Air quality assessment

Whitburn Neighbourhood Plan

September 2021

Whitburn Neighbourhood Forum

Contents

1. Introduction

Whitburn Neighbourhood Forum is developing a Whitburn Neighbourhood Plan. As part of the proposed plan, a policy on air quality is proposed to be included.

This assessment looks at the data available on air quality in Whitburn to provide evidence for and shape the policy on air quality.

2. Air quality

Air quality is a very topical issue. Air quality relates to the degree to which air is suitable or clean enough for humans, animals, or plants to remain healthy. This can be both outdoor and indoor. Air quality can have great spatial and temporal variations.

It is widely acknowledged that the contribution from human activities far exceeds natural sources of air pollution. Human activities that are major sources of outdoor air pollution, include:

- Fuel combustion from motor vehicles (e.g. cars and heavy duty vehicles)
- Heat and power generation (e.g. oil and coal power plants and boilers)
- Industrial facilities (e.g. manufacturing factories, mines, and oil refineries)
- Municipal and agricultural waste sites and waste incineration/burning
- Residential cooking, heating, and lighting with polluting fuels[1].

2.1 Outdoor air pollution

There is a growing body of evidence showing that reduced outdoor air quality affects health and wellbeing. For instance, detailed meta-analysis of studies connecting air pollution and human health identified 31 health outcomes have been identified where there is a clear link with exposure to air pollution [2]. These are as follows:

1. Reduced Lung function (FEV1) in children from long term exposures
2. Numbers of children age 6-8 with FEV1 less than 85% predicted: 'low lung function'
3. Lung function (FVC) at age 15.
4. Lung function (FVC) growth in children from long term exposures (% change in FVC in children from age 11-15)
5. Lung cancer long-term
6. Myocardial Infarction (MI), short term
7. Coronary heart disease, long-term
8. Out of hospital cardiac arrest short-term
9. Respiratory admissions short-term all ages
10. Respiratory admissions short-term elderly
11. Stroke admissions, short term
12. First occurrence of stroke long term

[1] WHO (2021) *Ambient air pollution: Pollutants*. Available at: https://www.who.int/airpollution/ambient/pollutants/en/

[2] Williams, M. et al (2019) *Personalising the Health Impacts of Air Pollution – Summary for Decision Makers.* Available at: http://erg.ic.ac.uk/Research/docs/Personalised-health-impacts-Summary%20for%20Decision%20Makers.pdf

13. Heart failure short term
14. Heart failure long-term
15. Asthma admissions in children
16. Asthma admissions in adults
17. Asthmatic symptoms in asthmatic children, short-term
18. Term low birth weight
19. Cardiovascular Disease (CVD) admissions all ages short-term
20. Cardiovascular Disease (CVD) admissions elderly
21. Pneumonia admissions in children short term
22. COPD admissions short term all ages
23. COPD admissions short-term elderly
24. Hypertension short-term
25. Hypertension long-term
26. Diastolic Blood Pressure (DBP) short-term
27. DBP long-term
28. Cardiac arrhythmia short-term
29. Atrial fibrillation short-term
30. Prevalence bronchitic symptoms in asthmatic children long-term
31. Bronchitis prevalence in children (long-term exposure)

Clearly, outdoor air pollution is an important health issue. The main pollutants of concern are nitrogen dioxide and nitrogen oxide (NOx gases), particulate matter (PM) ground level ozone, carbon monoxide, sulphur dioxide, hydrocarbons and black carbon (BC) [3]. A summary from the WHO on the characteristics and effects of these pollutants is included in Appendix A.

Emissions from traffic (traffic-related air pollution, or TRAP) is a major source of air pollution. Studies consistently show the contribution of pollution from traffic[4]. The air pollution levels are highest on and in near proximity to the road, such as on the pavements. Therefore, being near a busy road will have negative effects on people's health[5].

Fumes are known to dissipate as you are further from the source of pollution, but the rate at which depends on factors such as weather (e.g. wind, humidity, temperature)[6]. It seems there is no set rule about harmful distances to roads, but various studies indicate that living within 150 - 200m from a busy road has detrimental effects on health[7]. For instance, one study performed a meta-analysis found that within 100 metres from a road, 32% of black carbon, 26% of carbon monoxide, 17% of

[3] https://addresspollution.org

[4] Matz et al. (2019) *Human health effects of traffic-related air pollution (TRAP): a scoping review protocol*. Systematic Reviews volume 8, Article number: 223

[5] Perez, L. et al. (2013) *Chronic burden of near-roadway traffic pollution in 10 European cities (APHEKOM network)*. European Respiratory Journal 2013 42: 594-605

[6] Knittel et al. (2011) *Caution, Drivers! Children Present: Traffic, Pollution, and Infant Health*. Available at: https://www.nber.org/system/files/working_papers/w17222/w17222.pdf

[7] E.g. Bowatte, G. et al. (2017) *Traffic-related air pollution exposure over a 5-year period is associated with increased risk of asthma and poor lung function in middle age*. European Respiratory Journal 2017 50: 1602357. Available at: https://erj.ersjournals.com/content/50/4/1602357; Williams, M. et al. (2019) *Personalising the Health Impacts of Air Pollution – Summary for Decision Makers.* Available at: http://erg.ic.ac.uk/Research/docs/Personalised-health-impacts-Summary%20for%20Decision%20Makers.pdf; Pasquier, A. and Andre, M. (2016) *Considering criteria related to spatial variabilities for the assessment of air pollution from traffic*. 14th World Conference on Transport Research (WCTR 2016), Jul 2016, SHANGHAI, China.

