DRAFT Health Impact Assessment

Oxfordshire LTP4 Strategic Environmental Assessment: Appendix C - Effects on Human Health

Prepared for

Oxfordshire County Council

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CH2MHILL®

Burderop Park
Swindon, SN4 0QD, UK

Contents

SECTION 1

1 Introduction

1.1 Background

Health Impact Assessment (HIA) is a process that uses a combination of procedures, methods and tools to help identify possible health impacts of a programme, policy or project, and the appropriate actions to manage those effects. Health is determined by a combination of factors including access to quality healthcare services, lifestyle choices and the social and economic conditions in which people live.

This HIA forms part of the Strategic Environmental Assessment (SEA) of Oxfordshire's draft Local Transport Plan (LTP) 4. It considers the relationship between transport and human health and the likely significant positive and negative effects of the draft LTP4 on human health. *'SEA is a major opportunity to prevent ill health and tackle health inequalities as set out in the White Paper 'Choosing Health and Our Health, Our Care, Our Say'* (Department of Health 2007).

In considering the effects on human health as part of the SEA, CH2M HILL has followed guidance from the Department of Health (Department of Health, 2007). Wherever possible, reference has been made to the health baseline for Oxfordshire. However for some issues, there is a lack of local evidence and therefore reference is also made to research and evidence from other locations.

The scoping stage of the SEA was undertaken between March and April 2014. This included a statutory consultation period between 11 April 2014 and 16 May 2014.

2 Transport and Human Health

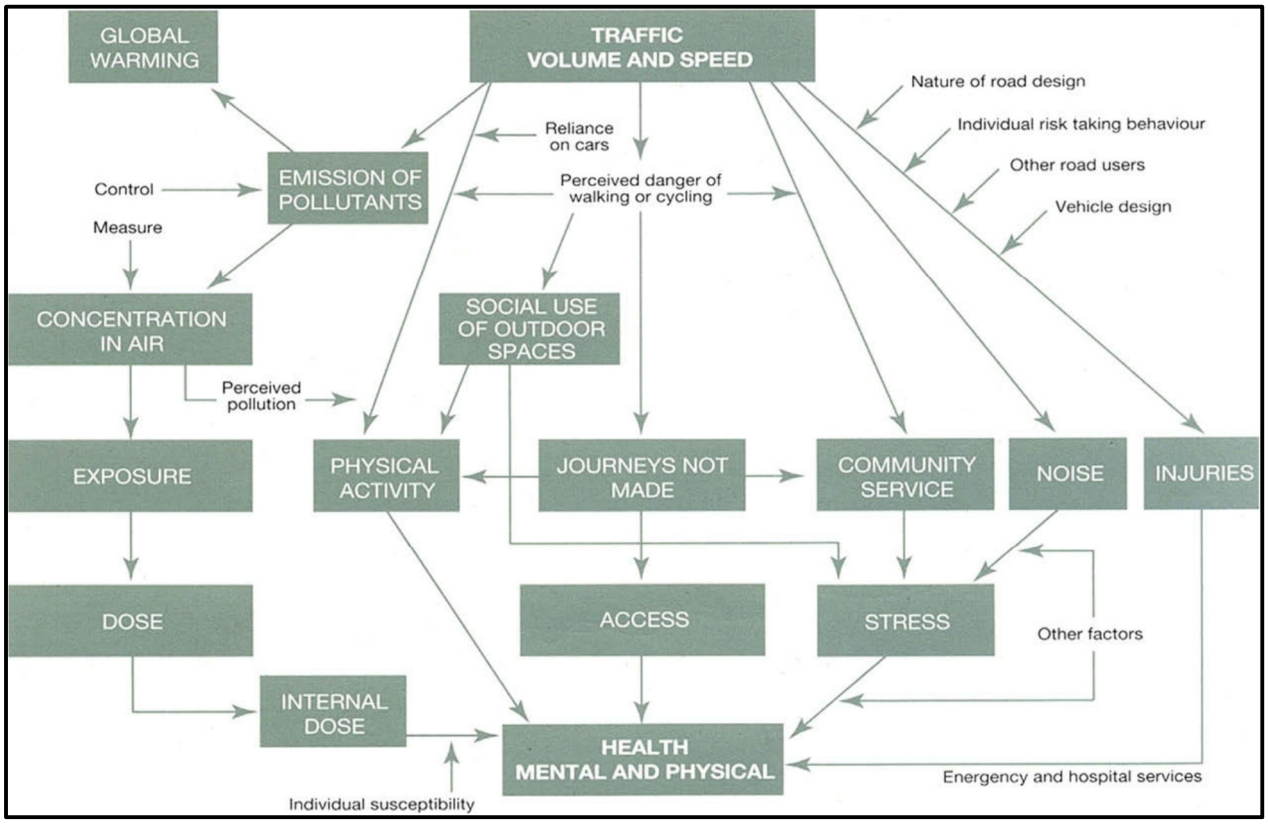
2.1 Introduction

The health of those residing in Oxfordshire is generally good and better than the England average (2013c). Only 3.5% of the population declare themselves as being in bad or very bad health, with the largest proportion of these residing in urban areas (ONS, 2011).

