London Borough of Camden

Public Health and Wellbeing

JASON STRELITZ

PROOF OF EVIDENCE

FOR PUBLIC INQUIRY COMMENCING ON 10th OCTOBER 2017

SCHEME

Torrington Place / Tavistock Place Corridor – Trial Traffic Corridor

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SUBJECT OF PUBLIC INQUIRY

The Camden (Torrington Place to Tavistock Place) (Prescribed Routes, Waiting and Loading Restrictions and Loading Places) Traffic Order [2017]

PLANNING INSPECTORATE REFERENCE:

DPI/X5210/17/8

CAMDEN REFERENCE

SC/2017/04

1. Introduction

1.1 I, Jason Strelitz, have prepared this proof of evidence. I am Deputy Director of Public Health for the London Borough of Camden. I am a qualified public health consultant, and Fellow of the Faculty of Public Health. I have an MSc in Public Health from the London School of Hygiene and Tropical Medicine and a PhD from the London School of Economics.

1.2 I believe the Tavistock Place / Torrington Place Trial ('the Trial') contributes positively to important overall local strategies aiming to promote mode shift, which will in turn improve the health and wellbeing of Camden's resident and visiting populations. I set out the evidence for this below. While the Trial will have a number of impacts in the short term which I believe are predominantly positive from a public health perspective, I also recognise that any scheme can have adverse impacts and displacement effects. These should be mitigated wherever practicable. However, an intervention such as this, which is consistent with the Mayor of London's Healthy Streets agenda and supportive of the wider evidence base around mode shift, should be understood in terms of its contribution to Camden's wider mode shift strategy and its longer term impact for public health.

2. The effects of reducing car usage and increasing walking and cycling on population health

2.1 The Trial is one part of the London Borough of Camden's long-term goal to increase the number of journeys taken by foot or bicycle and reduce the numbers of journeys taken by car and other motorised vehicles. This goal, often described as a "mode shift" to greater active travel is important for public health and wellbeing, contributing in a number of ways by:

i. Improving air quality through reduction in car use with direct impact on physical health
ii. Promoting walking and cycling which are associated with a range of benefits for physical and mental health
iii. Creating safer and more attractive street environments for all

iv. Contributing to meeting carbon emissions targets and the long term health benefits of tackling climate change

2.2 The evidence around improved health from active travel led NICE (National Institute for Health and Care Excellence) to recommend in its evidence based guideline Physical Activity and the Environment that policymakers should:

"Ensure pedestrians, cyclists and users of other modes of transport that involve physical activity are given the highest priority when developing or maintaining streets and roads. (This includes people whose mobility is impaired). Use one or more of the following methods:

- *re-allocate road space to support physically active modes of transport (as an example, this could be achieved by widening pavements and introducing cycle lanes)*
- *restrict motor vehicle access (for example, by closing or narrowing roads to reduce capacity)"*

2.3 This compliments recommendations for spatial planners, which recommends prioritising active travel in new developments by ensuring that local facilities and services are easily accessible on foot, by bicycle and by other modes of transport involving physical activity.[1]

2.4 This is reflected in Camden's Local Plan,[2] which states under policy T1 (Prioritising walking, cycling and public transport) that the Council will promote sustainable transport by prioritising walking, cycling and public transport in the borough. This complements other policies that seek to encourage active travel and improve air quality, such as Policy T2 (Parking and car-free development), under which the Council limits the availability of parking and generally requires all new developments in the borough to be car-free.[2]

2.5 In 2008, 60 of the UK's leading organisations working on all areas of public health, including Age Concern, the British Heart Foundation, the Mental Health Foundation and the Royal College of Physicians, came together to provide a consensus of expert views on active travel and health. Within this, they recommended the creation of safe, attractive walking and cycling conditions,

with coherent high quality networks linking all everyday destinations, so that walking and cycling are faster and more convenient than motor travel.[3]

2.6 The UK Faculty of Public Health supports the creation of pleasant street environments in which people want to dwell and travel actively. This is important for raising levels of everyday physical activity at the street level. Walking is increased in neighbourhoods through the provision of pavements, motor-traffic reduction strategies, better street connectivity and improved perceived neighbourhood safety.[4] Public Health England, the Government Agency responsible for promoting health and wellbeing of the population have published a number of reports in recent years calling for a shifts in transport planning to promote active travel.[5]

