

PORTISHEAD BRANCH LINE PRELIMINARY
ENVIRONMENTAL INFORMATION REPORT
VOLUME 4

APPENDIX 14.2

Health Impact Assessment



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Abbreviations

AQMA	Air Quality Management Area
BCC	Bristol City Council
BME	Black and Minority Ethnic
B&NES	Bath and North East Somerset
CoCP	Code of Construction Practice
DCLG	Department for Communities and Local Government
DCO	Development Consent Order
Defra	Department of Environment, Food and Rural Affairs
DFLE	Disability-free life expectancy
DfT	Department for Transport
EqIA	Equality Impact Assessment
EU	European Union
HGV	Heavy goods vehicle
HIA	Health Impact Assessment
IMD	Index of Multiple Deprivation
LSOA	Lower Super Output Area
NCN	National Cycle Network
NPSE	Noise Policy Statement for England
NPSNN	National Policy Statement for National Networks
NSC	North Somerset Council
ONS	Office for National Statistics
PEI Report	Preliminary Environmental Information Report
PPG	Planning Policy Guidance
PRoW	Public right of way
PSED	Public Sector Equality Duty
UA	Unitary Authority
WHO	World Health Organisation
WofE LEP	West of England Local Enterprise Partnership

SECTION 1

Introduction

- 1.1.1 This Health Impact Assessment (“HIA”) has been produced as part of the documents to support the Development Consent Order (“DCO”) Application for the Portishead Branch Line (MetroWest Phase 1) DCO Scheme (“the DCO Scheme”) under the Planning Act 2008 (“PA 2008”). This HIA also fulfils North Somerset Council’s Core Strategy Policy CS26 requirement for all major developments to produce an HIA and complies with the Scoping Opinion from the Secretary of State for Transport¹ to address the concerns of stakeholders on health and safety matters for the DCO Scheme.
- 1.1.2 The National Policy Statement for National Networks (“NPSNN”) (Department for Transport, December 2014) states that rail networks and freight interchange works can have direct impacts on people’s health because of traffic, noise, vibration, air quality and emissions, dust, light pollution, community severance, polluting water, odour, hazardous waste and pests. It also states, *“where the proposed project is likely to have significant environmental impact that would affect the health of the population, the environmental statement should identify and set out the assessment of any likely significant adverse health impacts. The [project] applicant should identify measures to avoid, reduce or compensate for adverse health impacts as appropriate. These impacts may affect people simultaneously, so the applicant, and the Secretary of State (in determining an application for development consent) should consider the cumulative impact on health”* (page 44, paragraphs 4.81 and 4.82).
- 1.1.3 The construction and operation of any major project has potential to affect the health, well-being and quality of life of the people who live and work in the area. This study aims to predict these impacts and to avoid or reduce their occurrence by considering them in the environmental assessment and in the design process. This HIA report presents the results of the study on the potential significant health impacts that may arise as a result of the construction and operation of the DCO Scheme.
- 1.1.4 This report has been prepared in accordance with established good practice for major infrastructure projects in the UK. The report is intended to provide both the decision makers and other stakeholders, including the affected communities, with information about issues that have potential to affect health and how they will be mitigated.
- 1.1.5 This chapter should be read in conjunction with the Preliminary Environmental Information Report (“PEI Report”) Chapter 4 Description of the Works, Chapter 7 Air Quality and Greenhouse Gases, Chapter 10 Geology, Hydrogeology, Ground Conditions and Contaminated Land, Chapter 13 Noise and Vibration, Chapter 15 Socio-Economics and Regeneration, and Chapter 16 Traffic and Transport. This report should also be read in conjunction with the Equality Impact Assessment in Appendix 14.1 of the PEI Report.

¹ The Scoping Opinion, which sets out the studies to be undertaken for the environmental impact assessment and reported in the Environmental Statement to be submitted to the Planning Inspectorate with the DCO Application, is available on the Planning Inspectorate’s website at: <https://infrastructure.planninginspectorate.gov.uk/projects/south-west/portishead-branch-line-metrowest-phase-1/?ipcsection=docs>

SECTION 2

Methodology

2.1 Aims

2.1.1 The HIA aims to:

- Appraise the potential positive and negative health and well-being impacts of the proposed development on the adjacent existing communities in the development area;
- Highlight any potential differential distribution effects of health impacts among groups within the population by asking 'who is affected?' for the impacts identified; and
- Suggest actions and mitigation measures to minimise any potential negative health impacts and maximise potential positive health impacts, referencing where possible the most affected vulnerable group(s).