Transport planning has the potential to impact on human health in a variety of ways including its influence on travel choices, behaviour and cost, which are described in the following sections. Other factors such as national regulations, taxes, fuel prices, transport operators and individual preference all influence the transport choices people make. There is therefore an inherent uncertainty in the overall impact that the LTP4 strategy is likely to have on impacting people's travel behaviour.

Figure 2.1 provides an overview of the links between transport policy and human health.

Figure 2.1: Pathways from Transport Policy to Health Outcomes (Metcalfe and Higgins, 2009)



2.2 Transport and Physical Activity

One of the most significant effects of transport policy on human health is considered to be its influence on physical activity and obesity, which are challenging issues within the county. Although levels of physical activity are comparable in the south-east to the rest of England, and estimated levels of physical activity and obesity are better than the England average; the Oxfordshire Partnership notes that obesity levels are rising across localities and age groups. Additionally, the Joint Strategic Needs Assessment (OCC 2014) identifies the increase in 'unhealthy' lifestyles, which leads to preventable disease, as a specific challenge.

Table 2.1 indicates modes of travel to work by residents aged 16 to 74 years in Oxfordshire, based on the 2011 census. Driving a car or van is the most common mode of transport (accounting for 39.7% of all modes) and is one of the indicators of a sedentary lifestyle.

In the UK, there has been a general upward trend in car ownership since the 1960s and increased time spent in cars has been linked to obesity (although it is not known whether increased car use is linked to reduced physical exercise (Health Scotland 2007). Health issues related to low physical exercise and obesity are likely to reduce the use of alternative modes of transport rather than the car, increasing traffic growth. The effect of switching from active modes of travel (walking and cycling) to the use of the private car is now regarded by health professionals as the major health impact of recent transport policy and behaviour.

There are highly significant health benefits associated with adopting a more physically active lifestyle. Adults who are physically active have 20-30% reduced risk of premature death and up to 50% reduced risk of developing the major chronic diseases such as coronary heart disease, stroke, diabetes and cancer (Department of Health, 2004).

In addition, a study in 2010 (Hendrikson, et al) highlights a link between active travel and reduced rates of sickness absenteeism. The study revealed that people who cycle over 5 km more than three times a week, are absent from work for fewer days on average. The study concluded that “cycling to work is associated with less sickness absence.

The Chief Medical Officer advises that adults should undertake a minimum of 30 minutes of physical activity (1 hour for children) five times a week in order to improve health and that “For most people, the easiest and most acceptable forms of physical activity are those that can be incorporated into everyday life. Examples include walking or cycling instead of driving…”(Department of Health, 2004)

Promoting healthy lifestyles through physical activity is an effective way of reducing the risk of chronic disease and premature death (Oxfordshire Clinical Commissioning Group et al 2013), and the LTP4 can directly promote this.

SECTION 2

Table 2.1: 2011 Census: Method of Travel to Work (ONS)

Location	Work mainly at or from home	Underground, metro, light rail, tram	Train	Bus, minibus or coach	Taxi	Motorcycle, scooter or moped	Driving a car or van	Passenger in a car or van	Bicycle	On foot	Other method of travel to work
Oxfordshire	**24,274**	**638**	**9,915**	**23,400**	**877**	**2,731**	**191,595**	**14,293**	**23,770**	**41,002**	**1,924**
Cherwell	4,757	96	2,185	3,672	298	556	47,271	4,034	2,592	8,964	404
Oxford	4300	170	1,769	11,405	264	482	23,735	2,245	12,270	12,674	493
South Oxfordshire	6229	180	3,453	2,184	103	558	43,957	2,766	2,575	7,682	400
Vale of White Horse	4472	105	1,455	3,695	111	640	39,766	2,660	4,018	5,905	354
West Oxfordshire	4516	87	1,053	2,444	101	495	36,866	2,588	2,315	5,777	273

2.3 Community Severance and Barriers to Active Travel

Traffic volumes and speed are linked to a perceived danger of cycling and walking. Therefore it is likely that there is relationship between traffic growth and the reported decline in rates of walking and cycling in England, which can increase community severance. Community severance or the 'traffic barrier effect' is:

> "…the sum of inhibiting effects upon pedestrian behaviour resulting from the impact of traffic conditions within a specific environment/street context. These effects can be either physical (observable) or psychological (unobservable) impediments to pedestrian movement."(Hine, 1994)

The Active Travel Strategy for England (Department for Transport/Department for Health, 2010) cites a number of reasons why people don't walk or cycle as much anymore. These include:

- Overestimating the distance, difficulty or time involved in undertaking a journey by bicycle or on foot;
- Lack of confidence or feeling unsafe getting back on a bicycle;
- Concerns over personal security when going out on foot after dark or allowing children to walk home from school;
- Location and design of our most common destinations. For example employment and retail parks being located on the edge of towns, or along busy roads which are difficult to cross; Ample car parking is not matched by facilities to lock up bicycles or there is a lack of storage facilities or showers in workplaces for cyclists;
- Design of streets. For example, cycle lanes which are poorly maintained, incomplete, or too narrow to allow comfortable cycling; pavements which are narrow or have gaps, intimidating conditions to pedestrians and cyclists caused by heavy or fast moving traffic; uneven pavements; better signage for drivers than for pedestrians.