NO2 and 37% of NoX would dissipate. At 300 metres, 59% of BC, 58% of CO, 21% of NO2 and 52% of NOx would disappear. Another study found that most pollutants reached background concentrations within 400m, but the distance at which 50% decay was reached differed per pollutant from 50 – 150m. However, CO, NO, NOx and ultra-fine particles were considered to be "near-road" pollutants, whilst PM10, PM2.5 were identified as persistent pollutants with no clear decaying distance[8]. However, another study found a link between PM2.5, road dust and mortality[9].

The higher the pollution, the more risk to health. For instance, one study showed a 4% increase in the risk of out-of-hospital cardiac arrest per 10 µg/m3 increase in PM2.5[10], whilst another found that for cyclists, every 1 µg increase in inhaled PM2.5 caused an 0.48 increase in variation of heart rate[11].

Risks to health are not just associated with areas that exceed levels set by for instance UK government and the WHO. Pollution that is below WHO thresholds is also associated with negative effects on health. The WHO itself states that "the lower the levels of air pollution, the better the cardiovascular and respiratory health of the population will be, both long- and short-term". For instance, small particulate pollution (PM2.5 and PM10) has health impacts even at very low concentrations. As a result, no threshold has been identified below which no damage to health is observed. Even where PM concentrations in many cities do comply with guideline levels, it is estimated that average life expectancy is 8.6 months lower than it would otherwise be, due to PM exposures from human sources [12].

A report on the inquest into the death of Ella Kissi-Debrah, whose cause of death was air pollution, stated that the evidence at the inquest was that there is no safe level for particulate matter and that the WHO guidelines should be seen as minimum requirements[13]. Recent research also showed that there is no evidence for a threshold in the health effects of fine particles[14].

In addition, one study which examined the effects of air pollution on health, concluded that "where background pollution levels are low and further mitigation strategies may appear to be unnecessary, near-road traffic-related pollution may in fact contribute greatly to the local disease burden. For example, in Stockholm, PM10 and NO2 levels were below our reference values and the WHO

[8] Pasquier, A. and Andre, M. (2016) C*onsidering criteria related to spatial variabilities for the assessment of air pollution from traffic*. 14th World Conference on Transport Research (WCTR 2016), Jul 2016, SHANGHAI, China

[9] WHO (2013) *Review of evidence on health aspects of air pollution – REVIHAAP Project: Technical report*. Available at: www.ncbi.nlm.gov/books/NBK361807

[10] Zhao et al. *The impact of short-term exposure to air pollutants on the onset of out-ofhospital cardiac arrest: A systematic review and meta-analysis*. International journal of cardiology 2017; Jan 1;226:110-117. doi: 10.1016/j.ijcard.2016.10.053

[11] Buregeya et al. (2020) *Short-term impact of traffic related particulate matter and noise exposure in cardiac function*. International Journal of Environmental Reserach and Public Health 17(4), 1220

[12] WHO (2018) *Ambient (outdoor air pollution)*. Available at: https://www.who.int/news-room/fact-sheets/detail/ambient-(outdoor)-air-quality-and-health

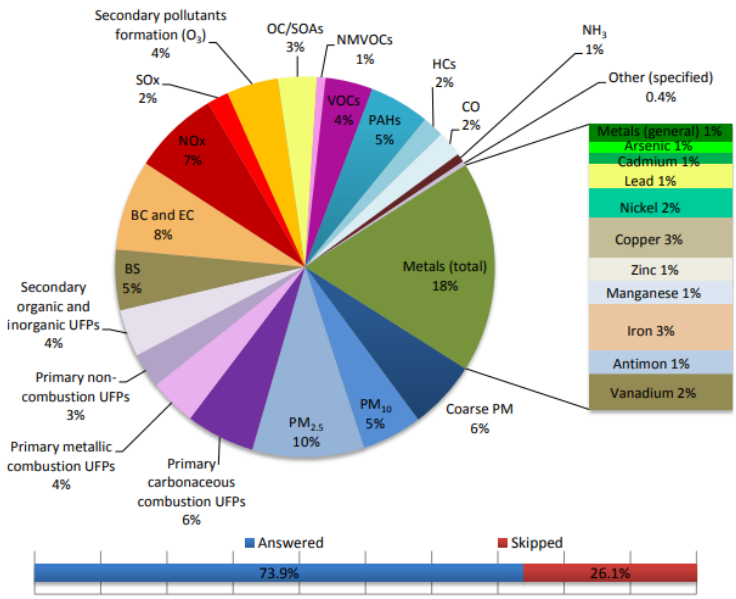
[13] Laville, S. (2021) *Lower UK air pollution limits to prevent deaths, says coroner*. The Guardian, 21 April 2021. Available at: https://www.theguardian.com/environment/2021/apr/21/reduce-air-pollution-levels-uk-to-who-limits-says-coroner-ella-kissi-debrah

[14] Whaley, P. et al (2021) *Update of the WHO Global Air Quality Guidelines: Systematic Reviews*. Available at: https://www.sciencedirect.com/journal/environment-international/special-issue/10MTC4W8FXJ

recommended standards, yet approximately 7% of asthma cases and associated acute events were attributable to near-road traffic-related pollution"[15].

