prestigious route as promoted on the Gatwick website.

With the aspirations for a 2nd runway and sustainable travel, people who cycle urge Gatwick shareholders to reconsider their Gatwick 2 road plans that provide very little safe access to the airport terminals.

“Few improvements for workers and flyers are seen in the proposal for Gatwick Airport’s 2nd runway. Much is made in their proposal about sustainable transport, and they suggest that cycling and walking will be ways to reduce their carbon footprint, but we are seeing more dangerous new road junctions and disconnected cycle routes,” commented Becky Reynolds of Cycling UK’s Cycle Advocacy Network, South East.”

“Surely if the Gatwick 2nd runway proposals seek to have 3 in 5 walking or cycling to the airport, they must be held responsible for the maintenance and improvements to walking/ cycling routes and should not pass the cost to the taxpayer via the local authorities,” says CAGNE, Andrew Cadman.

The Gatwick 2 new road proposals do not show dedicated cycling routes but are shared cycling and pedestrian routes, with cyclists and walkers having to cross a major dual carriageway and a 4-lane roundabout junction to access the North and South Terminals. Safe access to North Terminal has recently disappeared with closure of access to one of the car parks. Cyclists heading to North Terminal now need to negotiate a major roundabout alongside all North Terminal motor traffic.

Another example is from the Longbridge roundabout to the South Terminal, where there is currently a shared-use pavement for walking and cycling; however, Gatwick plans appear to show removing this to widen the road for additional vehicle traffic. In the G2 documents, a noise barrier has replaced the cycle route, with only a pedestrian ramp being offered, routing people down into Riverside Park. This leaves the only cycle access from the Horley direction being via Riverside Park, which is dark, narrow, wooded, and unsuitable for use after dark, for personal safety.

“This section links directly to the new A217 segregated walking / cycling path (at Hookwood). Part of the reasoning for the new shared use path was its direct link into South Terminal. A route expected to take a significant number of cyclists from Horley, Westvale Park, Hookwood and Reigate to the commuter hub at South Terminal train station to commute into London. Without this link, it will be almost impossible for people working in the city to cycle from their homes in Horley and beyond, into South Terminal and not arrive muddy!” said Cllr Lisa Scott, Mole Valley Green Party.

With all the investment by government in the new railway station, it is disappointing that the only lift to accommodate cyclists from the cycle path (Route 21) is not even signposted and requires an element of strength, being that it is an old-fashioned, industrial loading-bay style lift, with slatted metal doors which must be manually pulled open to enter.

Cyclists deserve better from Gatwick Airport management if they are to be taken seriously in their efforts to encourage people to cycle to work and cycle to fly in its aim to reduce emissions.

Notes -

National Cycle Route 21 - xiv xv

Gatwick 2nd runway proposals ^{xvi}

Cycling UK (the national cycling charity) inspires millions more people to cycle, providing skills, motivation, advice, and support to enable everyone to ride a bike. ^{xvii}

Cycling is an inclusive and healthy way for children, older people, and the disabled to get around without a car, to reduce emissions. This is even more possible since the development of e-bikes, adapted bikes and adult trikes for the disabled. It is a far cheaper way to travel, considering the increases in fuel and the cost of living.

Film – A short video that highlights some of the issues at Gatwick Airport for bike riders ^{xviii}.

Appendix B – Evidence

Surface access particles

Tyres are even worse for the environment than many thought, so much so that the particulate emissions from tyre wear could be nearly 2,000 times greater than those from your exhaust.

That's according to a new study in Europe, which compared the particulates produced by tyre wear (in a variety of situations) with the emissions at the tailpipe.

The study, undertaken at the National Physical Laboratory in the UK by independent emissions testing company Emissions Analytics, found that, under normal conditions, particulate matter released by tyre wear is 1,850 times more than the particulates that come from burning the fuel in your engine. ^{xix}

Even if vehicles travelling to Gatwick Airport are electric, it would seem from new research that they still cause pollution. Electric cars may have zero exhaust emissions, but they still emit noxious waste from their tyres. All vehicles (both on road and airside) shed pieces of spent rubber when they drive along tarmac, as rubber and more toxic compounds in tyres are ground away.