The Active Travel Strategy explains that '*Contrary to popular opinion, it's not the weather – annual rainfall in Amsterdam is higher than it is in Manchester, and it's colder in winter*' that deters people from walking and cycling.

A study into the barrier effect (which included use of video analysis of behavioural responses among three age groups to variations in traffic conditions) showed that the elderly (65+) are many times more susceptible to barrier effects than other adults (more than 10 fold on the basis of the indicator used in the study) (Hine and Russell, 1996).

Since the population of the UK is ageing, barrier effects from traffic are likely to become increasingly significant.

2.4 Road Injuries and Deaths

The rate of road injuries and deaths is worse in Oxfordshire than the England average, although the total number of road accidents in Oxfordshire has fallen from 3,077 in 2003 to 2,304 in 2012 (OCC, 2013). However, without a road safety strategy within and beyond the county, some roads may become more dangerous, for example through inappropriate use.

Road traffic collisions are a major cause of preventable injuries and death (APHO and Department of Health, 2009). Data on those killed and seriously injured are collated by the Police and published by the Department for Transport.

Although pedestrians and cyclists are disproportionately impacted by road accidents (compared to the proportion who travel by those modes) it is likely to be a reflection of the lack of safety in the dominant mode of transport, the car, which accounts for this. For example, driver error is a contributory factor in 90% of accidents. (APHO and Department of Health, 2009). Pedestrians and cyclists are highly vulnerable to road accidents having little or no physical protection, and with a higher fatality rate per distance travelled than for any other mode of transport with the exception of motorcyclists. Consequently, personal safety fears may deter people from walking, cycling or using public transport.

People who live in deprived areas are more likely to be injured on the roads, both within and outside their community, partly because they tend to walk more than those who live in less deprived areas. In 2002, the Government set a three-year target to reduce casualties in deprived areas in England faster than the rest of the country, which it met. However, the most deprived areas were still over-represented in the casualty population in 2007, and pedestrians and cyclists were very overrepresented (see section 1.9.4).

Whilst there may be concern that the promotion of active travel modes would lead to greater increases in casualties among pedestrians and cyclists, evidence suggests that there is "safety in numbers" for walkers and cyclists. One key study into this concept was reported by Jacobson 2003. Jacobsen provided evidence based on analysis of national data from fourteen European countries on walking and cycling as well as data for 47 towns in Denmark, and 68 towns in California. The author concluded that:

- "there is a relationship between motor vehicle collisions with pedestrians and or cyclists and numbers of pedestrians and or cyclists. For example, in a community where walking doubles it can be expected that there will be a 32% increase in pedestrian injuries, where cycling doubles it can be expected that there will be a 34% increase in cyclist injuries;
- motorists appear to adjust their behaviour in the presence of people walking and cycling which largely controls the likelihood of collisions;
- In result, the relationship between pedestrian or cyclists exposure and casualties is not linear, that is, there is safety in numbers for these mode users"(Davis, 2010).

Following on from this study a number of other studies have provided further evidence to support the safety in numbers principle (Robinson, 2005, Bonham. et al, 2007 and Pucher, 2003). Most recently, the road safety analyst Elvik has reported on the non-linearity of risk and the promotion of sustainable transport. (2009) As with other researchers Elvik concludes that evidence for safety in numbers suggests that the risk to each individual cyclist or pedestrian declines as there are increases in walking and cycling, and that the greater the number of pedestrians and cyclists, the greater the reduction in risk. This leads him to conclude that "*the high injury rate for pedestrians and cyclists in the current transport system does not necessarily imply that encouraging walking and cycling rather than driving will lead to more accidents*".

In the context of Oxfordshire, the evidence above may mean that in urban areas, where there are already some significant pedestrian movements and some cyclists, the growth of these modes is likely to result in a non-linear relationship of risk and injury. This is likely to result as motorists' speeds are lower and they adapt more to the greater numbers of pedestrians and cyclists.

2.5 Transport and Air Pollution

A study combining UK and EU emissions data with models of weather and the ways in which chemicals disperse suggested that '*pollution from overall UK combustion emissions causes approximately 13,000 premature deaths a year, with road transport being the biggest source'*. A further 6,000 deaths are estimated to be due to European Union emissions produced outside the UK (NHS 2012). Despite considerable improvements in air quality in the last few decades, air pollution (see Section 4.5) from road transport (in addition to combustion sources) continues to pose respiratory and inflammatory health risks to people. Elevated levels and/or long term exposure to air pollution can lead to a range of serious symptoms affecting human health. Many areas in the UK still fail to meet the health based national air quality objectives and European limit values, particularly for particles and nitrogen dioxide

(www.environmental-protection.org.uk/committees/air-quality/air-pollution-and-transport/car-pollution/).