2.7 The Mayor's "Healthy Streets for London" document[6] provides a framework for policies and strategies that underpin the Mayor's Transport Strategy (2017)[7]. Its ambition is that 80 per cent of Londoners' trips will be on foot, by cycle or by using public transport and to reduce traffic volumes by about 6 million vehicle kilometres per day by 2041. The framework is based on ten health evidence-based indicators of what makes streets health-promoting and attractive places:

- Pedestrians from all walks of life
- People choose to walk, cycle and use public transport;
- Clean air;
- People feel safe;
- Not too noisy;
- Easy to cross; and
- People feel relaxed.
- Places to stop and rest;
- Shade and shelter
- Things to see and do

2.8 Of these the first eight are all directly facilitated by the Torrington Place/Tavistock Place Trial.

2.9 The remaining indicators (Shade and shelter; and Things to see and do) are supported by the Trial which enhances the characteristics of the area, including the nearby amenities of Gordon Square and Tavistock Square gardens, and the area's designation within the Bloomsbury Conservation Area.[8] The Conservation area strategy supports improvements to the public realm.

2.10 The Tavistock Place / Torrington place Trial is consistent with this approach, supporting people who choose to walk, cycle and use public transport and encouraging others that do not already do so by increasing comfort and the feeling of safety.

2.11 The Tavistock Place / Torrington Place Corridor ('the Corridor') was the busiest cycle corridor in Camden pre-Trial, therefore improvements for existing cyclists (and pedestrians) is an important factor.

2.12 According to the Travel in London reports, since 2005-8 the average mode share of car transport in Camden has fallen from 19% to 13%, while walking has risen considerably from 37-42%. Cycling has also increased from 3% to 4%. That equates to about 68,000 more journeys by foot per day, 10,000 more by bicycle, and a reduction of 30,000 daily car trips.[9, 10] The overall strategy is therefore working and there is a need to continue and go further.

2.13 The evidence suggests that no single action alone can deliver this kind of long-term change. A combination of policies at a national level (e.g. vehicle and fuel taxes, policy to promote uptake of cleaner technologies), at a city-wide level (e.g. congestion charging, low emission zones, investment in public transport) and at borough level (e.g. local travel infrastructure, parking policy) have been influencing trends to date and will continue to do so. The impact of such policies and interventions is cumulative.[7]

2.14 The feedback from the Trial suggests positive improvements for cyclists and pedestrians, with both data about perception (which was reflected in consultation responses) and impact, evident in increases in the use of these Trial affected areas for active travel, and fewer safety incidents.

2.15 While new cycle routes may to some extent displace walking or cycling trips in the short term (i.e. cyclists and pedestrians switch from other routes), Goodman et al's study of changes in three English cities, shows that they generate new trips in the longer term.[11]

2.16 In a systematic review of the effect of the environment on cycling, Fraser and Lock identified one US study of seven new cycle routes which demonstrated a statistically significant increase in the percentage of cycle commuters over 10 years (and another US study across 35 cities which found a positive correlation of commuting by bicycle with density of bike lanes.[12]

2.17 In a study of the Cambridge Guided Busway, which included infrastructure to promote walking, cycling, and public transport, the authors found a 34% increase in the likelihood of an increase in weekly cycling commute time, and a 76% increase in overall time spent in active commuting among the least active commuters.[13]

2.18 New cycle lanes have also been shown to increase cycling in areas where cycling rates were already high. In Delft, the Netherlands, 12 km of new bicycle paths, lanes, and standalone tracks resulted in an increase in mode share for cycling from 40% to 43%, an important finding given the already high mode share for cycling before the new infrastructure.[14]

2.19 A substantial analysis of road reallocation case studies from the both the UK and internationally, found that predictions of traffic problems following a reduction in road capacity are often unfounded. The authors conclude that traffic modelling often under-estimates the behavioural response of drivers to road reallocation that results in changed driving behaviour rather than predicted displacement and consequent traffic. They also state that expectations through the media highlighting concern over the impact is often unfounded. The schemes included in the analysis included bus lanes, pedestrianisation, bridge closures, and road closures.[15]

