

M25 junction 10/A3 Wisley interchange TR010030

6.3 Environmental Statement Chapter 14: Health impacts

Regulation 5(2)(a)
Planning Act 2008

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009



Infrastructure Planning

Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 (as amended)

M25 junction 10/A3 Wisley interchange

The M25 junction 10/A3 Wisley interchange Development Consent Order 202[x]

6.3 ENVIRONMENTAL STATEMENT CHAPTER 14: HEALTH IMPACTS

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14. Health Impacts

Executive summary

This chapter describes the anticipated effects on health due to the construction and operation of the Scheme. It has taken into account key health outcomes and determinants of health. It is compliant with the NPSNN and is in accordance with the guidance provided in the DMRB Volume 11 and Interim Advice Note (IAN) 125/15. Effects on topic areas related to health are covered in other chapters in the ES.

The health in the core and intermediate study areas is either significantly better than or in line with the England average. Deprivation and health inequalities are low.

Overall, the majority of adverse effects are during construction and are of negligible-slight significance after mitigation. There is expected to be an increase in air pollution and noise and this is expected to have a slight adverse effect on health. There are also expected to be beneficial health effects from the employment and procurement related to the Scheme and the improved journey times, safety and improved connectivity due to the Scheme during operation.

During construction, the potential adverse effects on community health are through individual and a combined impacts related to traffic, air quality, noise, vibration, drainage/water environment, geology and soils, and visual impact, particularly for communities with increased susceptibility (potential issue) and increased vulnerability (pre-existing issue) to health issues, from construction traffic and activity, increased congestion, decreased connectivity to public and commercial services and loss of amenity. There may also be some disruption to lifestyles and daily routines for example travelling to school, work or retail amenities may take longer or be perceived to be less safe. There are also potential beneficial effects on community health through impacts on the increase in local employment and the wider economy through the construction jobs created and the associated procurement of road building materials from businesses in the region and the districts in and around the Scheme.

During operation, the impact of the additional capacity on the road of the Scheme could lead to some increase in air pollution and noise for communities living around the Scheme and on connecting roads which could have an adverse effect on community health. The impact of reduced congestion, improved road journey times, improved road safety and improved connectivity by foot and cycle is likely to have a beneficial effect on community health.

Opportunities to introduce mitigation and enhancement measures into the Scheme design have been undertaken and the management of construction of the Scheme. The design should be developed with community requirements in mind. The use of best practice construction methods as secured in the Outline CEMP and as identified in this and other health relevant chapters of the ES, will reduce disruption to users of residential, community and other receptors near the Scheme and minimise the effects on the community, especially those susceptible to health issues.

14.1 Introduction

- 14.1.1 This chapter describes the anticipated effects on health (human population health and wellbeing) due to the construction and operation of the Scheme and has taken into account the main health outcomes and determinants of health that relate to the Scheme.
- 14.1.2 Existing conditions have been reviewed to establish the baseline against which the likely significant effects from the construction and operation of the Scheme have been assessed.
- 14.1.3 The assessment topics and methodology followed is in accordance with the guidance provided in the DMRB Volume 11 and Interim Advice Note (IAN) 125/15¹. Effects on topic areas related to health are covered in other chapters in the ES. For example, air quality, noise and people and communities are covered in Chapters 5, 6 and 13 of this ES. The finding of the health chapter have been informed by these health-relevant chapters.
- 14.1.4 Following receipt of the Scoping Opinion from the Planning Inspectorate, including comments from the local authorities and other stakeholders, the study area for this assessment has been expanded to include the settlements of Ripley, Ockham, East Horsley and West Horsley.

14.2 Competent expert evidence

- 14.2.1 This health assessment has been undertaken by two health professionals who have experience and qualifications in health impact assessment, public health and medicine.
- 14.2.2 The lead assessor has a degree in Medicine, University of Leicester, England, an MSc in Environmental Epidemiology from the London School of Hygiene and Tropical Medicine (LSHTM), England and a PhD in Public Health Policy from LHSTM, England. They are a member of the International Association for Impact Assessment, an associate of the Faculty of Public Health and a Fellow of the Royal Society of Public Health. They are also a member of the Transport and Health Study Group and the Town Planning Institute. They have worked and trained in HIA with Ben Cave, of Ben Cave Associates, Leeds, England, in 2003-04 and with Martin Birley, Birley HIA, between 2013-2017.
- 14.2.3 The assistant assessor has a degree in Medicine from the University of Porto, Portugal and an MSc in Public Health from LSHTM, England. They undertook the 5 day health impact assessment course at the University of Liverpool, and run by IMPACT, in 2013. They are a member of the International Association for Impact Assessment and an International Practitioner member of the UK Faculty of Public Health.
- 14.2.4 Together they have 19 years of knowledge and experience in health impact assessment and over 30 years of knowledge and experience in public health and have used their health impact and public health and knowledge and professional judgement to undertake this assessment.

¹ IAN 125/15 introduces new guidance in order to facilitate more and effective and efficient, Environmental Assessments for Highways. It is for use by Highways England or those undertaking work on behalf of the Highways England. It should be read in conjunction with DMRB Volume 11 and replaces IAN 125/25. It can be found online: <http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian125r2.pdf>

14.3 Legislative and policy framework

14.3.1 The following table outlines the relevant principal legislation and policies considered in undertaking this assessment.

Table 14.1: Legislation, regulatory and policy framework for health impacts

Legislation / Regulation	Summary of requirements
National	
National Policy Statement for National Networks (NPSNN)	<p>The Government's vision and strategic objectives for the national networks include improving overall quality of life, journey quality, reliability and safety and linking up communities. Junction improvement is cited as a measure which will be used to enhance the existing national road network towards this vision (Paragraph 2.23).</p> <p>The NPSNN establishes the expectation that delivery of new schemes will improve quality of life and avoid and mitigate environmental and social impacts in line with the principles set out in the NPPF and the Government's planning guidance (Paragraph 3.3). Schemes will also be expected to improve accessibility and inclusivity and reduce community severance, to contribute to a network that provides a range of opportunities and choices for people to connect with jobs, services and friends and family (Paragraph 3.19).</p> <p>Although it does not provide specific guidance for people and communities impacts, the NPSNN outlines the approach to land use which is of relevance to this assessment. Applicants should identify existing and proposed land uses, including best and most versatile agricultural land, near the Scheme and the likely effects on these (Paragraphs 5.165 and 5.168).</p> <p>It is acknowledged in the NPSNN that new or enhanced national networks infrastructure can have direct (paragraph 4.79) and indirect (paragraph 4.80) impacts on health, well-being and the quality of life of the population. It further states that (paragraph 4.81) where a proposed project has likely significant environmental impacts that would have an effect on human beings, any environmental statement should identify and set out the assessment of any likely significant adverse health impacts. And that the applicant should identify measures to avoid, reduce or compensate for adverse health impacts as appropriate (paragraph 4.82).</p>
National Planning Policy Framework (NPPF) 2018	<p>The NPPF sets out Government's planning policies to achieve sustainable development under three overarching objectives, one of which being a social objective. This objective aims to support strong, vibrant and healthy communities (...) by fostering a well-designed and safe built environment, with accessible services and open spaces that reflect current and future needs and support communities' health, social and cultural well-being.</p> <p>NPPF8 Promoting healthy and safe communities sets that planning policies and decisions should aim to achieve healthy, inclusive and safe places which: a) promote social interaction, including opportunities for meetings between people who might not otherwise come into contact with each other; b) are safe and accessible, so that crime and disorder, and the fear of crime, do not undermine the quality of life or community cohesion; and c) enable and support healthy lifestyles, especially where this would address identified local health and well-being needs.</p> <p>The NPPF sets policies on many determinants of health, making direct and indirect references to how these determinants should contribute to health objectives, including NPPF9 Promoting sustainable transport</p>