In comparison to many other countries, air pollution levels in the UK are low, although in parts of major cities, including parts of central Oxford, particularly near busy roads, they are high enough to be of concern. The local pollution picture reflects a complex mixture of sources and distribution of pollutants. They contribute not only to local air pollution impacts, but also to increasing ground levels of ozone, adding to local and global climate impacts.

Air quality across Oxfordshire is generally good but there are a number of areas in the county where elevated levels of pollutants have been detected. Local Air Quality Management within the County is the responsibility of each district council who are required to provide routine reports on air quality in each district in relation to air quality standards and objectives, as defined in the UK Air Quality Strategy. Exceedances of air quality objectives require declaration of Air Quality Management Areas (AQMAs), along with Action Plans produced in conjunction with OCC as the transport authority. There are currently nine declared AQMAs in Oxfordshire (Abingdon, Banbury, Botley, Oxford City, Chipping Norton, Henley, Wallingford, Watlington and Witney).

The trend for a reduction in emissions per vehicle as the vehicle stock is replaced by newer vehicles meeting higher emissions standards has not taken place as expected. The relative growth in numbers of newer diesel vehicles with emission control technology, have given rise to higher direct emissions of nitrogen dioxide into vehicle exhausts. The result has been detected as some increases in localised pollution levels in urban centres and a failure of pollution levels to decrease at the rate predicted. Any downward trend can be offset locally if traffic growth exceeds reductions due to improvements in technology; overall emissions increases are even more likely if traffic growth results in increased congestion. However, traffic pollution has become worse, as the high use of cars is the main mode of access in urban areas for relatively short journeys. The issue of air pollution is of particular concern within urban areas because of the density of population (therefore greater numbers of people exposed to air pollution) as well as the fact that many car journeys within urban areas are typically less than 6km and that since the effectiveness of catalytic converters in the initial minutes of engine operation is small, the average emission per distance driven is very high in urban areas (Krzyzanowski et al, 2005).

The most troublesome pollutants are:

- oxides of nitrogen;
- particles;
- volatile organic compounds; and
- carbon monoxide.

In the UK, road transport contributes to the majority of the public's exposure to these pollutants and is responsible for up to 70% of air pollution in urban areas (Environmental Audit Committee, 2010).

Both short-term and long-term exposure to air pollution is a significant cause of ill health and premature death (COMEAP, 1998 and 2009). Air pollution causes short term health effects on the respiratory system and more serious impacts due to long-term exposure including permanent reductions in lung function. Air pollution is linked to asthma, chronic bronchitis, heart and circulatory disease, and cancer (Krzyzanowski et al, 2005). It is estimated that air pollution causes as many as 50,000 premature deaths per year in the UK (Environmental Audit Committee, 2010).

Air pollution is also a significant contributor to climate impacts. The Climate Change Risk Assessment for the 'health' sector (Defra, 2012) shows the principal impacts of climate change on human health are expected to come from changing temperatures, ground-level ozone levels and sunlight.

The LTP4 could take an integrated approach to reducing air pollution and carbon emissions from road transport through the adoption of reduction targets for transport emissions within the LTP.

2.6 Transport and Noise

Significant traffic noise, will require further consideration in the LTP4 as it can interfere with the enjoyment of those working, visiting and residing in the county.

Transportation is the main source of noise pollution in Europe and, except for people living in close proximity to railway lines or airports, road traffic is the major cause of human exposure to noise (Cora and Phillips, 2000). Traffic noise causes impaired communication (difficulty in making oneself heard), sleep disturbance, annoyance and increased aggression. There is also increasing evidence of a link to heart disease and hypertension, which could be significant given the large percentage of population being exposed to noise (Cora and Phillips, 2000).

Noise is subjective i.e. what is noisy for one person may not bother someone else. However, it is known that disturbed sleep can become an issue where noise levels constantly exceed 30 dBLAeq and most people would be 'moderately annoyed' at 50 dBLAeq.

2.7 Mental Health and Wellbeing

Mental health and wellbeing is an important issue in Oxfordshire. Though deprivation in Oxfordshire is lower than the national average, deprivation continues to contribute to high levels of health inequalities and lower life expectancy. These factors impact significantly on risks that affect mental health and wellbeing such as low income, poor education, poor housing, unemployment and family breakdown, and also on the ability of the population to respond to the negative factors that increase mental health.

There are several ways in which transport can also impact upon well-being and common mental health conditions such as anxiety and depression, which are currently experienced by 64,500 people in Oxfordshire (Director of Public Health, 2013).

While traffic noise has been shown to induce nervousness, depression, sleeplessness and undue irritability; traffic congestion is linked to aggressive behaviour and increased likelihood of involvement in a crash. However, access to a car has also been linked to improved mental health, as has regular physical exercise (Health Scotland 2007).