2.20 Sloman and colleagues evaluated the impact of the Department of Transport's *Sustainable Travel Towns* programme between 2004 and 2009 in Darlington, Peterborough, and Worcester. The programme was diverse across the three towns and largely consisted of "soft" measures (school and workplace travel planning, promotional campaigns for walking, cycling etc.). Darlington was the only one of the three selected as a Cycling Demonstration Town in 2005, bringing an additional £500,000 per year from 2005 onwards, largely for cycling infrastructure improvements. Darlington, as the only town of the three to incorporate cycling infrastructure, saw the largest mode shift towards cycling (Table 1).[16]

Table 1: Percentage change in trips in Sustainable Travel Towns, 2004-2009

	All trips	Walking	Cycling	Bus	Car driver	Car passenger
Worcester	-0.5	2.3	1.7	8.7	-10.7	-2.2
Peterborough	-1.1	5.3	1.5	9.0	-12.4	-5.1
Darlington	-1.8	-1.8	5.1	9.6	-11.3	-4.5

3. Air quality, traffic and health

3.1 Air Quality and Health

3.1.1 The Tavistock Place/Torrington Place scheme is in the south of the borough in Camden where there are some of the borough's worst air quality issues (see Figures 3 and 4 in Adam Webber's Proof of Evidence).

3.1.2 A joint report in 2016, from the Royal College of Physicians and the Royal College of Paediatrics and Child Health stated that:

3.1.3 *"Each year in the UK, around 40,000 deaths are attributable to exposure to outdoor air pollution, with more linked also to exposure to indoor pollutants. Air pollution plays a role in many of the major health challenges of our day, and has been linked to cancer, asthma, stroke and heart disease, diabetes, obesity, and changes linked to dementia. Neither the concentration limits set by government, nor the World Health Organization's air quality guidelines, define levels of exposure that are entirely safe for the whole population. When our patients are exposed to such a clear and avoidable cause of death, illness and disability, it is our duty as doctors to speak out."*[17]

3.1.4 The adverse impacts on health have been extensively studied, although uncertainty remains. In 2010, the Committee on the Medical Effects of Air Pollution (COMEAP) estimated that for every 10 µg/m^3 increase in long-term average $PM_{2.5}$ concentration there is a 6% increase in annual all-cause death rates ().[18] Using these estimates, the Institute of Medicine calculated that $PM_{2.5}$ concentrations in 2008 would have contributed to 107 deaths from all causes in Camden (range 18 to 200) and in London 4,267 deaths (range 756 to 7,965).[19]

3.1.5 Walton and colleagues estimate short-term exposure to $PM_{2.5}$ in 2010 resulted in 818 attributable deaths brought forward in London, of which 76 (9.3%) were due to London road transport sources; 2,072 respiratory hospital admissions, of which 192 (9.3%) were due to London road transport sources); and 769 cardiovascular hospital admissions (of which 72 (9.4%) were due to London road transport sources. For NO_2, the authors calculated that there were 461 deaths brought forward, of which 305 (66.2%) were due to London road traffic sources); and 419 respiratory hospital admissions (of which 277 (66.1%) were due to London road traffic sources).[20]

3.1.6 Less is known on the impact of other pollutants on mortality, or how combinations of pollutants interact to the detriment of health. In 2015, researchers at King's College London estimated that deaths attributable to anthropogenic $PM_{2.5}$ in 2010 had reduced from 4,267 to 3,537 (range 624 to 6,632) due to decreased concentrations of $PM_{2.5}$, but also estimated an additional 5,879 deaths (range 3,444 to 8,138) due to NO_2, assuming a 30% overlap in effects with $PM_{2.5}$.[20]

3.1.7 It is important to note, however, that these estimates represent an average shorter life expectancy, rather than known deaths per se. Poor air quality is never the cause of death (as written on a death certificate). Rather it is an underlying factor in the poor health of many, particularly those with other vulnerabilities; the very young and very old, and those with cardiac or respiratory difficulties.