Legislation / Regulation	Summary of requirements
	(contribution to reducing congestion and emissions, improving air quality and public health), NPPF11 Making effective use of land (safeguarding and improving the environment and ensuring safe and healthy living conditions; and securing well-designed, attractive and healthy places), NPPF12 Achieving well-designed places (creating places that are safe, inclusive and accessible and which promote health and well-being, with a high standard of amenity for existing and future users; and where crime and disorder, and the fear of crime, do not undermine the quality of life or community cohesion and resilience), NPPF15 Conserving and enhancing the natural environment (ensuring that new development is appropriate for its location taking into account the likely effects of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development; and mitigating and reducing to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life), and NPPF17 Facilitating the sustainable use of minerals (set out criteria or requirements to ensure that permitted and proposed operations do not have unacceptable adverse impacts on (...) human health).
Countryside and Rights of Way Act 2000	The Countryside and Rights of Way Act 2000 (CRoW) regulates all Public Rights of Way (PRoW) and ensures access to them. It requires local highway authorities to publish a Rights of Way Improvement Plan (RoWIP), which should be reviewed every 10 years. The Act also obliges the highway authority to recognise the needs of the mobility impaired when undertaking improvements.
Road Investment Strategy (RIS) and Strategic Business Plan 2015	<p>The RIS aims to improve connectivity, safety, air quality and road user satisfaction, boost the economy whilst reducing noise and negative environmental impacts all of which will have an impact on local communities and people.</p> <p>It also recognises the importance of the network accounting for the needs of walkers and cyclists, and not act as a deterrent to active travel options. The network must be easier to get over, under or around to ensure that roads do not divide communities, and that the associated health and wellbeing benefits of walking and cycling are felt as widely as possible.</p>
Health and Social Care Act 2012	This is a wide-ranging piece of legislation that places a duty of care to protect and improve public health on the Secretary of State for Health as well as other bodies directed by the Secretary of State for Health such as local authorities, including Directors of Public Health, and the NHS (Sections 11, 12, 18, 22, 30, 31 and 60).
Public Health Outcomes Framework 2016	This sets out the national vision and targets for public health and how public health is being improved and protected. Key target indicators include: reducing killed and seriously injured casualties on England's roads; reducing percentage of the population affected by noise; increasing utilisation of outdoor space for exercise/health reasons; increasing proportion of physically active adults; reducing the fraction of mortality attributable to particulate air pollution; reducing mortality rate from causes considered preventable; and reducing numbers of 16-18 year olds not in education, employment or training.
Regional	
Surrey Transport Plan (STP)	The vision and objectives of the Plan either directly or indirectly relate to community health and wellbeing.

Legislation / Regulation	Summary of requirements
	<p>The vision of the Plan is:</p> <p>To help people to meet their transport and travel needs effectively, reliably, safely and sustainably within Surrey; in order to promote economic vibrancy, protect and enhance the environment and improve the quality of life.</p> <p>The objectives are to:</p> <ul style="list-style-type: none"> • Effective transport: To facilitate end-to-end journeys for residents, business and visitors by maintaining the road network, delivering public transport services and, where appropriate, providing enhancements; • Reliable transport: To improve the journey time reliability of travel in Surrey; • Safe transport: To improve road safety and the security of the travelling public in Surrey; and • Sustainable transport: To provide an integrated transport system that protects the environment, keeps people healthy and provides for lower carbon transport choices.
Local	
<p>Guildford Borough Proposed Submission Local Plan: strategy and sites (June 2017) pp. 24-26</p>	<p>This proposed plan has four core themes relevant to health and wellbeing:</p> <ul style="list-style-type: none"> • Society: Improving the lives of our residents by making Guildford a place where everyone is truly valued; • Environment: To protect and enhance the environment and balance the needs of all residents and visitors with the desired outcome of improved overall wellbeing; • Economy: To encourage economic growth through knowledge, innovation and creativity, improving employment opportunities available to all residents and supporting rural businesses; • Infrastructure: To work effectively with partners to ensure that there is appropriate infrastructure in place for existing communities as they expand and move towards a sustainable transport system with improved public transport and less reliance on the car; • Policy P4: Flooding, Flood risk and groundwater protection zones; • Policy ID1: Infrastructure and delivery; • Policy ID2: Supporting the Department for Transport's "Road Investment Strategy"; and • Policy ID3: Sustainable transport for new developments.
<p>Elmbridge Borough Council Core Strategy (2011) pp. 15-16</p>	<p>Elmbridge is reviewing its local plan currently.</p> <p>Key health and wellbeing relevant objectives in the core strategy are:</p> <ul style="list-style-type: none"> • To retain the high quality of life experienced by most Borough residents and share the benefits across all sections of the community, within an overall context of stabilising and ultimately reducing the Borough's ecological footprint; • To reduce people's reliance on driving, by directing new development to sustainable locations, promoting attractive and convenient alternatives to using the private car and, in so doing, reducing congestion and pollution caused by traffic; • To promote sustainable lifestyles, and limit the use of natural resources, reducing the need to travel and maximising the use of renewable energy;

Legislation / Regulation	Summary of requirements
	<ul style="list-style-type: none"> To address inequalities, promote better integration and increase opportunities for people who live in the less affluent areas of the Borough; and To respond to the social and physical infrastructure needs arising from new development in a way that delivers sustainable growth.
Guildford Health and Wellbeing Strategy 2017-2022 (2017) p. 24	10.3 Road Safety and Air Quality Desired outcomes: <ul style="list-style-type: none"> To reduce the number of people killed and seriously injured on roads so that the Borough is not significantly different from the England average. (specific target to be set by the working group); Identify areas with high levels of pollution and introduce measures to improve air quality; and Encourage the use of lower polluting transport options.
Elmbridge Council Plan 2018-19 p. 5	Our Priorities Our Priorities support our Vision and are reviewed every year. Character and Environment – We will make Elmbridge a sustainable and attractive place. Quality Services – We will work in partnership to ensure services are efficient, effective and offer value for money. Economic Development – We will facilitate economic growth, including improved infrastructure and housing. Community Wellbeing – We will listen to all of our residents and support communities to become healthier, empowered and safe.

14.4 Study area

- 14.4.1 The core and intermediate study area includes the borough councils within which the Scheme is located namely Guildford Borough Council (GBC) and Elmbridge Borough Council (EBC). The wider study area includes other borough councils which are connected to the existing road network around the Scheme: Woking Borough Council (WBC), Runnymede Borough Council (RBC), Surrey Heath Borough Council (SHBC), Mole Valley District Council (MVDC), Reigate and Banstead Borough Council (RBBC) and the Royal Borough of Kingston upon Thames (RBK).
- 14.4.2 The study area for the health assessment is divided into three parts, 250m from the Scheme boundary (the core study area), 250m to 1 km from the Scheme boundary (the intermediate study area), and over 1 km from the Scheme boundary (the wider study area). The distance was established based on professional judgment, relevant guidance and EIA scoping consultation feedback from stakeholders. The core study area is where potential adverse health effects on residents, during both construction and operation phases, are likely to be greatest. The intermediate study area is where there will be some level of adverse health effects during the construction phase and to a lesser extent the operation phase. The wider study area is likely to experience the greatest beneficial effects and potentially some limited adverse health effects during the operation phase.

14.5 Assessment methodology

- 14.5.1 The following section describe the methodology that was used in this health assessment, the information and data sources that were consulted; and the assessment criteria and assessment framework.
- 14.5.2 This assessment is based on established good practice guidance on health impact assessment developed by the English Department of Health², Public Health England, the Department for Communities and Local Government, the Devolved Countries in the UK^{3,4,5}; as well as professional associations such as the Faculty of Public Health⁶, the Institute of Environmental Management and Assessment (IEMA)⁷, and international agencies and associations such as the International Finance Corporation⁸ and the International Association for Impact Assessment.⁹ The World Health Organisation (WHO) definition of health used by public health professions within the UK and internationally are that health is “a *state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity*” and is “*the extent to which an individual or group is able to realise aspirations and satisfy needs, and to change or cope with the environment. Health is therefore a resource for everyday life, not the objective of living; it is a positive concept, emphasizing social and personal resources, as well as physical capacities*”.^{10,11}
- 14.5.3 The health assessment has been informed by and builds on other assessments that were undertaken e.g. transport, air quality, noise, community responses from the wider community consultation programme and the discussions and documents used to develop the Scheme.
- 14.5.4 The assessment was made up of the following:
- Discussion of existing baseline conditions;
 - Review of evidence on health effects of similar road schemes;
 - Qualitative assessment of the likely effects on health; and
 - Identification of mitigation and enhancement measures.
- 14.5.5 The key population sub-groups that the health assessment focused on were: residents living in the study areas, workers working in the study area, and visitors coming to visit sites and people in the area. Key sensitive groups that were considered were: older people; people with disabilities or existing health conditions; women; children and young people; people from minority ethnic backgrounds and those on low incomes/or who are unemployed.

² Health Development Agency. (2002). Introducing health impact assessment (HIA): informing the decision-making process, England.