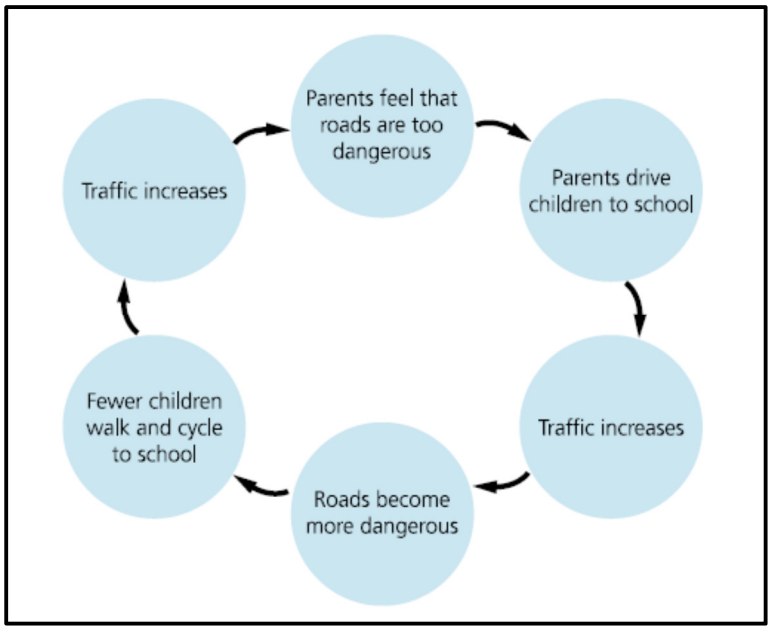


Figure 2.2: The Effects on Ever Increasing Traffic on Children's Freedom of Movement (Sustrans, 1996)

An increased uptake of children walking and cycling can improve self-confidence and physical exercise can benefit child development, cognition, concentration and academic performance. However, high traffic density has meant that fewer children are being allowed to walk or cycle for short distances. Figure 2.2 indicates this phenomenon and the cumulative effect it has on restricting children's movement.

2.9 Inequalities and Vulnerable Groups

Oxfordshire is overall a very healthy county (OCC, 2014) but the health effects of transport are known to fall disproportionately across certain groups of the population. '*Health inequalities are one of the Department of Health's top six priorities for the NHS, which reflects a growing recognition of the impact of social disadvantages on the population's health'* (Department of Health, 2007). Such health inequalities result from exposure to a range of factors including location and socio-economic influences.

Urban areas: The negative health impacts of transport are often concentrated in inner-city districts and along busy roads i.e. areas where traffic density is particularly high and where many people live and work. The result is the increased risk of injury and death for pedestrians and cyclists, exacerbation of the severance effect of traffic and air and noise pollution levels that are higher than in suburban and rural areas (Croxford et al, 1996).

Rural areas: Rural areas suffer a disproportionate number of road fatalities, probably due to higher traffic speeds. In 2012, approximately 60% of fatalities in Great Britain occurred on rural roads, with 38% occurring on rural A-roads and a further 21% on other rural roads. This is considerably higher than the 42% of traffic which is found on these roads (Department for Transport, 2013).

Deprived communities:

- Children in the ten per cent most deprived wards in England are more than three times as likely to be pedestrian casualties as those in the ten per cent least deprived wards (Grayling et al, 2002) according to research published in 2002; more recently the DfT (May 2009) reports that pedestrians aged 0 to 16 in the most deprived areas are four times more likely to be killed or injured than those in the least deprived areas.
- Social deprivation is associated with increased injury and fatality levels in road traffic collisions. Driving at excessive speed, driver intoxication, driver/passenger failure to wear seat-belts, and unlicensed/uninsured driving is most prevalent in fatal collisions in the most deprived social classes (Clarke et al, 2009);
- Deprived communities are more likely to live in inner city areas where the polluting effects of transport are more pronounced due to higher housing density, older vehicles and exposure to busy roads;

Disability: There are 89,756 disabled people within Oxfordshire, which accounts for approximately 14% of the population (Census 2011). This is less than the national average at 18%. Adults with physical and learning disabilities wish to be more independent, with greater choice and control to be fully integrated into the wider community (OCC et al, 2014). This includes improved access to support services and good health care.

Age: Life expectancy in the county for a person born in 2013 was above the national average at 80.3 years for males and 84.1 years for females (Public Heath Observatories, 2013); although there are variations between districts.

The 2011 Census showed an increasing number of older people living in Oxfordshire, with the population aging faster than the national average (Director of Public Health, 2013). Additionally, the more rural districts are likely to experience the greatest increase in the over 85s over the coming decades.

- The elderly have been found to be most at risk of pollution-related premature death in time series studies of mortality, possibly because of higher rates of illness among this group. It has been estimated that periods of high pollution in Britain may hasten by a few days or weeks up to 24,100 deaths each year, mainly among older people and the sick; and 23900 hospital admissions, as well as causing additional emissions (Department of Health Committee, 1998).