3.2 Air Quality and Traffic

3.2.1 Reducing motorised road traffic is widely understood to play a vital role in improving air quality in Britain.

3.2.2 Motorised road traffic contributes 60 per cent of particulate matter (PM_{10}), and 47 per cent of nitrogen oxides (NO_X), and whilst EU limit values for PM_{10} have been achieved at roadside locations across London, NO_2 concentrations (derived from NO_x) still widely exceed EU limit values. Although values for PM_{10} are within EU limits, there is no overall safe level and further reductions are desirable.[21] Just under 50% of Camden's NO_X and PM_{10} come from road traffic emissions. Of these road traffic emissions, cars (petrol and diesel) account for 26.5% of NO_X and 45.3% of PM_{10} emissions. Taxis and HGVs currently account for a disproportionately larger share of emissions given their levels of use in the borough.[22]

3.2.3 Most poor air quality days in London result from variations in the weather acting on a generally consistent level of emissions. Reducing these emissions will result in fewer poor air quality days.[21]

3.2.4 While reducing motorised traffic volumes overall at a locality level is important for improving air quality, the impacts of any given change may be differential, according to factors such as the particular areas within that locality or types of road users.

3.2.5 For example, concentrations tend to be highest (above background concentrations) in the road carriageway itself, decreasing rapidly with distance. Kerb sides, adjoining roads, are therefore more polluted than conditions even a few metres back from the traffic way. Locations with high volumes of motorised traffic, congestion and road junctions are all particularly associated with poor air quality, as they are characterised by high densities of slow-moving traffic. Please refer to Adam Webber's Proof of Evidence.

3.2.6 The contribution of vehicular traffic reduction to air quality is dependent on a number of factors, including fuel type, engine size, and driving style. de Hartog and colleagues estimated that, for a typical major Dutch urban street with a traffic intensity of 10,000 vehicles/day, a 12.5% reduction in traffic intensity resulted in concentration reductions of 1.3 $\mu g/m^3$ for NO_2 and 0.4 $\mu g/m^3$ for PM_{10}.[23]

3.2.7 Air quality monitoring was carried out at two sites along the Corridor (on Gordon Square and Tavistock Place). The key air pollutant of concern in central London is Nitrogen Dioxide (NO_2), where many streets breach the annual mean health-based limit set out in the UK Air Quality Strategy of 40µg/m^3. Air quality monitoring in the area shows improvements in NO_2 of between 9% and 21% (table 2).

Table 2: Air quality monitoring of NO_2 pre- and during Trial

Monitor location	Before Trial (01/07/2015 – 08/11/2015) µg/m^3	During Trial (24/11/2015 – 01/07/2016) µg/m^3	Absolute change µg/m^3	Percentage change
Gordon Square	51.38	46.67	4.71	-9.0%
Tavistock Place	33.11	26.01	7.01	-21.4%

Source: Camden Council

3.2.8 Due to concerns about air quality arising from displaced traffic, the Council installed air quality monitors at Endsleigh Gardens and Judd Street in February 2017 as part of ongoing monitoring.

3.2.9 The evidence from the scheme is that air quality has improved along the Corridor. This is of significant benefit to all road users; drivers, cyclists and pedestrians, improving the air quality of a significant, heavily used thoroughfare in the south of the borough. Two additional air quality monitors have shown that there is some evidence of potential displacement, particularly along Endsleigh Gardens. Actions taken at national and city level will reduce these levels over time (as described in Adam Webber's Proof of Evidence). Camden Council should also look to mitigate the impacts of this where practicable as should Transport for London which is responsible for Euston Road running alongside this corridor and with some of the worst air quality in London as a whole.

4. Health benefits of physical activity

4.1 The health benefits of physical activity have been widely shown. Becoming physically active, for those who are inactive, is of greatest benefit, however any incremental increase in physical activity is beneficial. [1].

4.2 A person who is physically active every day significantly reduces their risk of a wide range of adverse health outcomes including diabetes, coronary heart disease and dementia. In addition, physical activity has a very positive impact on mental health.

4.3 In 2015, 64% of Camden adults were physically active, compared to 57.8% in London, whilst 12% of 15-year-olds were physically active for at least one hour a day, seven days per week. The proportion of adults who do any walking at least five times per week and once per week, and the percentage of adults who cycle at least once per month are higher in Camden than in London as a whole.[24]

4.4 Even small increases in physical activity among those who are the least active can bring great health benefits. Being physically active comes as much from active travel (walking and cycling as part of everyday life) as participation in sports or fitness activities[25]. A former Chief Medical Officer for England noted: "The potential benefits of physical activity to health are huge. If a medication existed which had a similar effect, it would be regarded as a 'wonder drug' or 'miracle cure'."[26]

[1] By way of guideline the Chief Medical Officer recommends the following levels of physical activity: Adults should aim for 150 minutes of moderate intensity physical activity each week which should happen in bouts of 10 minutes or more. Children need at least 60 minutes of moderate physical activity each day.