³ Institute of Public Health in Ireland. (2009). Health impact assessment guidance.

⁴ Public Health Institute of Scotland. (2001). HIA: a guide for local authorities; Scottish HIA network; 2001.

⁵ Welsh Assembly Government and Health Challenge Wales. (2004). Improving Health and Reducing Inequalities: a practical guide to health impact assessment.

⁶ NHS Executive. (2000). Resources for HIA: Volumes 1 & 2. England.

⁷ IEMA, Faculty of Public Health and Ben Cave Associates, (2017) Health in Environmental Impact Assessment: A Primer for a Proportionate Approach.

⁸ International Finance Corporation. (2010). Introduction to Health Impact Assessment.

⁹ International Association for Impact Assessment. (2006). Health Impact Assessment International Best Practice Principles. Special Publication Series No. 5. Fargo, USA.

¹⁰ World Health Organization. (1948). Preamble to the Constitution of the World Health Organization as adopted by the International Health Conference. New York, 19-22 June 1946, and entered into force on 7 April 1948.

¹¹ World Health Organization. (1984). Health Promotion: A Discussion Document on the Concepts and Principles. WHO Regional Office for Europe. Copenhagen.

- 14.5.6 Human health is underpinned by several determinants which span environmental, social and economic aspects. These include: population change, employment and economy, housing and shelter, transport and connectivity, learning and education, crime and safety, social capital and community cohesion, health and social care and public services, shops and retail amenities, spirituality, faith and traditions; arts and cultural activities; leisure and recreation; lifestyle and daily routines; governance and public policy, energy and waste; and land and spatial.
- 14.5.7 The full list of health outcomes and determinants that were considered are listed below.

Health Outcomes/Effects

- communicable diseases;
- non-communicable diseases (including the effects from air, water, soil and noise pollution);
- nutritional disorders (including obesity);
- physical injury (including traffic accidents and chemical poisoning); and
- mental health and wellbeing (including nuisance and annoyance effects).

Determinants

- population change (demography);
- jobs and economy;
- housing and shelter;
- transport and connectivity;
- learning and education;
- crime and safety;
- health and social care and public services;
- shops and retail amenities (commercial goods and services);
- social capital and community cohesion (including severance);
- spirituality, faith and traditions;
- arts and cultural activities;
- leisure and recreation (including greenspace and recreational physical activity);
- lifestyle and daily routines (including physical activity);
- governance and public policy;
- energy and waste; and
- land and spatial.

- 14.5.8 Governance and public policy has been scoped out as not relevant to this Scheme, the policy context shows that the Scheme is strongly aligned to existing national and local transport policy and the Scheme does not have any specific

impacts on governance or public policy. Spirituality, faith and traditions has been screened out as no places of worship and no local traditions are affected. Arts and cultural activities has been screened out as no arts and cultural venues are affected. Given the nature of the Scheme lifestyle and daily routines is considered as part of transport and connectivity.

14.5.9 The community health profile summarises information on the following where data is available:

- Attributes of the population: size, age, ethnicity and religion, gender, family structure and key socioeconomic characteristics such as education and employment and economy;
- Health: health and wellbeing status, health and social care provision; and
- Quality of life: deprivation, social capital and community cohesion, crime and safety.

Key existing amenities and facilities

14.5.10 The baseline and community profile used district and ward level data and where appropriate other higher or lower level geographic datasets.

14.5.11 The key data sources reviewed were the following:

- Department of Health area health profiles;
- Public Health England profiles; and
- NOMIS (Official Labour Market Statistics) and ONS (Office for National Statistics) local area profiles and information.

Health and other related information from the eight councils

14.5.12 For each potential health and wellbeing aspect ten key issues were considered:

- Which population groups are affected and in what way? Specifically, what sensitive/vulnerable communities are affected and what is the coping capacity/resilience of affected communities to deal with adverse impacts and take up beneficial opportunities?
- Is the impact (and associated health outcomes/effects) beneficial, neutral or adverse?
- Does it occur over the short, medium or long term or in a particular project phase? Is it permanent or temporary?
- Is it reversible or irreversible?
- How intense (or severe) are the potential health outcomes? Does the impact increase or decrease with time?
- Does it occur at a local, regional, national or global level (or more than one level)?
- Are the impacts direct, indirect and/or cumulative?
- Are public health or environmental health standards breached?
- Are feasible mitigating measures available and are they acceptable to affected communities and other key stakeholders?

- How important is the health impact to project affected communities and/or other key stakeholders?

14.5.13 The time period considered are, base year (2015-2018), 2 year main construction phase, operation phase (short term, Year 1 of operation, and long term, future years).

14.5.14 The assessment methodology and the assigning of sensitivity, magnitude and significance has, therefore, been developed using the consultants' professional judgement. This professional judgment has been based on knowledge from previous similar schemes, desk-based analysis of baseline public health and socio-economic characteristics of the wider study area, scientific literature on health effects, Scheme consultation and EIA scoping responses, national and local health priorities, national and international regulatory health standards, and national and local health policies.

14.5.15 Magnitude of impact on health receptors within this assessment is classified as Major, Moderate, Low, or Negligible, in line with the definitions provided in Table 14.2 below.

Table 14.2: Magnitude of impact on human health receptors

Magnitude	Criteria
Major	An impact that is expected to have major adverse or beneficial health effects, typically following one or more of the following: a large change in health risk (increase or decrease), affecting a large number of people, long-term in duration, permanent and irreversible.
Moderate	An impact that is expected to have a moderate adverse or beneficial health effect, typically following one or more of the following: a moderate change in health risk (increase or decrease), affecting a moderate number of people, short-term in duration, intermittent and reversible.
Minor	An impact that is expected to have a minor adverse or beneficial health effect, typically following one or more of the following: a low change in health risk (increase or decrease), affecting a small number of people, temporary or short-term in duration, intermittent and reversible.
Negligible	An impact that is unlikely to have an effect on population or human health.

14.5.16 Sensitivity of impact on health receptors within this assessment is classified as Very High, High, Medium, Low, or Negligible, in line with the definitions provided in Table 14.3 below.

Table 14.3: Sensitivity of human health receptors

Sensitivity	Criteria
Very High	Communities with one or more of the following: existing very high levels of poor physical and/or mental health; very high levels of health inequalities or inequities; weak social and economic support networks; high levels of deprivation; very high levels of exposure to environmental risk factors; very poor availability of or access to health and social services; very high proportion of vulnerable sub-groups (e.g. children, elderly, people with disabilities, economically inactive); very strong views or very high degrees of uncertainty about the project. These communities are judged to have a little or no coping capacity.
High	Communities with one or more of the following: existing high levels of poor physical and/or mental health; high levels of health inequalities or inequities; weak social and economic support networks; high levels of deprivation; high

Sensitivity	Criteria
	levels of exposure to environmental risk factors; poor availability of or access to health and social services; high proportion of vulnerable sub-groups (e.g. children, elderly, people with disabilities, economically inactive); strong views or high degrees of uncertainty about the project. These communities are judged to have a low coping capacity.
Medium	Communities with one or more of the following: existing moderate or average levels of physical and/or mental health; moderate or average levels of health inequalities or inequities; social and economic support networks; moderate or average levels of deprivation; moderate or average levels of exposure to environmental risk factors; moderate availability of or access to health and social services; average proportion of vulnerable sub-groups (e.g. children, elderly, people with disabilities, economically inactive); no strong views or high degrees of uncertainty about the project. These communities are judged to have a moderate coping capacity.
Low	Communities with one or more of the following: good levels of physical and/or mental health; low levels of health inequalities or inequities; good social and economic support networks; low levels of deprivation; low levels of exposure to environmental risk factors; good availability of or access to health and social services; low proportion of vulnerable sub-groups (e.g. children, elderly, people with disabilities, economically inactive); no strong views or high degrees of uncertainty about the project. These communities are judged to have a high coping capacity.
Negligible	Communities with one or more of the following: very good levels of physical and/or mental health; very low levels of health inequalities or inequities; very good social and economic support networks; very low levels of deprivation; very low levels of exposure to environmental risk factors; very good availability of or access to health and social services; low proportion of vulnerable sub-groups (e.g. children, elderly, people with disabilities, economically inactive); no strong views or high degrees of uncertainty about the project. These communities are judged to have a very high coping capacity.