2.1.2 The HIA methodology has been informed by studies from similar projects and is in line with the NPSNN.

2.2 Consultations

2.2.1 A summary of consultations undertaken to date is presented in Table 2-1 below. Further information on the consultation process is presented in Chapter 5 Stakeholder Consultation and the Consultation Report on the informal stakeholder consultations undertaken in 2015 is available on the MetroWest project website at the following address <http://travelwest.infometrowest>.

Table 2-1: Summary of consultation responses

Organisation and date	Summary of response	Consideration within the PEI Report
Scoping Responses (August 2015)		
Planning Inspectorate	Para. 4.39. It is a matter for the applicant to consider whether they submit a stand-alone Health Impact Assessment but the applicant should have regard to the responses from consultees, the Health and Safety Executive and / or Public Health England.	The applicant has decided to submit this stand-alone HIA. The concerns of the H&S Executive and Public England have been taken into consideration in this HIA. See below
	Para. 4.40. The methodology for the HIA should be agreed with the relevant statutory consultees and take account of mitigation measures.	The methodology for this HIA was discussed with the local authorities as explained in Chapter 5.
GCT Pipelines	Quadrant Pipelines Ltd, GTC Pipelines Ltd, Independent Pipelines Limited, the Electricity Network Company and Independent Power Networks Ltd had no comments to make in the Scoping Opinion.	No comment.
Health and Safety Executive	The HSE has identified two major accident hazard pipelines (Natural Gas) which cross the proposed railway near Lodway.	Information on utilities has been sought from the utility companies and is being considered in the design and construction of the DCO Scheme.
	A parcel of permanent land-take near the proposed Portishead station falls within the HSE Outer Consultation Zone of Coleman (UK).	This concern is being investigated and will be addressed in the Environmental Statement.
	The presence of hazardous substances on, over or under land at or above set threshold quantities may require Hazardous Substances Consent.	A significant volume of the existing track bed is classified as hazardous waste due to zinc and lead concentrations. This material will be transported off site by train and taken to a ballast recycling facility in Cambridgeshire that is licensed to handle hazardous waste. During operation, fuels, oils, lubricants and common cleaning products will be the only hazardous substances used eg within locomotives, machinery, generators, etc. These will be handled and stored safely, according to the contractor's method statement and COSHH assessment with spill kits or bunded storage where appropriate.
	The project does not impinge on any licensed explosive sites.	No comment.

Table 2-1: Summary of consultation responses

Organisation and date	Summary of response	Consideration within the PEI Report
	The project involves connections to electrical power distribution systems and impacts on existing generation, transmission, and distribution assets on the UK mainland. The design of electrical components has to comply with the relevant legislation. There is a duty to protect members of the public from the dangers posed by the electrical equipment used.	The project will have electrical works including station electric supplies, signalling power supplies, junction lighting and points heating. All works will be low voltage and comply with the Electricity at Work Regulations, BS 7671 IET Wiring Regulations and the relevant British, Euronorm, Railway Group and Network Rail standards.
Public Health England (“PHE”)	PHE recommends the discussion of health related issues in a specific section of the Environmental Statement, to summarise key information, risk assessments, proposed mitigation measures, conclusions and residual impacts relating to human health. Compliance with the NPS requirements and relevant guidance and standards should be highlighted. The HIA should be proportionate to the potential impacts. The applicant should confirm whether the proposed development includes or impacts upon any potential sources of Electric and Magnetic Fields (“EMF”), and if so to ensure that adequate assessment of the potential impacts is undertaken.	This report presents the results of the HIA. As the DCO Scheme will not be electrified, no consideration has been given to the potential health risks associated with Electric and Magnetic Fields. A GSM-R masts will be installed as per FTN/GSM-R standards which dictate safe minimum distances to the public. Therefore the installation of the masts is not likely to create a public health risk.
Stakeholder consultation		
North Somerset Council (“NSC”)	A meeting was held with NSC public health officer on 12 January 2016.	See Chapter 5
Bristol City Council (“BCC”)	The public health officer was invited to the meeting on 12 January 2016, but did not attend.	See Chapter 5