5. Air quality, active travel, and health impacts

5.1 . The health benefits of active travel have consistently been shown to outweigh the dis-benefits of exposure to air pollution. In a systematic review that included 17 studies that investigated the effects of air pollution, the authors found mode shifts to active travel resulted in reductions of all-cause mortality, respiratory disease, cardiovascular disease, cancer, adverse birth outcomes, activity-restriction days, and productivity loss.[27] These benefits exist despite the higher breathing rate of cyclists. Int Panis and colleagues calculated that a cyclist breathes in 4.3 times the volume of air compared to a car passenger.[28] However, Tainio and colleagues found that the benefits of active travel in urban areas outweigh the dis-benefits of poor air quality in all but the very highest concentrations; levels which are not seen in the United Kingdom.

5.2 Kendrick et al compared exposure to ultra-fine particulate matter after creating changes to a road layout. Three lanes with a kerbside cycling lane were changed to two lanes with a buffer of parked cars between the highway and cycle lane. Measurements of ultra-fine particles on the cycle lane side of this buffer were between 8% and 35% lower than the highway side, depending on the time of day. The authors ascribed this to the increased distance between source and cyclist.[29] Similarly, MacNaughton and colleagues found that cycle lanes (adjacent to the highway) had concentrations of traffic-related black carbon and NO_2 that were approximately 24% and 25% higher respectively than cycle paths (separated from the highway).[14] This illustrates the potential benefit of the Trial to pedestrians on the footway adjacent to the new cycle lane.

6. Safety

6.1 It is clearly important that environments are safe, and feel safe. Both pedestrians and cyclists are vulnerable in a motor-vehicle centric environment. Perception matters as well, as this acts as a driver of behaviour; places perceived to be safe will encourage use; conversely those perceived as unsafe discourage use. A clear aim of the Trial as stated in Louise McBride's Proof of Evidence was to make cycling along the corridor safer and improve the environment for pedestrians.

6.2 Collision records from before the Trial indicate that some pedestrian-cyclist collisions on the Corridor appeared to have been a result of pedestrians stepping out into the cycle track. The Corridor also suffered from a poor collision record, relating to collisions between motor vehicles and both cyclists and pedestrians. Improvements to the Corridor have increased pedestrian comfort by making the road layout easier to use and a safer environment for pedestrians, and wider cycle one-direction cycle lanes which appear to have reduced cyclist conflict.

6.3 Local draft data on collisions in the Tavistock Place/Torrington Place area indicate that serious collisions have reduced from three in the 14 months prior to the Trial to zero during the 14 months during the Trial, whilst slight collisions have remained the same at 16 over the same periods.

6.4 In the 14 months surveyed during the Trial, the number of collisions resulting in pedestrian casualties significantly reduced to two, which is more than a 75% reduction when compared with 14 months prior to the Trial. Although the average number of cyclist casualties have increased during the Trial, the severity of the causalities has reduced. Prior to the implementation of the Trial, three collisions were recorded as 'serious' compared with no collisions recorded during the Trial.

6.5 Although the data is short-term, as Simi Shah states in her Proof of Evidence, the number of pedestrian casualties on the Corridor decreased from nine over

the 14 months before the Trial to two in the 14 months during the Trial. The number of cyclist casualties along the Corridor increased from seven to 11 over the same periods, although it should be noted that there have been significant increases of up to 52% in cycling (at one site surveyed) from east to west along the Corridor during the morning and afternoon peak periods, and an overall increase in cycling along the Corridor, which may help to explain increases in cyclist casualties.

6.6 Of respondents to the consultation on the Trial, 3782 (25%) of all respondents expressed that the Corridor felt safer and more pleasant to cycle and walk. Only 191 (1%) of respondents expressed concern about the negative impact of the Trial on safety.