Significance of Effect

- 14.5.17 Significance of effect is the product of the sensitivity of receptors and magnitude of impact. The significance of effects within this assessment is classified according to Table 14.4 below. Of the effects described, moderate and large effects are considered 'significant'.

Table 14.4: Matrix Determining Significance

Environmental Value (Sensitivity)	Magnitude of impact (degree of change)				
	No Change	Negligible	Minor	Moderate	Major
Very High	Neutral	Slight	Moderate or Large	Large or Very Large	Very Large
High	Neutral	Slight	Slight or Moderate	Moderate or Large	Large or Very Large
Medium	Neutral	Neutral or Slight	Slight	Moderate	Moderate or Large
Low	Neutral	Neutral or Slight	Neutral or Slight	Slight	Slight or Moderate
Negligible	Neutral	Neutral	Neutral or Slight	Neutral or Slight	Slight

14.6 Assumptions and limitations

- 14.6.1 The health assessment has been informed by the findings of the other health relevant assessments undertaken as part of the EIA such as air quality (Chapter 5), noise (Chapter 6) and people and communities (Chapter 13). The findings of the health assessment are therefore based on the assumptions set out in those assessments.
- 14.6.2 The assessment is at a population level and individual level effects are not identified as this would require a detailed individual level of baseline information which is not feasible.
- 14.6.3 The assessment provides a broad, high level indication of effects based on simple assessment and professional judgement. A more detailed assessment of effects will be possible when there are further details concerning the construction and design of the Scheme.
- 14.6.4 Beneficial effects do not cancel out adverse effects as often the beneficial effects and adverse effects are experienced by different groups within a community. Though there can be overlap where people experience both the beneficial and adverse effects at the same or different points in time.
- 14.6.5 District and ward level data is used as being representative of the existing residents, workers and visitors living, working and visiting the area around the Scheme.
- 14.6.6 The above assumptions and limitations have not affected the overall and general accuracy of the findings of the health assessment but have made it difficult to be more precise about impacts and health effects.

14.7 Baseline conditions

- 14.7.1 Baseline information is provided at district and ward levels. In this health profile the word 'significantly' and 'not statistically significant' are used in the epidemiological sense of being a difference that is not due to chance i.e. that this is a real difference between the local area and the England average.

- 14.7.2 The community health and wellbeing status of Guildford and Elmbridge Borough Councils; Lovelace ward (which includes the villages of Ripley, Ockham and Wisley) and Clandon and Horsley ward (East and West Horsley) in Guildford Borough Council; and Weybridge St George's Hill ward and Cobham and Downside wards in Elmbridge Borough Council.
- 14.7.3 Overall, the health in the above areas is either significantly better than the England average or in line with the England average. Deprivation and health inequalities are low.

District level profile

- 14.7.4 The resident population of Guildford Borough Council (GBC) is approximately 147,000 of which 20% are under 18 years of age and just over 16% are aged 65 years and over.¹² The proportion of residents from an ethnic minority group is 3.6% (compared to an England average of approximately 21%, 18% and 14%).
- 14.7.5 The level of deprivation in GBC is low compared to England as a whole (approximately 2% compared to 20% of residents live in areas that are most deprived). There are only a few small pockets of high deprivation in the central part and the eastern edge of GBC. The life expectancy gap between women and men from the least deprived areas compared to the most deprived areas is 5.4 years for women and 6.2 years for men. Trends in all cause, cardiovascular and cancer mortality in under 75 year olds is lower than the England average.
- 14.7.6 Key health indicators that are significantly worse in GBC are: the rate of people killed or seriously injured on roads 77.4 per 100,000 people compared to 39.7 in England as a whole. Percentage of GP recorded diabetes and dementia are also significantly worse (only 63% and 60% of the estimated proportion of people with diabetes and dementia have been diagnosed).
- 14.7.7 Elmbridge Borough Council (EBC) has a smaller resident population than GBC, approximately 136,000 of which a higher proportion are under 18 years of age (25%) and a higher proportion are aged 65 years and over (18%).¹³ The proportion of residents from an ethnic minority group is also higher at almost 16%.
- 14.7.8 The level of deprivation in EBC is very low compared to England as a whole (less than 1% compared to 20% of residents live in areas that are most deprived). There are no pockets of the highest level of deprivation in EBC. The life expectancy gap between women and men from the least deprived areas compared to the most deprived areas, is also low, 2.8 years for women and 3.5 years for men. Trends in all cause, cardiovascular and cancer mortality in under 75 year olds is lower than the England average.
- 14.7.9 Key health indicators that are significantly worse in EBC are: the rate of people killed or seriously injured on roads 47.7 per 100,000 people compared to 39.7 in England as a whole. Percentage of GP recorded diabetes is also significantly worse (only 61% of the estimated proportion of people with diabetes and dementia have been diagnosed).

¹² Public Health England (2018) Guildford district local authority health profile 2018. Available at: https://fingertips.phe.org.uk/profile/health-profiles/area-search-results/E07000209?place_name=Guildford&search_type=parent-area (Accessed: 20 October 2018)

¹³ Public Health England (2018) Elmbridge district local authority health profile 2018. Available at: https://fingertips.phe.org.uk/profile/health-profiles/area-search-results/E07000207?place_name=Elmbridge&search_type=parent-area (Accessed: 20 October 2018)

Ward level profile

Lovelace ward

- 14.7.10 Lovelace ward includes Ripley, Ockham and Wisley. Lovelace ward has a population of 2,715, of which 16.6% is under 16 years of age (lower compared to Guildford district and England), and 20.6% is over 65 years of age (higher compared to Guildford and England). The proportion of ethnic minority residents is 6% (proportion of residents who are not 'White UK' is 12.2%).¹⁴ The proportion of income, child and older people deprivation is significantly lower than the England average (6.5%, 8.7% and 8.3% compared to the England average of 14.6%, 19.9% and 16.2%).
- 14.7.11 The proportion of residents with self-perceived bad or very bad health is in line with the England average (5.8% compared to 6.7%). The proportion of people with a limiting long term illness or disability is significantly lower than the England average at 15.2% (it is, though, higher than the Guildford average). The proportion of pensioners living alone, 29.2%, is in line with the England average.
- 14.7.12 The proportion of children who are obese in Reception Year and Year 6 is in line with the England average (Lovelace has a slightly higher percentage of obese children in Reception Year and a lower percentage of obese children in Year 6 than Guildford district). Lovelace has a significantly lower proportion of children who have excess weight than the England average (and lower than Guildford). The proportion of obese adults, those who binge drink and those who eat healthily is in line with the England average.
- 14.7.13 The ratio of hospital admissions for any cause, heart disease, stroke, heart attacks, chronic obstructive pulmonary disease, self harm, alcohol-related harm, hip fracture in over 65 year olds, hip fractures, hip replacement and knee replacements is in line with or significantly lower than the England average (it is also in line with or lower in relation to Guildford, except for self harm and hip replacements). The incidence of cancers is also in line with the England average (and in relation to Guildford). Deaths from all causes, cancers circulatory diseases, heart disease, stroke and respiratory diseases is in line with the England average.
- 14.7.14 Lastly, life expectancy in men is in line with the England average (81.2 years, Guildford 82.1 years, England 79.4 years) and for women is significantly better than the England average (91.3 years, Guildford 84.8 years, England 83.1 years).

Clandon and Horsley ward

- 14.7.15 Clandon and Horsley ward includes East and West Horsley. Clandon and Horsley ward has a population of 8,908, of which 20.5% is under 16 years of age (lower compared to Guildford district and England), and 24.1% is over 65 years of age (higher compared to Guildford and England). The proportion of ethnic minority residents is 3.5% (proportion of residents who are not 'White UK' is

¹⁴ Public Health England (2018) *Lovelace ward local health profile*. Available at: http://www.localhealth.org.uk/GC_preport.php?lang=en&codgeo=E05007295&nivgeo=ward_2016&id_rep=r03 (Accessed: 20 October 2018)

9.8%).¹⁵ The proportion of income, child and older people deprivation is significantly lower than the England average (3.5%, 4% and 4.6% compared to the England average of 14.6%, 19.9% and 16.2%).