The WHO also conducted a survey among air pollution experts[16], which showed that emissions from road transport are of particular concern to people's health. Experts felt that in particular fine and ultra-fine particles are of greatest concern in relation to health effects. The findings also affirmed that experts and stakeholders do not perceive current air quality standards to be "safe": adverse impacts on human health from air pollutants emitted by various sources are still observed at current levels.

Fig. 9. Response rates for ambient air pollutants that pose a health risk (road transport) and answering rate



Moreover, one study conducted in Brazil showed that even under conditions that are compliant with air quality standards, the concentration of atmospheric pollutants can negatively affect human health[17]. Therefore, areas that have air pollution at levels below WHO standards, are still of concern with regards to damaging effects of air pollution caused by traffic.

In addition, studies have shown the effects of both long-term and short-term exposure to air pollutants. For example, a report by the WHO summarises research conducted on the health effects from being exposed to transport-related air pollution, causing for instance a heightened risk of

[15] Perez, L. et al. (2013) *Chronic burden of near-roadway traffic pollution in 10 European cities (APHEKOM network)*. European Respiratory Journal 2013 42: 594-605

[16] Henschel, S. and Chan, G. (2013) *Health risks of air pollution in Europe – HRAPIE project*. Available at: https://www.euro.who.int/__data/assets/pdf_file/0017/234026/e96933.pdf

[17] Olmo NRS et al (2011) *A review of low-level air pollution and adverse effects on human health: implications for epidemiological studies and public policy*. *Clinics.* 2011;**66**(4):681–690. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3093800/

allergy development, inflammation, cardiovascular morbidity, whilst it also affects lung function[18]. A study in London and Barcelona also found health effects from walking along busy roads[19].

The risks to health are also linked to variations in traffic on roads. For instance, health risks from congestion are potentially significant and any additional traffic can significantly increase risks. Risks and exposures are not proportional to traffic volumes. A study found that congestion pose risks to commuters on and residents near arterial roads that are greater than congestion risks associated with freeways, possibly because lower speeds might be associated with more acceleration/ deceleration events than higher speeds, while low speeds also reduce vehicle-induced dispersion[20].

In addition, individual susceptibility matters. For example, studies show that children are more vulnerable to the effects of air pollution, as they breathe more rapidly than adults and absorb more pollutants. They also live closer to the ground, where some pollutants reach peak concentrations – at a time when their brains and bodies are still developing[21]. A study showed that a person's health can be harmed at NO2 levels at 5 µg/m3 (with WHO levels being 40 µg/m3)[22].

Therefore, areas with air pollution even at lower levels, can still make substantial health gains to children by reducing both ambient pollution and traffic congestion[23]. Tackling transport sources of air pollution, however, "are well beyond the control of individuals and demands concerted action by local, national and regional level policy-makers working in sectors like transport, energy, waste management, urban planning, and agriculture"[24].

2.2 Indoor air pollution

Another important issue is the effects of indoor air quality on health. Indoor air quality is particularly important to humans since we spend up to 90% of time indoors, whilst indoor air quality in the developed world is a main cause of allergies, other hypersensitivity reactions, airway infections, and cancers[25].

In general, attention for indoor air pollution has been largely overshadowed by outdoor air pollution and transport emissions. There is a need for more information about levels of exposure to indoor air

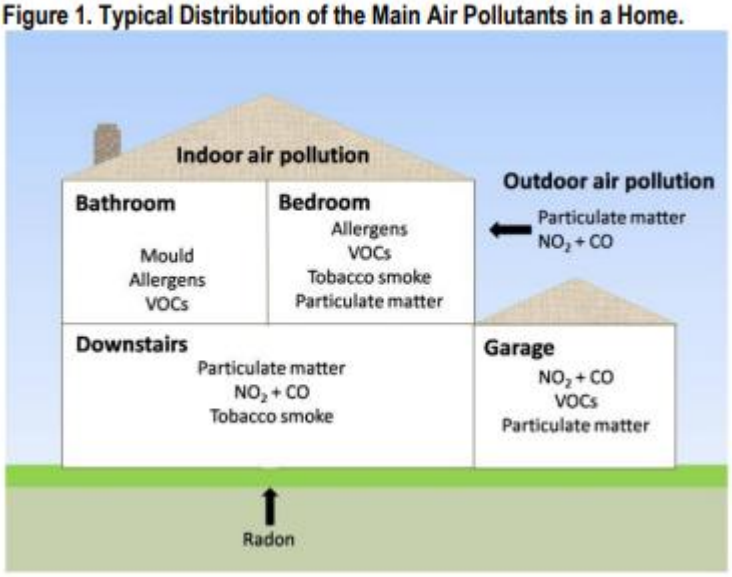
[18] WHO (2005) *Health effects of transport-related air pollution.* Available at: https://www.euro.who.int/__data/assets/pdf_file/0006/74715/E86650.pdf
[19] Van Veldhoven et al. (2019) *Impact of short-term traffic-related air pollution on the metabolome – Results from two metabolome-wide experimental studies*. Environment International: volume 123, pp 124-131
[20] Zhang, K., Batterman, S. (2013) *Air pollution and health risks due to vehicle traffic*. Science of The Total Environment, Volumes 450–451, Pages 307-316
[21] WHO (2018) *More than 90% of the world's children breathe toxic air every day*. Available at: https://www.who.int/news/item/29-10-2018-more-than-90-of-the-worlds-children-breathe-toxic-air-every-day#:~:text=One%20reason%20why%20children%20are,and%20bodies%20are%20still%20developing.
[22] Committee in the Medical Effects of Air Pollution (2018) *Association of long-term average concentrations of nitrogen dioxide with mortality*. Available at: httpps://www.gov.uk/government/publications/nitrogen-dioxode-effects-on-mortlaity.
[23] Knittel et al. (2011) *Caution, Drivers! Children Present: Traffic, Pollution, and Infant Health*. Available at: https://www.nber.org/system/files/working_papers/w17222/w17222.pdf.
[24] WHO (2018) *Ambient (outdoor air pollution)*. Available at: https://www.who.int/news-room/fact-sheets/detail/ambient-(outdoor)-air-quality-and-health
[25] Sundell, J . (2004) *On the history of indoor air quality and health*. Indoor Air, 14(suppl 7):51-58.

pollutants, as well as the risks posed by long-term exposure and from new developments such as nanomaterials[26].