Since EVs are heavier and accelerate faster than ICE-powered cars, they chew up tyres faster and shed more of these dirty particles, or tyre emissions. ^{xx}

The researchers compared real-world exhaust emissions with the amount of microplastics released through tyre wear. (The study also compared regular driving with aggressive driving, and new tyres with used tyres).

Appendix C – Ultrafine particles affect wildlife

“Ultrafine particles affect wildlife as well,” says Clive Cobie. Observations of caterpillars over a 22-year period.

“It was in the year 2000 that I, Clive Coble, now aged 63, arrived in this beautiful 65-acre woodland, between Rudgwick and Five Oaks, West Sussex.”

Clive lives and attends to these native woodlands of West Sussex, which is under the arrival route to the west of Gatwick Airport, as well as a departure route (7 & 8).

Clive remembers how every spring, there was a period corresponding with birds' eggs hatching, when thousands and thousands of tiny caterpillars would hang from the trees on silken threads and swing gently in the breeze, whilst making their way back up the thread with their little silk ball, from which they make their cocoon.

“Over the years, they got less and less, as the base lines changed. It was about 2015 that they ceased; the small birds that relied on them for their chicks, we had to supplement with bird food, which used to be left to rot once the caterpillar feast was afoot.”

Sadly, the supplemental feeding of the birds during breeding season has become the norm, and Clive had forgotten about the caterpillar abundance for their chicks and put it to the back of his mind - until COVID, when with the following spring came a flush of caterpillars.

“During COVID, birds had two and three broods This made me think that it must have something to do with pollution, as the particles from aeroplanes are a lot smaller than particles from car and truck fuel.

“The following spring was similar; this abundance of caterpillars didn't come close to early 2003 but it was a vast improvement to when planes are flying. I am anticipating a decline this spring now as we have a return of planes overhead every 30 seconds.”

Testimonial by Clive Cobie
The Shack
Nr Keepers Cottage
RH14 9BG

Caterpillars play an important role in the biodiversity of nature, coming in many shapes, sizes, colours, and types.

Caterpillars are larval creatures that turn into moths or butterflies after they metamorphose (pupate). Caterpillars provide high protein for wild birds, because they contain lots of amino acids, which all animals and birds need to build proteins and stay healthy. Caterpillars are also high in fat and energy density (calories per gram), making them a good choice when other food sources are scarce or less nutritious.

References

- i <https://www.sciencedirect.com/science/article/pii/S0160412022000186>
- ii https://youtu.be/8E_UgYeTyFo
- iii <https://www.gov.uk/government/news/world-leading-environment-act-becomes-law>
- iv <https://www.gov.uk/government/publications/hgv-maximum-weights/hgv-maximum-weights>
- v https://sussex-air.net/Reports/AnnualStatusReports/ASR_Crawley_2016.pdf.
- vi <http://www2.westsussex.gov.uk/ds/cttee/gat/gat201016i3.pdf>
- vii https://www.reigate-banstead.gov.uk/download/downloads/id/3053/rbbc_asr_2016.pdf
- viii https://youtu.be/8E_UgYeTyFo for difficulty of walking and cycling to Gatwick
- ix <https://www.gov.uk/government/publications/hgv-maximum-weights/hgv-maximum-weights>
- x <https://www.theiet.org/media/8908/energy-technologies-for-net-zero.pdf>
© The Institution of Engineering and Technology
- xi https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/708855/Estimation_of_costs_to_the_NHS_and_social_care_due_to_the_health_impacts_of_air_pollution_-_summary_report.pdf
- xii <https://www.gov.uk/government/news/public-health-england-publishes-air-pollution-evidence-review>
- xiii <https://cleanair.london/health/great-smog/>
- xiv <https://www.avenuevertelondonparis.co.uk/>
- xv <https://www.sustrans.org.uk/find-a-route-on-the-national-cycle-network/route-21/>
- xvi <https://www.gatwickairport.com/business-community/future-plans/northern-runway/>
- xvii <https://www.cyclinguk.org/>
- xviii https://youtu.be/8E_UgYeTyFo
- xix <https://jalopnik.com/emissions-from-tire-wear-are-a-whole-lot-worse-than-we-1849023188>
- xx <https://jalopnik.com/tire-pollution-will-get-worse-as-heavy-evs-hit-the-road-1849490346#>

With thanks to Dr Gary Fuller and Reigate and Bansted Council for research data.