- 14.7.16 The proportion of residents with self-perceived bad or very bad health is significantly better (lower) the England average (2.7% compared to 5.5%). The proportion of people with a limiting long term illness or disability is significantly lower than the England average at 12.6% (it is, the same as the Guildford average). The proportion of pensioners living alone, is 24.5%, which is significantly lower than the England average.
- 14.7.17 The proportion of children who are obese in Reception Year is in line with the England average. The proportion of children who are obese in Year 6 is in line with the England average. Lovelace has a slightly higher percentage of obese children in Reception Year and a lower percentage of obese children in Year 6 than Guildford district. Lovelace has a significantly lower proportion of children who have excess weight than the England average (and lower than Guildford). The proportion of obese adults, those who binge drink and those who eat healthily is in line with the England average.
- 14.7.18 The ratio of hospital admissions for any cause, heart disease, stroke, heart attacks, chronic obstructive pulmonary disease, self harm, alcohol-related harm, hip fracture in over 65 year olds and hip replacement and knee replacements is in line with or significantly lower than the England average (it is also lower in relation to Guildford). The incidence of cancers is also in line with or significantly lower than the England average (and in relation to Guildford). Deaths from all causes, cancers circulatory diseases, heart disease and respiratory diseases is significantly lower than the England average and stroke is in line with the England average (and in relation to Guildford).
- 14.7.19 Lastly, life expectancy in men is significantly better than the England average (84.7 years, Guildford 82.1 years, England 79.4 years) and for women is significantly better than the England average (85.8 years, Guildford 84.8 years, England 83.1 years).

Weybridge St George's Hill ward

- 14.7.20 Weybridge St George's Hill ward has a population of 8,630, of which 20.7% is under 16 years of age (lower compared to Elmbridge district though higher than the England average), and 21.4% is over 65 years of age (higher compared to Elmbridge and England).¹⁶ The proportion of ethnic minority residents is 13% (proportion of residents who are not 'White UK' is 28.1%).
- 14.7.21 The proportion of income, child and older people deprivation is significantly lower than the England average (5.5%, 4.8% and 11.9% compared to the England average). The proportion of residents with self-perceived bad or very bad health is significantly lower than the England average (4.3% compared to 6.7%). The proportion of people with a limiting long term illness or disability is significantly lower than the England average at 13.4% (it is, though, higher than the

¹⁵ Public Health England (2018) *Clandon and Horsley ward local health profile*. Available at: http://www.localhealth.org.uk/GC_preport.php?lang=en&codgeo=E05007291&nivgeo=ward_2016&id_rep=r03 (Accessed: 20 October 2018)

¹⁶ Public Health England (2018) *Weybridge St George's Hill ward local health profile*. Available at: http://www.localhealth.org.uk/GC_preport.php?lang=en&codgeo=E05011089&nivgeo=ward_2016&id_rep=r03 (Accessed: 20 October 2018)

Elmbridge average). The proportion of pensioners living alone, 33.6%, is in line with the England average.

- 14.7.22 The proportion of children who are obese in Reception Year, is in line with, and in Year 6, significantly lower than, the England average (and is similar to the Elmbridge district average). The proportion of children who have excess weight in Lovelace is in line with (Reception Year) or lower than (Year 6) the England average (though similar to Elmbridge). The proportion of obese adults, those who binge drink and those who eat healthily is in line with or better than (percentage of obese adults is significantly lower than) the England average.
- 14.7.23 The rate of A&E attendances for 0-4 years olds is significantly worse (higher) than the England average. The ratio of hospital admissions for any cause, heart disease, stroke, heart attacks, chronic obstructive pulmonary disease, self harm, alcohol-related harm, hip fracture in over 65 year olds and knee replacements is significantly lower than or in line with the England average except for high fractures in over 65 year olds which is significantly higher (it is also in line with or lower in relation to Elmbridge, except for alcohol related harm and hip replacements). The incidence of cancers is also in line with the England average (and similar to Elmbridge). Deaths from all causes and stroke are significantly higher compared to cancers circulatory diseases, heart disease, stroke and respiratory diseases which are in line with the England average. Though, premature deaths in under 65 year olds and under 75 year olds from all causes is significantly lower than the England average.
- 14.7.24 Lastly, life expectancy in men is significantly better than the England average (81.2 years, Elmbridge 81.9 years, England 79.4 years) and for women is in line with the England average (82.3 years, Elmbridge 85.1 years, England 83.1 years).

Cobham and Downside ward

- 14.7.25 Cobham and Downside ward has a population of 8,650, of which 21.7% is under 16 years of age (lower compared to Elmbridge district though higher than the England average), and 21.5% is over 65 years of age (higher compared to Elmbridge and England).¹⁷ The proportion of ethnic minority residents is 7.6% (proportion of residents who are not 'White UK' is 18.6%).
- 14.7.26 The proportion of income, child and older people deprivation is significantly lower than the England average (8.3%, 10.2% and 9.8% compared to the England average). The proportion of residents with self-perceived bad or very bad health is significantly lower than the England average (4.4% compared to 6.7%). The proportion of people with a limiting long term illness or disability is significantly lower than the England average at 14.5% (it is, though, higher than the Elmbridge average). The proportion of pensioners living alone, 32.5%, is in line with the England average.
- 14.7.27 The proportion of children who are obese in Reception Year, significantly lower than, and in Year 6, is in line with, the England average (and the Elmbridge district average). The proportion of children who have excess weight in Lovelace is in line with (Reception Year) or significantly lower than (Year 6) the England

¹⁷ Public Health England (2018) *Cobham and Downside ward local health profile*. Available at: http://www.localhealth.org.uk/GC_preport.php?lang=en&codgeo=E05011075&nivgeo=ward_2016&id_rep=r03 (Accessed: 20 October 2018)

average (though similar to Elmbridge). The proportion of obese adults, those who binge drink and those who eat healthily is in line with the England average.

- 14.7.28 The ratio of hospital admissions for any cause, heart disease, stroke, heart attacks, chronic obstructive pulmonary disease, self harm, alcohol-related harm, hip fracture in over 65 year olds and knee replacements is significantly lower than the England average except for high fractures in over 65 year olds which is in line with the England average (it is also in line with or lower in relation to Elmbridge, except for self harm and hospital admissions for all causes). The incidence of cancers is also in line with the England average (and similar to Elmbridge). Deaths from all causes, cancers, circulatory diseases, heart disease are significantly lower, and stroke and respiratory diseases are in line with, the England average. Premature deaths in under 65 year olds and under 75 year olds from all causes is significantly lower than the England average.
- 14.7.29 Lastly, life expectancy in men is significantly better than the England average (82.5 years, Elmbridge 81.9 years, England 79.4 years) and for women is in line with the England average (86.3 years, Elmbridge 85.1 years, England 83.1 years).
- 14.7.30 Deprivation in the above wards is low with the highest level of deprivation in the area around Ripley. The highest levels of deprivation are in the domains of housing and services and living environment with lower levels of deprivation in the domains of crime (and safety).

14.8 Potential impacts

- 14.8.1 The Scheme has the potential to affect health, both during construction and operation.

Construction

- 14.8.2 The potential adverse effects on community health during construction are through individual and a combined impacts related to traffic, air quality, noise, vibration, drainage/water environment, geology and soils, and visual impact, particularly for communities with increased susceptibility (potential issue) and increased vulnerability (pre-existing issue) to health issues, from construction traffic and activity, increased congestion, decreased connectivity to public and commercial services and loss of amenity. There may also be some disruption to lifestyles and daily routines for example travelling to school, work or retail amenities may take longer or be perceived to be less safe.
- 14.8.3 There are also potential beneficial effects on public health through impacts through increase in local employment and the wider economy through the construction jobs created and the associated procurement of road building materials from businesses in the region and the districts in and around the Scheme.
- 14.8.4 The communities immediately surrounding the junctions (within 250m) are more likely to be adversely affected though some adverse effects may also be experienced further away e.g. effects related to construction lorry traffic along roads. The key sensitive groups, identified earlier, who often experience greater existing social and environmental burdens and/or higher levels of pre-existing illness and disability, can be more vulnerable to the adverse effects of the above impacts. During construction, the impacts are likely to be temporary, of short

duration (a few weeks or months), localised and can be reduced by Best Practicable Means (BPM) mitigation measures. These impacts will occur primarily due to increases in construction lorry traffic and construction equipment use and the associated noise, emissions and potential risk of accidents; the diversions for the non-motorised user (NMU) routes, bus routes and vehicular access; increases in journey times to public and commercial services; reduced amenity to views and use of local open and green spaces.

Operation

- 14.8.5 The impact of the additional capacity on the road during the operation of the Scheme could lead to some increase in air pollution and noise for communities living around the Scheme and on connecting roads which could have an adverse effect on community health. The impact of reduced congestion, improved road journey times, improved road safety and improved connectivity by foot and cycle is likely to have a beneficial effect on community health.