Air quality indoors may become affected as a result of combustion products from heating, cooking, and the smoking of tobacco, as well as pollutants emitted from building materials, such as volatile organic compounds (VOCs) from sources including paints, varnishes, solvents, and preservatives. Buildings are increasingly energy efficient, meaning that modern homes and offices are frequently more airtight than older structures. In addition, due to an increased use of synthetic building materials, more contaminants are produced and may build up to much higher concentrations than are found outside[27]. It is estimated that indoor levels of pollutants may be up to 100 times higher than outdoor pollutant levels and have been ranked among the top 5 environmental risks to the public[28]. A summary from the WHO on the characteristics and effects of these pollutants is included in Appendix A.

For instance, carbon monoxide is a by-product of the combustion of carbonaceous fuels. It can be lethal at high levels and have potentially chronic effects at low levels. Nitrogen Dioxide (NO2) in the home is the product of gas-fuelled appliances. During the winter levels can be as much as twice as high as outdoor levels and can affect lung function and is associated with respiratory symptoms[29]. Particulate matter is produced through cooking and aerosols and can cause reduced lung function and increased risk of heart and respiratory disease. Volatile organic compounds and ozone is created by cleaning products, paints and printers and can cause respiratory tract irritation and possible effects on asthmatics. Other sources of air pollution are radon, tobacco smoke and allergens[30]. It is important to note that outdoor air quality will also affect indoor air quality.

Figure 1. Typical Distribution of the Main Air Pollutants in a Home.



Source: Post (2010)[31]

[26] POST (office for both houses of parliament) (2010) *UK Indoor Air Quality*. Postnote 366
[27] Jones, A.P (1999) *Indoor air quality and health*. Atmospheric Environment, Volume 33, Issue 28, Pages 4535-4564
[28] Seguale, J.M (2016) *Indoor air quality*. American Journal of Lifestyle Medicine.
[29] Seguale, J.M (2016) *Indoor air quality*. American Journal of Lifestyle Medicine.
[30] POST (office for both houses of parliament) (2010) *UK Indoor Air Quality*. Postnote 366
[31] POST (office for both houses of parliament) (2010) *UK Indoor Air Quality*. Postnote 366

Furthermore, as with outdoor air quality concerns include the potential chronic (long-term) health effects of pollutants at low levels of exposure.

Improvement to indoor air quality can be made by for instance improved ventilation, changed building materials, changes in products that emit pollutants and changes in behaviour. The WHO has also produced guidelines for indoor air pollution[32].

3. Air quality in Whitburn

3.1 Outdoor air quality

Nitrogen Dioxide (NO2) levels are measured near the Jolly Sailor PH by a diffusion tube that is left out for set periods of time, monthly or time specified if longer than a month. Diffusion tubes do not give real time data but they do provide an indication of whether further investigation into air quality is required in an area. The concentration may be higher during peak traffic flows. The figures provided are the raw data concentrations for the period of time that the diffusion tubes are left at the location. (All measurements are in µg/m3). The national annual average objective level for NO2 is 40 µg/m3 per cubic metre.

2019 NO2 Data for monitor near Jolly Sailor PH

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
35.9	33.8	26.8	32.8	21.6	23.5	25	19.8	23.5	31.3	N/A	19.8

The reason that NO2 data is often higher during winter months is due to weather conditions and pressure. In winter, when the ground is cold and there is little wind, emissions are trapped near to the ground[33]. Air pollution will therefore worsen during periods of air stagnation when pollution from local sources will accumulate [34].

There are concerns regarding the position of the diffusion tube. Defra guidance advises that diffusion tubes should be placed at breathing height. This tube is placed at a height of 2.3m. Research has shown that the higher the position of the tube, the lower the recorded emissions. A study found that NO2 concentrations at 2.7 metres were 47% lower than those at 0.7 metres (the height of a child, who is more vulnerable to air pollution)[35].

Additionally, it is on the pavement on the other side of the road to traffic queueing at traffic lights, avoiding the fumes from stationary traffic. It is situated to the South of Eastfields and thus avoids the traffic congestion that occurs in the centre of Whitburn Village.