- Nearly one third of car drivers (30%) who die or are seriously injured are under the age of 25, yet this age bracket makes up a much smaller proportion of licence holders.
- Pedestrians over the age of 70 account for a disproportionate share of deaths (Department for Transport, 2009);
- When it comes to accidental deaths, traffic kills far more children and young people (excluding babies) than all events such as fire, drowning, poisoning or falls. Four out of five accidental deaths of 10-19 year olds are in road crashes.

Pedestrians and Cyclists: Pedestrians and cyclists are particularly vulnerable road users and are disproportionately involved in crashes given the amount of time they spend on the road and the relatively short distances they travel.

- Britain's good record on road safety is marred by its high rate of child pedestrian casualties. Figures published by the Department for Transport show that in 2011, 2,412 children under the age of 16 were killed or seriously injured on the roads (http://makingthelink.net/child-deaths-road-traffic-accidents).
- Collisions with vehicles travelling at more than 20 miles per hour increase the severity of pedestrian and cyclist casualties (Department for Transport, 2009).
- In 2013, after car occupants, pedestrians were the second largest casualty killed in reported accidents (23%) in Great Britain, followed by motorcyclists (19%) and pedal cyclists (6%) (Department for Transport, 2014).

Cyclists are 12 times more likely to be killed on the road than people in cars. Cyclists are more likely to be killed in collisions with lorries (Department for Transport, 2009).

SECTION 3

3 Scope of Assessment

Based upon the above evidence, the scope of this assessment focuses upon the following 'relevant' SEA objectives and sub-objectives (noting that only those sub-objectives affecting human health are included):

- *Protect and promote everyone's physical and mental wellbeing and safety*
  - *Increase opportunities and amenity of active travel modes for health benefits*
  - *Promote safer non-motorised and public transport*
  - *Ensure access to health facilities by a wide range of sustainable modes of travel*
  - *Provide safer conditions for pedestrians and cyclists, including children and the infirm.*
- *Reduce noise pollution*
  - *Reduce the number of people being affected by transport noise*
- *Reduce all forms of transport-related air pollution in the interests of local air quality*

Table 3.1 sets out the assessment objectives with the reasons for their selection. The table also includes a number of issues that are considered as indicators as to whether the SEA objectives would benefit or undermine the LTP4 strategy options.

Table 3.1: SEA Objectives for Effects on Human Health

Sub-objective	Link to Human Health	How objective could be achieved	Reason
Protect and promote everyone's physical and mental wellbeing and safety			
Increase opportunities and amenity of active travel modes for health benefits	Improving access and opportunities for active travel modes such as foot or bike can deliver positive health outcomes and provide the right environment for promoting active lifestyles and good use of resources.	**Provide opportunities for physical activity.** This may include the provision of additional and better quality facilities (and improved conditions) for pedestrians and cyclists including high-quality green infrastructure	Improvements to pedestrian movement /crossing points are likely to encourage more pedestrian/cycle journeys, and thus increase physical activity. Physical activity is one of the best ways of improving overall health and reducing obesity.
		Promote the health and environmental benefits of undertaking more journeys on foot or by bicycle and **encourage a move away from car dependency for shorter journeys**	Sedentary lifestyle is linked to a number of health issues including obesity and weight gain, cardiovascular disease and cancer. Therefore significant public health benefits can be achieved if more people adopt walking or cycling as all or part of their journeys rather than using the car. There are also important long term health benefits relating to reducing carbon emissions. The Association of Directors of Public Health recommends that 10% of transport budgets is committed to walking and cycling.
Promote safer non-motorised and public transport	Improvement of safety is national transport policy goal. Certain groups of society are disproportionately at risk of accidents. British Crime Survey data reveals that speeding traffic is rated as the greatest problem in local communities.	**Improvements to conditions and safety (such as lower speed limits in residential areas)** in order to encourage pedestrians and cyclists	There is evidence that levels of walking and cycling increase after the implementation of traffic calming schemes. There is unequivocal evidence from Europe for casualty reduction where 30kph zones are implemented. Implementation of 20mph limits is now favoured by the Department for Transport as a potentially effective intervention to improve safety in residential areas as well as improve quality of life. There is an opportunity to enhance the viability of non-motorised and public transport as a means of increasing travel options and cutting reliance on car use, hence reducing accidents,
		Provision of a road safety strategy which strongly promotes walking and cycling and **seeks to reduce fear of crime** for pedestrians and cyclists through good urban design	
Ensure access to health facilities by a wide range of sustainable modes of travel	Poor access to healthcare is a significant factor in social exclusion, which is associated with health problems. There is therefore a link between improved connectivity of health facilities by	**Improved connectivity and improved transport to key health services** **Reduce physical barriers by improving sustainable transport infrastructure** and	Poor access to services is a significant factor in social exclusion, which is associated with health problems.