14.9 Design, mitigation and enhancement measures

- 14.9.1 Opportunities to introduce mitigation and enhancement measures into the Scheme design have been undertaken, and the management of construction of the Scheme. The design should be developed with community requirements in mind.
- 14.9.2 The use of best practice construction methods as secured in the Outline CEMP and as identified in this and other health relevant chapters of the ES, air quality, noise and vibration, landscape, geology and soils, road drainage and water environment, materials and waste, and people and communities will reduce disruption to users of residential, community and other receptors near the Scheme and minimise the effects on the community, especially those susceptible or vulnerable to health issues.

Construction

- 14.9.3 The following measures will be developed as the Scheme progresses through later stages.

Design and Implementation:

- Allow ongoing access and minimise the severance for individuals and communities. Pedestrian linkages and accessibility should be maintained.
- Provide a clear and consistent signage strategy, to direct users during construction and support access to community and recreational facilities using footpaths and cycleways.
- Ensure noise barriers and planting minimise noise and visual impacts on local communities particularly those living near the Scheme including sensitive receptors such as schools, nurseries/daycare facilities and care homes.

Mitigation:

- Take on board the environmental design mitigation from the other topics, notably air quality, noise and vibration, landscape, geology and soils, road

drainage and water environment, materials and waste, and population and communities that are linked to community health.

- Limit the extent of permanent severance affecting nearby dwellings and communities.
- Ensure pedestrian linkages and accessibility are maintained and improved. Users of affected public rights of way (PRoW), footpaths and cycleways should be notified of planned diversions, with signs along sections to be closed during construction, at least one month prior to the works.
- Ensure emergency vehicle access to local residents.
- Construction works should be programmed so that affected PRoW, footpaths or cycleways remain open for part, or duration, of the construction period, and so that other routes can act as a diversion route for those affected. Ensure public transport routes and stops are maintained and disruption is managed. Potential disruption should be discussed with local public bus companies well in advance.
- Best Practicable Means approach taken to day-time, night-time and weekend construction works to minimise noise, vibration and dust disposal impacts at residential and community receptors.
- Less intensive piling processes to be used close to sensitive receptors as part of a BPM approach.
- If construction lorry traffic is routed on roads near schools and nurseries there should be liaison with these establishments so that they are aware of potential noisy activities and disruption to the road network that may affect the schools and nurseries and journeys to and from them. Any construction activities to be undertaken outside of school or nursery hours if they occur near school and nursery locations to avoid any amenity impacts.
- Clear signage and provision of access information for all users during construction.
- Replace any lost amenity planting.
- Traffic Management Plan, produced by the contractor, to be implemented to mitigate negative effects for road users during construction and to ensure the businesses that require customer, supply chain and delivery access are not impacted significantly.
- Alternative access arrangements for the existing accesses that are temporarily and permanently closed during the construction phase.
- Ensure emergency vehicles have good access during the construction phase and procedures are in place to ensure that construction vehicles and activities give way to emergency vehicles.

Enhancements:

- Ensure a clear stakeholder plan is established to provide consistent and regular communication with a range of stakeholders. The plan must acknowledge the differing perspectives and issues of each stakeholder.

- Ensure a clear and easy to access complaints and advice helpline and ensure that complaints are responded to, investigated and addressed promptly.
- Ensure recruitment for construction jobs and procurement of goods and services starts at district and regional levels to ensure that the employment and economic benefits of the construction phase benefits the district and the region.

Operation

Design Suggestions:

- Ensure monitoring of key design aspects as identified in this and other health relevant chapters of the ES, air quality, noise and vibration, landscape, geology and soils, road drainage and water environment, materials and waste, and population and communities. This should include monitoring for the need for additional noise barriers and effectiveness of designed in/existing noise barriers, numbers of road traffic incidents to ensure that road safety has been improved, traffic flows to ensure that congestion is reduced and use of PROW, footpaths and cycleways to ensure that there is no reduction in usage.

Mitigation:

- Operational mitigation would be developed in future design phases e.g. noise barriers, low noise road surfaces, surface water drainage and additional planting to reduce visual impacts.
- No additional operation phase mitigation measures have been identified at this stage.

Enhancements:

- No specific operation phase mitigation measures have been identified at this stage.

14.10 Assessment of effects

- 14.10.1 Table 14.5 shows the overall findings of the health assessment. Significant health effects are discussed below.

Table 14.5: Overall Findings of the Health Assessment (potential effects)

Health aspect	Pathway	Baseline	Construction without mitigation	Construction without mitigation	Mitigation Measures	Construction with mitigation	Construction with mitigation	Operation with mitigation (both designed-in and additional)	Operation with mitigation (both designed-in and additional)
		Sensitivity	Magnitude	Significance		Magnitude	Significance	Magnitude	Significance
Health Outcome									
Communicable disease	Communicable diseases are spread by person to person contact, contact with infected materials such as water and food, and by contact with animal vectors such as mosquitos such as respiratory infections, water borne and vector borne diseases, and sexually, blood and needle transmitted diseases. There are no likely pathways by which the Scheme would increase the risk of communicable diseases in local communities.	Low	Negligible	Neutral	Not required	Negligible	Neutral	Negligible	Neutral
Non-communicable disease	Individually (and in-combination) increases in air pollution, noise and vibration, or anxiety and worry caused by, relocation, land take and loss of amenity, as well as disruption to daily routines, both temporary and long term, can increase the risk of non-communicable disease. The key categories of non-communicable diseases are cardiovascular disease (heart disease, heart attacks and stroke), respiratory conditions (asthma, bronchitis and chronic obstructive pulmonary disease) and cancer. Some groups are more sensitive. The Scheme is likely to increase air pollution and noise and vibration during both construction and operation. It is also likely to cause some anxiety and worry in some local residents who have a change in their access to the local road network and users of the existing road network and PROWs, footpaths and cycleways. This is likely to lead to an increased risk of non-communicable disease in some residents. Only a small number of dwellings are affected by noise and air pollution. However, there is deprivation.	Low - Medium	Minor - Moderate	Slight – Moderate Adverse on some local residents	See construction and operation-related mitigation measures in human health, air quality, noise, people and communities, landscape, geology and soils, road drainage and water management, and materials and waste chapters.	Minor	Slight Adverse	Minor	Slight Adverse
Non-communicable disease	Good quality, secure employment reduces the risk of non-communicable disease. Some groups are more sensitive and can benefit more. The Scheme will create construction jobs and maintain or increase jobs in construction related business that support the Scheme. This is likely to lead to a reduced risk of non-communicable disease in construction workers and workers in construction businesses that the Scheme procures from.	Low - Medium	Minor - Moderate	Moderate Beneficial	See also construction and operation-related mitigation measures in, human and people and communities chapters.	Minor	Slight Beneficial (at local level)	Minor	Slight Beneficial (at local level)
Mental health and wellbeing	Lower wellbeing and, to a lesser extent, exacerbation of, or increase in, mental illness is linked to increases in noise and anxiety and worry caused by, for example relocation, land take, loss of amenity and noise and vibration, as well as disruption to daily routines, both temporary and long term. Some groups are more sensitive.	Low - Medium	Minor - Major	Moderate - Large Adverse on some local residents	As above	Minor-Moderate	Slight – Moderate Adverse (Moderate on the few the few residents with disruption to	Minor	Slight Beneficial