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[32] https://www.who.int/airpollution/publications/en/

[33] M. Grundström et al. (2011) *Urban NO2 and NO pollution in relation to the North Atlantic Oscillation NAO*. Atmospheric Environment, 2011; 45 (4): 883

[34] Defra's Air Quality Expert Group (2004) *Nitrogen Dioxide in the UK*. Available at: https://uk-air.defra.gov.uk/library/assets/documents/reports/aqeg/chapter3.pdf

[35] Rowell, A., Terry M. E. and Deary, M.E. (2021) *Comparison of diffusion tube–measured nitrogen dioxide concentrations at child and adult breathing heights: who are we monitoring for?* Air Quality, Atmosphere & Health volume 14, pages27–36(2021). Available at: https://link.springer.com/article/10.1007/s11869-020-00909-4

X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)
440,822	561,822

Using data from the Imperial College London's Environmental Research Group (ERG), the website 'addresspollution.org' produces local pollution reports. Such a report classes East Street in Whitburn as 'low air pollution'[36]. However, this data is annualised. You can see that the readings for NO2 can vary considerably by month from the table above, and will vary at even greater levels on hourly basis depending on peak hours and congestion. Additionally, there is no healthy limit of PM2.5, whilst NO2 exceeds the levels at which health impacts have been found also (see literature discussion above).

Air pollution report for Whitburn

Pollutant one: PM2.5

At this address, the annual average of PM2.5 is 6.76mcg/m3. The World Health Organization limit is 10mcg/m3.

However, there is no healthy limit of PM2.5. These particles, which are less than 2.5 micrometers in diameter, can cause asthma, respiratory inflammation and jeopardize lung functions.

Pollutant two: PM10

The reading for PM10 at this address is 11.79mcg/m3. The W.H.O. limit is 20mcg/m3.

There is no healthy limit of PM10.
Exposure to PM10 affects lung development in children.

Pollutant three: NO2

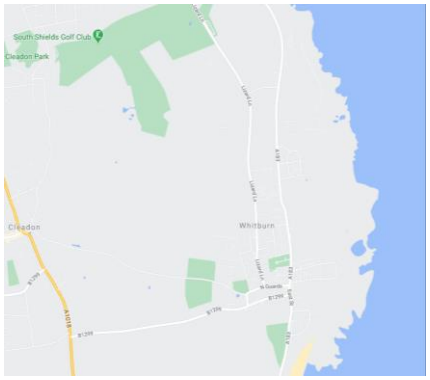
The reading for N02 at this address is 21.87mcg/m3. The W.H.O. limit is 40mcg/m3.

[36] https://addresspollution.org/results/2e56b754-09b1-4419-8bf9-07b20cc3b305

3.2 Traffic in Whitburn

There are a few thoroughfares in Whitburn. Whitburn's only A-road connects South Shields to Sunderland. This is the A183, running through Whitburn and going north-south. In Whitburn, the road is called Mill Lane in the north, East Street in the centre and Whitburn Bents Road in the south.

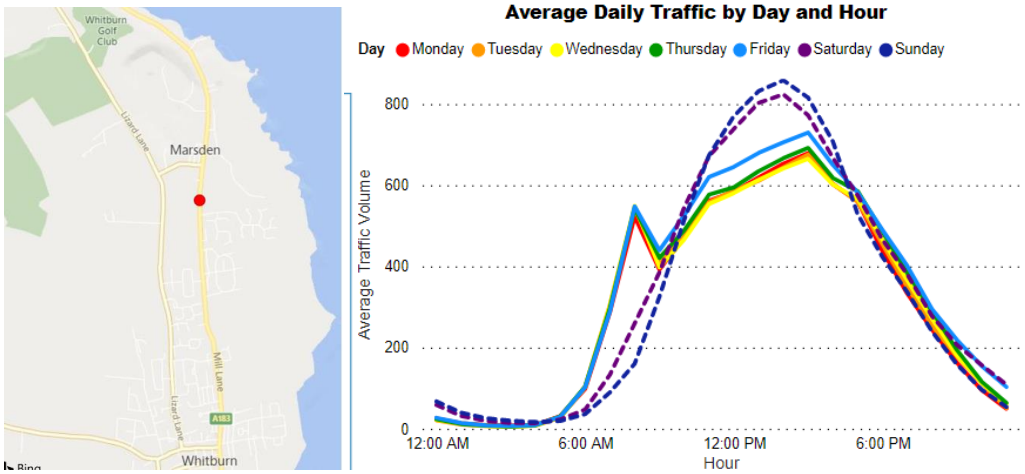
The only B-road in Whitburn (B1299) connects Cleadon to Whitburn, running west – east. This is called Front Street in the village, and Moor Lane further west.

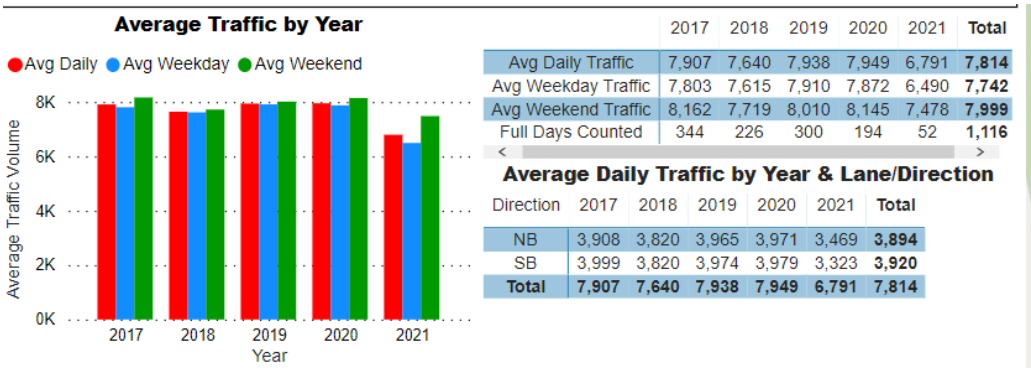


Research has shown that the effects of air pollution are the greatest within 200m from a road. Applying a 200m buffer to these two roads shows that a large proportion of the village is within this buffer.