Sub-objective	Link to Human Health	How objective could be achieved	Reason
	public transport, walking and cycling, and improved health.	reduce psychological barriers (e.g. road safety fears).	There is therefore an opportunity to enhance accessibility by foot, bike and public transport. This will help to promote healthy exercise and the sense of local community, increasing equity in the access to services and health facilities for people with poor access to transport.
Provide safer conditions for pedestrians and cyclists, including children and the infirm.	Pedestrians and cyclists are particularly vulnerable road users and are disproportionately involved in accidents given the amount of time they spend on the road and the relatively short distances they travel. Children are at high risk.	**Programmes of safety measures** to help reduce likelihood of accidents **Seek to reduce fear of crime for pedestrians and cyclists** through good urban design	Locations with a high number of crashes or fatalities may indicate a specific cause of accidents that could be addressed through targeted road improvement or alternative measures such as speed cameras.
Reduce noise pollution			
Reduce the number of people being affected by transport noise	Noise disturbance can interfere with the enjoyment of those working, visiting and residing in the county, and result in mental health problems.	**Reduce traffic volumes in residential areas**	Opportunity to divert traffic noise away from sensitive residential receptors.
Reduce all forms of transport-related air pollution in the interests of local air quality			
Improve air quality levels where possible, and minimise the number of exceedances of Air Quality Standards	Road transport contributes to air pollution, which affects human health.	**Encourage and facilitate the use of active travel and short journeys** **Reduce traffic congestion** **Limit the more polluting vehicles in sensitive areas and reduce transport emissions** **Seek initiatives to limit traffic growth.**	Opportunity to take an integrated approach to reducing air pollution and carbon emissions from road transport.

SECTION 4

4 Method of Assessment

4.1 General Approach

A preliminary assessment has been made to identify whether the area strategies and supporting strategies of the LTP4 would compromise the achievement of the SEA objective and sub-objectives with regard to human health.

Potential impacts were considered in relation to whether they were likely to be:

- widespread or significant in scale;
- localised or limited in scale;
- Uncertain whether it affects criteria, or whether
- No potential impact has been identified.

This information was recorded on a matrix in Appendix F 'Area and Supporting Strategy Assessment Report' of the Environmental Report. This matrix presents the potential positive and negative effects on the health-related SEA objective from the combination of measures that make up the draft LTP4.

The assessment methodology is set out in Chapter 5 of the SEA Environmental Report.

4.2 Limitations and Assumptions

At this stage there is limited detail available as to how the proposals within the LTP4 would be delivered and it is therefore difficult to estimate the population likely to take advantage of, or benefit by, the new schemes. There is also significant uncertainty regarding the likely level of funding that would be available to deliver the LTP4 strategy and the Delivery Plan is not yet available so the overall timescales are uncertain.

Consequently, this assessment is largely based upon a number of assumptions. The following broad assumptions have been made:

- All proposals listed within the LTP4 would be delivered between 2015 - 2031 and therefore have an effect within the short to medium term;
- All proposals would achieve the high level goals and objectives of the LTP4.

SECTION 5

5 Effect of LTP4 on Human Health and Safety

SEA Objective 4: Protect and promote everyone's physical and mental wellbeing and safety

No negative impacts on human health have been identified as a result of the LTP4.

The LTP4 identifies strategies to improve facilities, links and safety conditions for pedestrians and cyclists to encourage the uptake of walking and cycling. These improvements include the provision of super-premium and premium cycle routes, a cycling strategy for Science Vale, a Sustainable Transport Strategy for Bicester, a low traffic 'Oxford' city centre, innovative cycle parking facilities with cycle hubs and strategies to increase use of public transport. These are considered significant beneficial impacts as they will help to improve the health and well-being of local communities, while enabling access to housing sites and facilitating movement between employment sites, retail centres and residential areas.

This LTP4 demonstrates a commitment to maintaining the safety and condition of local roads and highway related assets with systematic prioritisation where there are safety related issues, premium bus routes and high pedestrian and cycle usage whilst still maintaining the network as a whole.

The Science Transit strategy also demonstrates a commitment to improving travel information and integrated and reliable services for the population to improve the traveller experience and road safety. Such systems will seek to work with modern lifestyles and align with aspirations for personalised mobility options. Additionally, the LTP4 together with the Science Transit will develop interchange points between multiple modes of transport (hubs) that will maintain safe walk and cycle access by keeping people segregated from public transport and vehicles.

As part of the Freight Strategy, features will be developed to influence lorry routes and journey times that reduce the danger that lorries pose to cyclists. Additionally, rest areas and proper facilities will be developed for lorry drivers with security, refreshments, washing and toilets catering better for drivers in terms of health and safety.

In the longer term, there may be increasing risks to cyclists and pedestrians from the estimated increase in large lorries, but these risks will increase at a greater rate in the absence of the LTP4.