Health aspect	Pathway	Baseline	Construction without mitigation	Construction without mitigation	Mitigation Measures	Construction with mitigation	Construction with mitigation	Operation with mitigation (both designed-in and additional)	Operation with mitigation (both designed-in and additional)
		Sensitivity	Magnitude	Significance		Magnitude	Significance	Magnitude	Significance
	The Scheme is likely to increase noise and vibration and to cause anxiety and worry in some local residents who have a change in their access to the local road network and users of the existing road network and PROWs, footpaths and cycleways leading to an increased risk in lower mental wellbeing in some residents.						their access to the local road network and the temporary effects of piling)		
Mental health and wellbeing	Good quality, secure employment improved mental health and wellbeing. Some groups are more sensitive and can benefit more. The Scheme will create construction jobs and maintain or increase jobs in construction related business that support the Scheme. This is likely to lead to an improvement in mental health and wellbeing in construction workers and workers in construction businesses that the Scheme procures from.	Low - Medium	Minor	Slight - Moderate Beneficial	As above	Minor - Moderate	Slight – Large Beneficial	Negligible	Slight Beneficial
Physical injury	Construction traffic, construction accidents and exposure to hazards through air, water and soil due to construction and remediation activities can increase the risk of physical injuries. Some groups are more sensitive. The Scheme is likely to increase exposure to construction traffic and construction related activities which could increase the risk of physical injuries for some local residents. Once operational, the Scheme is expected to improve road safety around the junctions.	Medium	Minor - Moderate	Slight – Moderate Adverse	As above	Minor	Slight Beneficial	Minor	Slight - Moderate Beneficial
Nutritional disorders	Nutritional disorders include under-nutrition (reduced calories, vitamin and mineral deficiencies, reduced diversity. In the case of obesity this is, to a lesser extent, also linked to reduced physical activity as well as increased or changed food intake. There are no likely pathways by which the Scheme would increase the risk of nutritional disorders in local communities.	Low - Medium	No change - Negligible	Neutral – Slight Adverse	As above, ensuring continued access to public transport as well as footpaths and cycleways.	No change	Neutral	No change	Neutral - Slight Beneficial
Health Determinants									
Population change	An increase in population, on a temporary or permanent basis, can change a range of factors leading to long term changes in health status in a local community. The Scheme will not change the demographic characteristics of population though a small number of construction workers are likely to move into the local area.	Low	Negligible	Neutral – Slight Adverse	Not applicable	Negligible - Minor	Neutral – Slight Adverse	Not applicable	Not applicable
Housing and shelter	The Scheme only involves some change in access for some local residents and some worry and anxiety related to worries about the impact on their homes from increases in noise and vibration and reduced visual amenity and where living near construction traffic routes reduced amenity on their local roads. There is no loss of land or relocation. Deprivation in relation to housing and services is high in the area around the Scheme.	Medium - High	Minor	Slight – Moderate Adverse for residents living near the Scheme that could be affected by piling and		Minor	Slight Adverse	Negligible - Minor	Negligible

Health aspect	Pathway	Baseline	Construction without mitigation	Construction without mitigation	Mitigation Measures	Construction with mitigation	Construction with mitigation	Operation with mitigation (both designed-in and additional)	Operation with mitigation (both designed-in and additional)
		Sensitivity	Magnitude	Significance		Magnitude	Significance	Magnitude	Significance
				those living along construction traffic routes.					
Local economy and employment	An increase in the number and quality of jobs and the stability of jobs through an improvement in the local (jobs for residents) and wider economy (jobs for people in the district and region) has positive health benefits on non-communicable disease, mental health and wellbeing, and, to a lesser extent, nutritional disorders. The Scheme will generate construction jobs and procure goods and services from construction-related businesses. It has the potential to provide jobs for local people directly on the Scheme and through construction-related business that the Scheme procures from.	Low - Medium	Minor - Moderate	Slight – Moderate Adverse	Ensuring that local job centres are actively make local residents aware of the job opportunities on the Scheme. Scheme to promote recruitment locally and regionally.	Moderate	Moderate Beneficial	Not applicable	Not applicable
Transport and connectivity (including lifestyle and daily routines)	During the construction phase of developments there can be disruption to existing travel modes affecting lifestyles and daily routines increasing the risk of non-communicable disease and reducing mental health and wellbeing. The Scheme could generate an increased risk of physical injury during the construction phase. An improvement in transport modes (public transport, foot and cycle) and connectivity has positive health benefits non-communicable disease, mental health and wellbeing, physical injuries and, to a lesser extent, nutritional disorders. The Scheme is designed to improve road safety, improve capacity, reduce journey times and improve which is likely to reduce road traffic related physical injuries and deaths; improve access and has the potential to increase physical activity during the operation phase.	Low - Medium	Minor - Moderate	Slight – Moderate Adverse	See construction and operation-related mitigation measures in air quality, noise, people and communities. Ensuring continued access or safe (well-lit, good physical quality, well sign-posted) and diversions to public transport as well as footpaths and cycleways.	Minor	Slight Adverse	Minor - Moderate	Slight - Moderate Beneficial
Learning and education	Schools can be affected by air pollution and noise and have reduced transport and connectivity because of the Scheme which can adversely affect learning and education in children and young people. The Scheme is likely to increase air pollution and noise and potentially disrupt journeys to and from school during the construction phase. This could affect the learning and education in some children and young people. The Scheme is expected to affect two schools situated near the Scheme. The Scheme is designed to improve traffic flows which could make it easier to get to and from school during the operation phase.	Medium - High	Minor - Moderate	Slight – Moderate Adverse	As above	Minor	Slight Adverse	Negligible - Slight Adverse and Slight Beneficial	Neutral - Slight Adverse and Slight Beneficial
	The Scheme is likely to provide construction workers to have opportunities for learning and training. This is likely to improve their current skill levels making them more employable after the Scheme is operational.	Low - Medium	Minor	Slight – Moderate Beneficial	Market construction jobs via local job centres and recruitment companies in the districts around the Scheme to increase uptake of	Moderate	Slight - Moderate Beneficial	Not applicable	Not applicable

Health aspect	Pathway	Baseline	Construction without mitigation	Construction without mitigation	Mitigation Measures	Construction with mitigation	Construction with mitigation	Operation with mitigation (both designed-in and additional)	Operation with mitigation (both designed-in and additional)
		Sensitivity	Magnitude	Significance		Magnitude	Significance	Magnitude	Significance
					jobs by people in the surrounding districts. Use construction contractors that are committed to providing training and support for their construction workers.				
Crime and safety	Development projects can influence crime and safety by, for example, making areas feel less safe because of disruption to existing walking and cycling routes and changes in lighting, the influx of construction workers into an area, or the availability of new equipment and materials that can be stolen. The Scheme due to its nature and location is unlikely to increase crime and reduce non-traffic related safety though because of the construction workers in the area some residents could perceive the area to be less safe.	Low - Medium	Minor	Neutral – Slight Adverse	See construction and operation-related mitigation measures in air quality, noise, people and communities. Ensuring continued access or safe (well-lit, good physical quality, well sign-posted) and diversions to public transport as well as footpaths and cycleways. Ensure appropriate security around the development site.	Negligible	Neutral	Negligible	Neutral
Social capital and community cohesion	Development projects can increase or reduce social capital and community cohesion by separating communities or creating barriers to social interaction. Increases in noise and traffic flows and inward and outward migration/relocation can reduce and impair existing social networks and thereby reducing social capital and community cohesion. The Scheme is likely to lead to an increase in construction noise and traffic flows and changes in the character of the local community during the construction phase this is likely to a reduction in social capital and community cohesion. During the operation phase the effects will be similar to current conditions as though there will be some extra noise for some residents and a potential increase in traffic flows this will be along the existing scheme which already has effects on social capital and community cohesion because of its severance effects. There is potential for some beneficial effects from the improvement in Non-Motorised User (NMU) links.	Low - Medium	Minor	Slight – Moderate Adverse	As above	Minor	Neutral	Negligible - Slight	Neutral – Slight Beneficial
Health and social care and public services	Development project can delay emergency vehicles and also increase the demand for health and other public services. For this Scheme the number of construction workers is unlikely to increase demands on existing public services. The Scheme has the potential to disrupt and delay emergency vehicles and increase journey times for local residents visiting GPs and hospitals during construction. It is expected to improve journey times for emergency vehicles and going to healthcare facilities.	Low - Medium	Minor - Moderate	Slight – Moderate Adverse	Ensure emergency vehicles have good access during the construction phase and procedures are in place to ensure that construction vehicles and activities give way to emergency vehicles.	Negligible	Neutral	Minor	Slight Beneficial
Shops and retail amenities	Development projects can improve or reduce access to shops and retail amenities as well as relocate or disrupt them.	Low - Medium	Minor	Slight Adverse	See construction and operation-related mitigation measures in air quality, noise, people and communities. Ensuring continued	Negligible	Neutral	Minor	Slight Beneficial