With regards to the number of motorised vehicles that pass through the village, Whitburn has an automatic traffic counter at Mill Lane in the north of the village[37]. This shows that the daily average is 7,814 motor vehicles. There are clear peaks, for instance on an average week day there is a peak at 15:00hrs (688 motor vehicles). The largest peak is on a Sunday, with 859 vehicles at 14:00hrs (11% of the total number of vehicles). Congestion / traffic queues are observed regularly during these peak times by residents.

The traffic data is visualised below. Please note that the counts for 2021 are incomplete, and lockdown is expected to have some effect on traffic numbers.





	2017	2018	2019	2020	2021	Total
Avg Daily Traffic	7,907	7,640	7,938	7,949	6,791	**7,814**
Avg Weekday Traffic	7,803	7,615	7,910	7,872	6,490	**7,742**
Avg Weekend Traffic	8,162	7,719	8,010	8,145	7,478	**7,999**
Full Days Counted	344	226	300	194	52	**1,116**

Average Daily Traffic by Year & Lane/Direction

Direction	2017	2018	2019	2020	2021	Total
NB	3,908	3,820	3,965	3,971	3,469	**3,894**
SB	3,999	3,820	3,974	3,979	3,323	**3,920**
Total	**7,907**	**7,640**	**7,938**	**7,949**	**6,791**	**7,814**

3.3 Indoor air quality

Indoor air quality is not measured at a local level. It is expected that the local picture does not differ from the national picture. Research shows that indoor air quality can affect health as much or perhaps even more than outdoor air quality, and should be a consideration in new development.

37

https://app.powerbi.com/view?r=eyJrIjoiOTliZTJmNDgtOWM4Yi00ZjhhLWE3YzEtYjNhMDNiYmVjZmRkIiwidCI6IjA5ZmJiOTc5LTQzMTctNGQyMS05Y2I2LWU1ODgxMTE2OWNkOCJ9

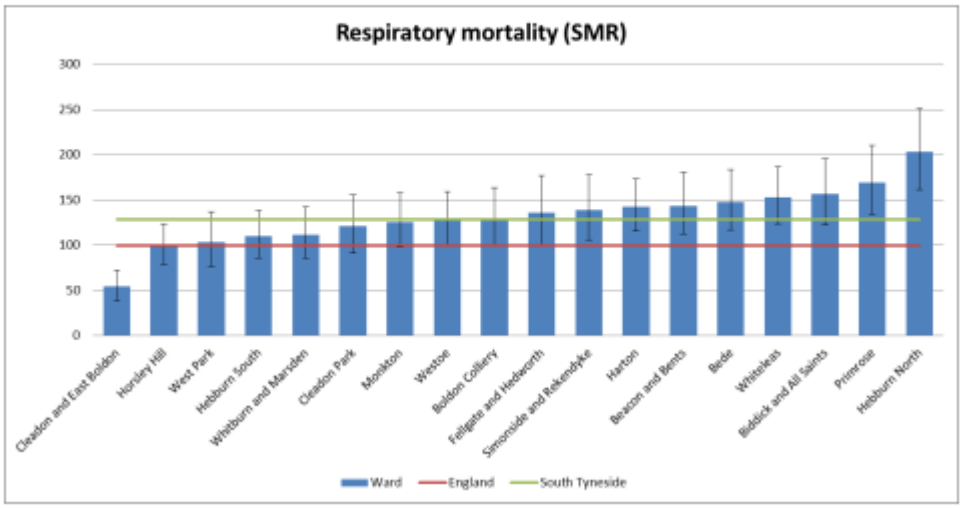
3.4 Health in Whitburn

Residents of South Tyneside Council generally have a lower life expectancy than the national average Public Health data reports[38]:

	Male	Female
South Tyneside	77.6 years	81.5 years
National Average	79.5 years	83 years

There is evidence to suggest that long term exposure to poor air quality increases the risk of premature mortality from cardiovascular and respiratory diseases. The premature mortality rates for cardiovascular, respiratory diseases and cancer are given below. It is important to note that other lifestyle factors such as smoking, etc. do influence these figures.

Chart 2.3. Deaths from respiratory diseases, all ages, standardised mortality ratio, by Ward 2011-2015:



This shows that the Whitburn and Marsden ward has mortality rates above national levels.

Additional data shows:

- Emergency admissions for chronic obstructive pulmonary disease is significantly worse in South Tyneside at 844 per 100,000 population in comparison to England at 417 per 100,0007
- Hospital admissions for asthma in children (birth to 9 years) are 403.2 per 100,000 as opposed to the England rate of 259.8 per 100,000.
- The hospital admission rates for young people aged 10 -18 is 264 per 100,000, double that of the England rate. This has seen a continual increase from 2010.

Even though these illnesses ay have various causes, these can be worsened by poor air quality. This emphasises the importance of reducing air pollution.

[38] https://www.southtyneside.gov.uk/media/39130/Air-Quality-Annual-status-report2018/pdf/290618_South_Tyneside_Council_ASR_final.pdf 7

4. Existing policy on air quality

4.1 National policy and legislation

The Air Quality (England) Regulations 2000 sets out various air quality objective levels for England. These national targets for air pollution include: for PM10, the annual mean is 40 µg/m3, for PM2.5 the annual mean is 25 µg/m3 (for urban areas there is a target of 15% reduction) and for NO2 the annual mean is 40 µg/m3[39].