7. Air quality, active travel and health inequalities

7.1 There are inequalities in the distribution of air pollution. PM_{10}, NO_2 and SO_2 concentrations tend to be higher in areas of greatest deprivation, although high concentrations have been seen in some of the least deprived areas.[30] In a 2015 study,[31] at 2001 concentrations of PM_{10} and NO_2 (the most recent high-resolution air quality data available to the study authors), the most deprived 20% of areas in London had 8.6% more PM_{10} compared with the least deprived 20%, and 8.1% more NO_2. In the same study, areas of London with more than 20% of non-white residents had 6.6% more PM_{10} compared with areas with less than 20% non-white residents, and 8.1% more NO_2. The distribution of PM_{10} and NO_2 can largely be explained by the high urban concentrations driven by road transport sources.

7.2 The general pattern in terms of health consequences is that deprived populations, although not always more exposed, experience greater harmful effects of air pollution, because of vulnerability factors.[32] This is, in part, because of a higher prevalence of underlying heart, respiratory, and other diseases.

7.3 Most of the research on the impacts of health inequalities of active travel has been undertaken according to the characteristics of area of immediate

residence, rather than the socio-demographics of users of a particular area. Essentially, as a low-cost form of travel, active travel is more appealing to those on limited incomes. Rind and colleagues found that the income-related gradient in active travel remained steep in the least environmentally-deprived areas because those in the highest income groups were markedly less likely to choose active travel when physical environment was 'good', compared to those on the lowest income.[33]

7.4 An Equalities Impact Assessment relating to the Trial was informed by population characteristics and responses to the consultation. The Equalities Impact Assessment found that there would be a range of positive impacts on protected groups, particularly for young people, older people, disabled people and people with impaired mobility, women, pregnant women, and ethnic groups if the Trial layout were to remain. Most of the positive impacts were from an improved environment for walking and cycling therefore promoting active travel and improved air quality. Perception of negative impacts included increased journey times, particularly for taxi users and people travelling to hospital, and increased traffic on other routes. A number of mitigation measures were proposed in the Equalities Impact Assessment to reduce the negative impacts including safe crossings and places to rest.

8. Climate Change

8.1 Climate change is one of the most significant public health challenges we face and in 2016 the UK ratified the Paris climate agreement, extending our commitment to tackle carbon emissions.

8.2 20% of carbon emissions in London stem from the transport sector, and under the agreement there are significant targets to reduce the levels.

8.3 Policies that focus on mode shift away from car use play an important role in achieving the long term emissions target.

9. Conclusion

9.1 There is a wealth of evidence that supports a mode shift from motorised vehicles to encourage walking and cycling. There are large numbers of pedestrians and cyclists using a streetscape whose health and wellbeing is adversely effected by the current pattern of use and the nature of an overall landscape that does not favour pedestrian and cyclists. The Trial aims to redress this and there is evidence that across important domains of health: improving air quality, encouraging physical activity, improving safety and reducing emissions it meets these goals.

9.2 Schemes such this one can have displacement effects and there is some evidence that the Trial does that to some extent. The Council and partners should work to monitor and mitigate these. From a public health perspective, it is important to consider whether the positive impact of the Trial most directly outweighs the adverse impacts of any displacement. However, in addition it is important to consider how the Trial contributes to an overall strategy that over time, if implemented effectively, should see all areas benefit from less polluting, motorised traffic. On both counts the evidence is supportive of the Trial remaining in place.

APPENDICES	
1	Sustrans on behalf working group partners (2008) Take action on active travel.
2	Faculty of Public Health (2013). Built environment & physical activity. A briefing statement.
3	TfL. Travel in London report 1 (2009) Table 3.11 (page 72)
4	TFL. Travel in London Report 9 (2017) supplementary information Table 1
5	Goodman A. et al. New Walking and Cycling Routes and Increased Physical Activity: One- and 2-Year Findings From the UK iConnect Study. Am J Public Health. 2014;104:e38–e46
6	Fraser DS. And Lock K. Cycling for transport and public health: a systematic review of the effect of the environment on cycling. European Journal of Public Health, Vol. 21, No. 6, 738–743
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8	MacNaughton P. et al. Impact of bicycle route type on exposure to traffic-related air pollution. Science of the Total Environment 2014;490:37–43
9	Cairns S. et al. Disappearing traffic? The story so far. Municipal Engineer 2002;151(1): 13-22
10	Sloman L. et al. (2010). The Effects of Smarter Choice Programmes in the Sustainable Travel Towns: Summary Report. Department of Transport
11	RCP / RCPCH (2016) Every breath we take: the lifelong impact of air pollution, Report of a working Party
12	COMEAP (2010) The Mortality Effects of Long-Term Exposure to Particulate Air Pollution in the United Kingdom
13	Miller, BG. (2010) Report on estimation of mortality impacts of particulate air pollution in London. Institute of Medicine
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15	de Hartog JJ. et al. Do the Health Benefits of Cycling Outweigh the Risks? Environ Health Perspect 2010;118:1109–1116
16	Public Health England: Physical activity
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18	Int Panis L. et al. Exposure to particulate matter in traffic: a comparison of cyclists and car passengers. Atmospheric Environment 2010;44:2263-2270
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22	Rind E. et al. Are income-related differences in active travel associated with physical environmental characteristics? A multi-level ecological approach. International Journal of Behavioural Nutrition and Physical Activity 2015; 12:73