Health aspect	Pathway	Baseline	Construction without mitigation	Construction without mitigation	Mitigation Measures	Construction with mitigation	Construction with mitigation	Operation with mitigation (both designed-in and additional)	Operation with mitigation (both designed-in and additional)
		Sensitivity	Magnitude	Significance		Magnitude	Significance	Magnitude	Significance
	The Scheme does not relocate any business and any disruption to business will be temporary.				access or safe (well-lit, good physical quality, well sign-posted) and diversions to public transport as well as footpaths and cycleways.				
Leisure and recreation	Development projects can improve or reduce access to open and green spaces and make walking and cycling more difficult (or vice versa) this can lead to an increase in the risk of non-communicable disease and reduced mental health and wellbeing. Some groups are more sensitive. The Scheme is likely to disrupt PROWs, footpaths and cycleways and bus routes to some extent. This could affect access to open and greenspaces and walking and running for leisure and recreation.	Low - Medium	Minor	Slight Adverse	See construction and operation-related mitigation measures in air quality, noise, people and communities. Ensuring continued access or safe (well-lit, good physical quality, well sign-posted) and diversions to public transport as well as footpaths and cycleways.	Negligible	Neutral	Minor	Slight Beneficial
Energy and waste	Energy and access to energy has positive health benefits however the emissions and hazardous activities associated with energy generation can have adverse effects on human health. Exposure to waste can also adversely affect human health. Both increase the risk of non-communicable disease. The Scheme has no energy generation linked to it. At this stage low emission vehicles and equipment are not envisaged. A more detailed ground investigation will be undertaken later.	Low	No change - Negligible	Neutral – Slight Adverse	See construction-related mitigation measures in geology and soils, road drainage and water environment, and materials and waste chapters.	Negligible - Slight Beneficial	Neutral - Slight Beneficial	Not applicable	Not applicable
Land and spatial	Residential and agricultural land take can affect availability and affordability of housing and availability and affordability of food. Both of these can adversely affect human health through an increase in the risk of non-communicable disease and reduced mental health and wellbeing. The Scheme takes some agricultural land. The amount of land taken is small.	Low	No change - Negligible	Neutral – Slight Adverse	See construction-related mitigation measures in geology and soils, road drainage and water environment, and materials and waste chapters.	Negligible - Slight	Neutral – Slight Adverse	Negligible - Slight	Neutral – Slight Beneficial

*Governance and public policy; spirituality, faith and traditions; and arts and cultural activities have been screened out. Communicable disease as a health outcome has been included for completeness

The effects are adverse except where beneficial effects are specifically identified

Significant effects

- 14.10.2 This section first analyses the potential health and wellbeing effects without mitigation, during construction (14.10.3-14.10.11) and operation (14.10.12-14.10.14). It then analyses the residual impacts, that is the expected reduction in health effects, with mitigation (14.10.15-14.10.16).

Construction

- 14.10.3 Individually (and in-combination) increases in air pollution, noise and vibration, or anxiety and worry caused by, land take and loss of amenity, as well as disruption to daily routines, both temporary and long term, can increase the risk of non-communicable disease during the construction phase. The key categories of non-communicable diseases are cardiovascular disease (heart disease, heart attacks and stroke), respiratory conditions (asthma, bronchitis and chronic obstructive pulmonary disease) and cancer. Some groups are more sensitive e.g. older people are more likely to be at risk of cardiovascular disease, respiratory condition and cancer; children and young people are more likely to be sensitive to respiratory conditions. Individuals from lower socio-economic groups are more likely to be sensitive to all three conditions.
- 14.10.4 The Scheme is expected to increase air pollution and noise and vibration. It is also likely to cause anxiety and worry in some local residents whose access is disrupted or changed and users of the existing road network and PROWs, footpaths and cycleways leading to an increased risk of non-communicable disease in some residents. Without mitigation this is considered to have a slight to moderate adverse effect on health.
- 14.10.5 Good quality, secure employment reduces the risk of non-communicable disease. Some groups are more sensitive and can benefit more e.g. those who are unemployed or on low incomes and in more insecure jobs.
- 14.10.6 The Scheme will create construction jobs and maintain or increase jobs in construction related business that support the Scheme. This is likely to lead to reduced risk of non-communicable disease in construction workers and workers in construction businesses that the Scheme procures from. There is a moderate beneficial effect on local residents and others who obtain construction jobs or jobs in construction businesses that the Scheme procures from.
- 14.10.7 Lower wellbeing and, to a lesser extent, exacerbation of, or increase in, mental illness are linked to increases in noise and anxiety and worry caused by, for example relocation, land take, loss of amenity and noise and vibration, as well as disruption to daily routines, both temporary and long term. Some groups are more sensitive e.g. children in school, night shift workers, some older people and some individuals with long term health conditions.
- 14.10.8 The Scheme is likely to increase noise and vibration and to cause anxiety and worry in some local residents whose access is disrupted or changed and users of the existing road network and PROWs, footpaths and cycleways leading to an increased risk in lower mental wellbeing in some residents. Without mitigation this is considered to have a slight to moderate-large adverse effect on health. There is a moderate beneficial effect on local residents who obtain construction jobs or jobs in construction businesses that the Scheme procures from.

- 14.10.9 Construction traffic, construction accidents and exposure to hazards through air, water and soil due to construction and remediation activities can increase the risk of physical injuries. Some groups are more sensitive e.g. children from lower socio-economic backgrounds, people with mobility problems.
- 14.10.10 The Scheme is likely to increase exposure to construction traffic and construction related activities which could increase the risk of physical injuries for some local residents. Without mitigation this is considered to have a slight to moderate adverse effect on health.
- 14.10.11 The main pathways of impact for the above health effects are housing and shelter, transport and connectivity, learning and education, and social capital and community cohesion. Details are provided in Table 14.5 describing the overall findings of the health assessment.

Operation

- 14.10.12 The Scheme is likely to increase air pollution and noise during the operation phase. Noise barriers will be placed in key locations during the construction phase where required. The increase in air pollution will be small. This is considered to have only a slight adverse effect on health. Potential increased risk of non-communicable disease and reduced mental health and wellbeing are likely to be small.
- 14.10.13 The Scheme is designed to improve road safety and improve traffic flows this is likely to reduce traffic-related physical injuries and deaths and improved journey times and quality of journeys. This is considered to have a slight to moderate beneficial effect on health.
- 14.10.14 The main pathways of impact for the above health effects are transport and connectivity. Details are provided in Table 14.5 describing the overall findings of the health assessment.

Residual effects

Construction

- 14.10.15 The residual health effects, during the construction phase, after mitigation and enhancement measures, that have been proposed in this ES are appropriately implemented during the construction phase are expected to be neutral or slight adverse and slight-moderate beneficial significance.

Operation

- 14.10.16 The residual health effects, during the operation phase, after mitigation and enhancement measures that have been proposed in this ES are appropriately implemented during the construction phase are expected to be neutral or slight adverse and slight-moderate beneficial significance.

14.11 Cumulative effects

- 14.11.1 Committed developments (projects which have been confirmed or projects with valid planning applications and require a formal EIA) in the area are provided in Chapter 17, Assessment of Cumulative Effects. The committed developments are likely to increase traffic on local roads which is likely to increase air pollution

and noise and may increase the risk of road traffic incidents that lead to injuries and deaths.

Construction

- 14.11.2 Committed developments are not expected to increase the potential adverse health effects during construction.

Operation

- 14.11.3 Committed developments are expected to have a small increase in the potential adverse health effects during operation. The significance of this is expected to be slight-moderate (Moderate for residents living very near the committed developments and/or Scheme).

14.12 NPSNN compliance

- 14.12.1 This assessment of human health is compliant with the NPSNN. The assessment has considered direct and indirect impacts on health and well-being of the population; identified likely significant adverse health impacts; and set out measures to avoid, reduce and compensate for the adverse health impacts as appropriate.

14.13 Monitoring

- 14.13.1 Monitoring measures are identified in air quality, noise, people and community assessments. Noise at nearby schools, daycare facilities and care homes should be monitored through regular liaison with these establishments to ensure that there are no adverse effects due to construction-related noise.
- 14.13.2 Complaints from local residents should be monitored and analysed in terms of residents linking potential impacts of the Scheme and potential health effects. Monitoring is set out in other parts of this ES in other health-relevant topics areas air quality, noise, people and communities, landscape, geology and soils, road drainage and water management, and materials and waste should be implemented. Findings from the monitoring should be evaluated on an ongoing basis and additional mitigation proposed to address any emerging issues.

14.14 Summary

- 14.14.1 Overall, the majority of adverse effects are during construction and are of negligible-slight significance after mitigation. There is expected to be an increase in air pollution and noise and this is expected to have a slight adverse effect on health. There are also expected to be beneficial health effects from the employment and procurement related to the Scheme and the improved journey times, safety and improved connectivity due to the Scheme during operation.

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