Note that the levels for particulate matter are above WHO recommendations, which stipulate that PM10 should not exceed 20 µg/m^3 annual mean, while PM2.5 should not exceed 10 µg/m^3 annual mean.

The UK Clean Air Strategy[40] aims to reduce people's exposure to air pollution, including a target to reduce the number of people living in locations above PM2.5 levels of 10 µg/m3.

The government's 25 Year Environment Plan sets out the objective for achieving clean air and the forthcoming Environment Bill will include a target on air quality, which includes PM2.5 and possibly other pollutants as well.

The National Planning Policy Framework (paragraph 181) states that:

"Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications."

Planning guidance on air quality[41] provides further advice on the role of the planning system in managing air quality. With regards to neighbourhood plans it states that:

"Air quality concerns can be relevant to neighbourhood planning, and it is important to consider whether air quality is an issue when drawing up a neighbourhood plan or considering a neighbourhood development order. The local planning and environmental health departments will be able to advise whether air quality is an issue that may need to be addressed in a neighbourhood area, and how this might affect potential policies and proposals that are being considered."

It does not limit the inclusion of air quality to AQMAs (Air Quality Management Areas) or Clean Air Zones.

Local Air Quality Management Policy Guidance (PG16)[42] sets out duties to local authorities with regards to air quality, such as assessment and reporting. It states that there is now very strong evidence on the significant contribution of transport emissions to air pollution in urban areas. Local authorities are therefore expected to take measures to reduce levels of pollutants from vehicles.

[39] https://uk-air.defra.gov.uk/assets/documents/Air_Quality_Objectives_Update.pdf

[40] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/770715/clean-air-strategy-2019.pdf

[41] https://www.gov.uk/guidance/air-quality--3

[42] https://laqm.defra.gov.uk/documents/LAQM-PG16-April-16-v1.pdf

Furthermore, central estimates of the fraction of mortality attributable to long-term exposure to current levels of human-made particulate air pollution range from approx. 2.5% to 5% in some local authorities in rural areas, to over 8% in some London boroughs. Local Authorities are expected to work towards reducing emissions and concentrations of PM2.5 in their local area as practicable.

With regards to indoor air pollution in the UK, this is regulated through for instance building regulations and health and safety regulations.

4.2 Local policy

On a local level, South Tyneside's Local Development Framework (2007) does not refer to air quality within a policy specifically. Policy EA5 Environmental Protection states that:

"To complement the regeneration of the Borough, the Council will control new development so that it: (A) acts to reduce levels of pollution, environmental risk and nuisance throughout the Borough."

Development Management Policies[43] include Policy DM1 Management of Development. This policy states that 'In determining all applications under the planning Acts we will ensure that, where relevant: (L) the development does not adversely impact upon air pollution levels."

The Borough has two AQMAs (Air Quality Management Areas) at Lindisfarne Roundabout / Leam Lane and Boldon Lane / Stanhope Road. None of these are within Whitburn.

The South Tyneside 2020 Air Quality Annual Status Report (ASR)[44] states that currently the main air pollutant threat occurs from traffic emissions. It also states that the Borough is currently meeting local air quality objectives for NO2 and PM10. No exceedances of the national objective levels have been recorded across the borough.

There is no local policy on indoor air pollution.

5. Policy development

The emerging air quality policy and a previous version of this air quality assessment were reviewed by AECOM to ensure that:

- Evidence has been assembled from robust sources;
- Stakeholder-derived evidence has been considered in an inclusive way;
- Relevant third-party comments/issues have been addressed;
- Reasonable conclusions have been drawn from that evidence;
- All useful evidence available has been referenced;
- There are no evidence gaps that need to be filled;
- The draft policy is clearly written, distinct from and in general conformity with the strategic policies in the adopted and emerging development plans, which for neighbourhood plans in South Tyneside comprises the Core Strategy 2007 (adopted),

[43] https://www.southtyneside.gov.uk/media/13672/Development-Management-Policies-DPD-adopted-December-2011-/pdf/Development_Management_Policies_(revised_adopted_Dec.2011_-_cWHS_modified_2014).pdf

[44] https://www.southtyneside.gov.uk/media/44901/Air-Quality-Annual-status-report-2020/pdf/STCLAQMASR2020.pdf

Development Management Policies 2011 (adopted), Site-Specific Allocations 2012 (adopted)2 and Local Plan (emerging); and

- The policy meets the Basic Conditions.

This review recommended some changes to the air quality policy. For instance, it stated that the evidence within this assessment showed that it is likely that traffic through Whitburn contributes to poorer air quality within 200 metres of main roads. It recommended that within the air quality policy, air quality assessment could be encouraged for all development within 200 metres of main roads. It also stated the policy could require buildings to meet BREAAM standards, in order to improve indoor air quality.

6. Conclusion

In conclusion, studies are showing the detrimental effects of air pollution on health. Evidence shows that air pollution has a great variety of health implications. It also suggests that only considering annualised data on air pollution levels does not fully consider the risks to health, and that no threshold of air pollution (in particular relating to PM) is considered safe. It is important to consider that air pollution will have a significant effect on health as a result of:

1) Short term exposures to air pollution, such as from traffic-related air pollution when walking or cycling beside a road;
2) Lower levels of pollution, also those below WHO and UK targets;
3) Short peaks of pollution typically caused by congestion, which has a disproportionate effect on air pollution and therefore health;
4) Individual vulnerability, such as children.