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[2] CD3/5 - Camden Local Plan Adopted Version, June 2017 http://camden.gov.uk/ccm/cms-service/stream/asset/?asset_id=3601932&
[3] Appendix 1 - Sustrans on behalf working group partners (2008) Take action on active travel.
[4] Appendix 2 - Faculty of Public Health (2013). Built environment & physical activity. A briefing statement.
[5] CD1/1 Public Health England (2016) *Working Together to Promote Active Travel A briefing for local authorities*; Public Health England (2014)
CD1/2 - Healthy People, Healthy Places Programme: *Everybody active, every day: a framework to embed physical activity into daily life* (2014; Public Health England (2013) *Obesity and the environment briefing: increasing physical activity and active travel*
[6] CD2/3 - TfL (2016) Healthy Streets for London Prioritising walking, cycling and public transport to create a healthy city
[7] CD2/1 - Mayor of London (2017). Mayor's Transport Strategy. Draft for public consultation
[8] CD3/6 - Camden Council (2011). Bloomsbury Conservation Area Appraisal and Management Strategy.
[9] Appendix 3 - TfL. Travel in London report 1 (2009) Table 3.11 (page 72)

[10] Appendix 4 - TfL. Travel in London Report 9 (2017) supplementary information Table 1
[11] Appendix 5 - Goodman A. et al. New Walking and Cycling Routes and Increased Physical Activity: One- and 2-Year Findings From the UK iConnect Study. Am J Public Health. 2014;104:e38–e46
[12] Appendix 6 - Fraser DS. And Lock K. Cycling for transport and public health: a systematic review of the effect of the environment on cycling. European Journal of Public Health, Vol. 21, No. 6, 738–743
[13] Appendix 7 - Panter J. et al. Impact of New Transport Infrastructure on Walking, Cycling, and Physical Activity. Am J Prev Med 2016;50(2):e45–e53
[14] Appendix 8 - MacNaughton P. et al. Impact of bicycle route type on exposure to traffic-related air pollution. Science of the Total Environment 2014;490:37–43
[15] Appendix 9 - Cairns S. et al. Disappearing traffic? The story so far. Municipal Engineer 2002;151(1): 13-22
[16] Appendix 10 - Sloman L. et al. (2010). The Effects of Smarter Choice Programmes in the Sustainable Travel Towns: Summary Report. Department of Transport.
[17] Appendix 11 - RCP / RCPCH (2016) Every breath we take: the lifelong impact of air pollution, Report of a working Party
[18] Appendix 12 - COMEAP (2010) The Mortality Effects of Long-Term Exposure to Particulate Air Pollution in the United Kingdom
[19] Appendix 13 - Miller, BG. (2010) Report on estimation of mortality impacts of particulate air pollution in London. Institute of Medicine
[20] Appendix 14 - Walton, H. et al. (2015) Understanding the Health Impacts of Air Pollution in London. Greater London Authority
[21] CD5/1 -TfL Roads Task Force Report (July 2013) Technical Note 21. What is air quality on the road network and how does this vary by road type, location and time of day?

[23] Appendix 15 - de Hartog JJ. et al. Do the Health Benefits of Cycling Outweigh the Risks? Environ Health Perspect 2010;118:1109–1116
[24] Appendix 16 - Public Health England: Physical activity. https://fingertips.phe.org.uk/profile/physical-activity/data#page/0/gid/1938132899/pat/6/par/E12000007/ati/102/are/E09000007 accessed 2nd August 02017
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