SEA Objective 5: Reduce noise pollution

No significant strategic impacts on noise have been identified as a result of implementing the LTP4. Any impacts of the strategies on noise (and thus human health) are likely to be dependent on location.

There are likely to be benefits to human health in terms of reducing noise in towns and Oxford city centre (e.g. through traffic reductions, proposals to re-route traffic and reduce freight traffic volumes, and the construction of bus tunnels). However, there will be elevated noise levels in other areas (e.g. at park and ride sites located further from towns and the city, and in more rural tranquil areas) through transport network improvements, the provision of more bus services and increased road traffic (including freight). It is uncertain how the Science Transit will align with the LTP4 and affect noise patterns through improved frequency, speed and reliability of services.

There are also likely to be negative impacts through increased noise pollution associated with construction of infrastructure works.

Noise will be assessed as part of scheme design and suitable noise mitigation will be used to reduce any impacts identified.

SEA Objective 6: Reduce all forms of transport-related air pollution in the interests of local air quality

No significant strategic impacts on air quality have been identified as a result of implementing the LTP4. Any impacts of the strategies on air quality are likely to be dependent on location.

Improvements to air quality are likely to be realised through the support of high capacity vehicles with low or zero emissions, through zero emissions restrictions for freight and taxis in some areas (e.g. Oxford), through support for low carbon modes of public transport and through the implementation of schemes that deter road traffic from town centres or provide traffic calming measures. Improvements to air quality in cities and town centres are also likely to be realised through the implementation of measures that deter freight traffic, and consolidate freight items, combining them for onward delivery to the same destination.

Additionally, proposals to encourage the use of sustainable modes of transport (e.g. walking and cycling) are likely to improve air quality in some areas. Cycling is a largely carbon-free form of transport and will therefore help to reduce the reliance on vehicle based transport and associated air pollutants from transport.

However, increases in air pollutants may result elsewhere from the re-routing of traffic (particularly freight traffic) and the improvements to the transport network, which will increase road capacity and may encourage further traffic growth in the long-term. The construction of new road and rail infrastructure and associated facilities is also likely to elevate air pollution.

5.1 Cumulative Effects

Many of the effects predicted for the LTP4 are cumulative in their nature. For example, the predicted positive effect on air quality depends upon a reduction in traffic arising from the cumulative effect on modal shift from the combination of public transport measures and promotion of walking and cycling.

It is anticipated that there would be a cumulative positive effect on human health through active travel. The combination of a reduction in traffic in urban centres, an increase in walking and cycling and improvements to walking and cycling facilities would combine to improve human health through a combination of increased physical activity and reduced air and noise pollution.

When project level detail associated with the LTP4 schemes (including location of transport improvements and ongoing maintenance and repair works) is available, further assessment of potential in-combination or cumulative impacts should be considered.

The LTP4 has also been developed in such a way to ensure that it has been fully integrated with other plans, strategies and programmes, including those that affect human health.

5.2 Recommendations for Mitigation and/or Enhancement

The Environmental Report sets out recommendations to improve the environmental outcome of the draft LTP4. In relation to objectives for health, the recommendations include the following:

- Continue to seek opportunities at project level to promote sustainable travel to support the planned housing growth, and to improve the safety of existing rights of way as part of strategy area implementation.
- Develop new walking and cycling infrastructure where possible, maximising opportunities to natural green space and the countryside, and promoting the creation/extension of and improvements to green and blue infrastructure.
- Continue to seek opportunities at project level to improve the safety and quality of existing rights of way (e.g. improving the quality of surfaces, providing directional signage, access to public transport) as part of strategy area implementation and to provide better integration with rail and strategic bus networks.

- Plan construction activities to minimise disturbance to pedestrians, residents, tourists and workers within affected areas, for example through the use of temporary acoustic screening where appropriate.
- Seek to ensure that freight traffic uses the most appropriate routes, as outlined in Oxfordshire's Inter-urban Freight Strategy and Oxfordshire Lorry Routes Guidance.
- Consider the use of low noise surfacing when constructing new roads and in delivering new walking and cycling routes, which would also have associated health and well-being benefits.
- Seek to implement measures to counteract traffic growth (e.g. by continuing to improve opportunities for sustainable transport).
- Continue to work with the Highways Agency, district councils, Network Rail and train operators to identify air quality improvements associated with the road and rail network to complement measures identified in Air Quality Action Plans.
- Carefully plan schemes in terms of location, scale and design at project level to ensure air quality reductions are realised.
- Apply restrictions on more polluting vehicles within Oxford to encourage a cleaner fleet. Consideration could be given as to how to apply a "polluter pays" principle within demand management measures.
- Consider use of trees in appropriate locations to filter out pollutants; urban tree planting can be beneficial to air quality, and should be considered at project level.

6 Abbreviations

AQMA	Air Quality Management Area
DfT	Department for Transport
HIA	Health Impact Assessment
LTP4	Local Transport Plan 4
NHS	National Health Service
OCC	Oxfordshire County Council
SEA	Strategic Environmental Assessment
UK	United Kingdom

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