Local data from Whitburn shows air pollution being below those levels set by the WHO. However, this data works on monthly averages or is annualised. The data is collected from a diffusion tube that is positioned considerably above breathing height at a location that avoids the heavy traffic congestion experienced in the centre of Whitburn Village.

In addition, as mentioned above, there are no safe levels of air pollution caused by traffic. Any reduction in air quality will cause more risks to health, in particular for children. Experts on air pollution agree that more needs to be done to reduce air pollution, and that measures need to go beyond the action of individuals, such as through the planning system.

Local traffic data identifies large numbers of motor vehicles passing through Mill Lane in Whitburn. Studies show that there is a link between traffic and air pollution. Data also shows that there are clear peaks, for instance during school pick up times, when there are large numbers of children walking home from school. This is of concern, considering the vulnerability of children to the effects of air pollution, and the health effects of congestion that is disproportionate to traffic volumes.

In addition, another peak is at the weekend, when in addition to there being more motor vehicles, there will also be more people walking and cycling. Mill Lane has a dedicated cycle track, which is part of the national cycling network, and which is very popular. This means again that a large number of people will be exposed to traffic fumes.

There are gaps in research about the exact effects of indoor air pollution, but there are clear indications that indoor air pollution affects health even at low levels. Many pollutants are the same for both outdoor and indoor, whilst outdoor air quality will affect indoor air quality. It is therefore expected that the concerns for outdoor air pollution will also be valid for indoor air pollution.

There is no local research conducted on the health effects of both indoor and outdoor air pollution. Instead, figures show that health levels are generally worse in South Tyneside, and in Whitburn and Marsden, compared to the national average.

National planning guidance states that air quality can be considered within neighbourhood plans if it is an issue. This is not limited to outdoor air quality, and can also be outside AQMAs or Clean Air Zones. Clearly, outdoor air pollution is an issue in Whitburn, where traffic levels and congestion indicate the presence of air pollution that is detrimental to health. This will affect indoor pollution too.

The local development framework is out of date, as no policy refers to air quality specifically, but Development Management policies do refer to the need for development to not contribute to air pollution, even if it is outside an area of pollution levels that are above national targets. There is no local policy on indoor air pollution.

Therefore, there is evidence that indoor and outdoor air quality should be considered within the Whitburn neighbourhood plan.

It is therefore proposed to include the following policy on air quality:

POLICY WNP15: AIR QUALITY

Development should comply at least with all minimum UK environmental requirements in relation to air pollutants.

Proposals will be supported where they can demonstrate that the proposal contributes to the improvement of air quality or where the proposal does not;
a) Lead to further deterioration of air quality;
b) Create any new areas that exceed air quality limits.

Development within 200 metres of the A183 and B1299 is encouraged to undertake an air quality assessment.

New development should meet BREEAM Quality Mark Standards, or its successor.

7. Appendix A

Types of pollutants

Source: WHO (https://www.who.int/airpollution/ambient/pollutants/en/)

Emphasis in bold added

Nitrogen dioxide, mainly emitted by power generation, industrial and traffic sources, is an important constituent of particulate matter and ozone. There is growing evidence that independently, it can increase symptoms of bronchitis and asthma, as well as lead to respiratory infections and reduced lung function and growth. Evidence also suggests that NO2 may be responsible for a large disease burden, with exposure linked to premature mortality and morbidity from cardiovascular and respiratory diseases.

Carbon monoxide (CO) a colourless and odourless gas, which at high levels can be harmful to humans by impairing the amount of oxygen transported in the bloodstream to critical organs. Although high concentrations of CO are more of a concern indoors, emissions outdoors, particularly in developing countries can be high. New evidence also reveals that long-term exposure to low concentrations is also associated with a wide range of health effects. The main sources of ambient CO include motor vehicle exhaust and machinery that burn fossil fuels.

Sulfur dioxide (SO2) is primarily produced from the burning of fossil fuels (coal and oil) and the smelting of mineral ores that contain sulphur. Exposure to SO2 affects the respiratory system and the function of the lungs, and causes irritation of the eyes. Inflammation of the respiratory tract from SO2 can aggravate asthma and chronic bronchitis, as well as increases the risk of infection, leading to increased hospital admissions and visits to emergency rooms. SO2 also combines with water in the air to form sulfuric acid - the main component of acid rain.

Ground-level ozone is one of the major components of photochemical smog and a key health risk linked to breathing problems, asthma, reduced lung function and respiratory diseases. It is a secondary pollutant, meaning that it is not directly emitted. Instead, it is produced when carbon monoxide (CO), methane, or other volatile organic compounds (VOCs) are oxidized in the presence of nitrogen oxides (NOx) and sunlight. In addition to their role as ozone precursors, CO, VOCs and NOx are dangerous air pollutants themselves. Major sources of NOx and VOCs include emissions from motor vehicle exhaust, industrial facilities, and chemical solvents. Major sources of methane include waste and the fossil fuel and agricultural industry. Aside from its health impacts, tropospheric ozone is a short-lived climate pollutant and one of the most important greenhouse gases

Particulate matter (PM) are inhalable and respirable particles composed of sulphate, nitrates, ammonia, sodium chloride, black carbon, mineral dust and water. Particles with a diameter of less than 10 microns (PM10), including fine particles less than 2.5 microns (PM2.5) pose the greatest risks to health, as they are capable of penetrating peoples' lungs and entering their bloodstream. Sources of PM include combustion engines (both diesel and petrol).