2.3 Definition of the Study Area

- 2.3.1 For purposes of the HIA, two study areas have been defined, to assess the direct and cumulative effects of the Portishead Branch Line (MetroWest Phase 1) DCO Scheme itself and the wider study area to assess the cumulative effects of the DCO Scheme in combination with other activities associated with MetroWest Phase 1.
- 2.3.2 For purposes of the HIA, the local study area comprises a 500 m buffer (for operational impact) and 100 m buffer (for construction impact) along the DCO Scheme to be consistent with the findings of the air quality and noise and vibration assessments reported in Chapters 7 and 13 of the PEI Report. The effects predicted in these chapters form the basis for assessment of health impact under the air quality and noise impact health determinant, explained in subsequent sections.
- 2.3.3 The HIA recognises that there might be wider cumulative effects for MetroWest Phase 1 in terms of health and well-being, both positive and negative during construction and operation. For this reason, the study area for the cumulative effects covers:
- Other nationally significant infrastructure projects (“NSIP”) within 10 km of the DCO Scheme;
 - Projects identified from NSC’s and BCC’s planning portals within 0.5 km;
 - Major applications further away in the Bristol area;
 - Other works required for MetroWest Phase 1, namely:
 - Parson Street Junction including Liberty sidings;
 - Bedminster Down Relief;
 - Avonmouth/Severn Beach Signalling;
 - Bathampton turnback.
- 2.3.4 The data sources used were:
- Census 2011;
 - Office for National Statistics annual mid-2014 population estimates;
 - Department for Communities and Local Government;
 - Office for National Statistics;
 - Public Health England;
 - Avon and North Somerset Constabulary;
 - National Child Measurement Programme; and
 - North Somerset Council, Bath and North East Somerset Council and Bristol City Council

2.4 Approach

- 2.4.1 The HIA needs to address the following key questions.
- Who are likely to be affected by the proposal? The development might affect different population groups in different ways, for example the health consequences of a scheme may be different for existing residents, workers on site during construction, and vulnerable groups.

- What determinants of health may be affected? Health determinants are the factors that can influence health. For example air quality, noise or access to green spaces and open spaces. The state of the health of individuals and communities is determined by many factors including their circumstances and environment. The HIA aims to forecast changes in health condition as a result of the potential changes to the health determinants due to the proposed scheme. The health determinants include community and economic factors as well as the physical environment. The list of determinants is drawn from existing literature and the local profile and is discussed in Section 2.3 below.
- What is the current health status of the community (baseline information from desktop studies)?
- What are the health concerns for the community, as viewed by the key health stakeholders? (See Section 2.4 below.)
- What are the potential positive and negative impacts of the proposal against each of the categories identified in the determinants of health checklist? And if there are any negative effects, how can they be avoided, reduced or compensated? Impacts often arise in indirect ways or could be unforeseen consequences, and can happen at different stages of a causal pathway.
- Identify whether any further evidence/research is needed to inform the final recommendations of the HIA.

2.4.2 The study has been conducted through the following steps:

- Policy and literature review to provide the evidence base for identifying health determinants as well as to understand evidence available on the link between the health determinants and health effects;
- Determine the study area boundary and identify the health determinants;
- Profiling health characteristics of the population / determinants in the study area;
- Consult with the client team and key health stakeholders to gather their views on health concerns relating to the affected community; and
- Conduct the impact assessment and identify and incorporate mitigation measures, if any required, into the scheme design, construction activities and operational procedures.

2.4.3 Each of the above steps is elaborated in sections 3 to 7 in this report.

2.4.4 The HIA has been conducted in line with the NPSNN requirements (page 44, paragraphs 4.81 and 4.82) to, a) identify the impact on health of direct and indirect impacts; b) identify and include information on any significant adverse health impact in the Environmental Statement, and c) identify measures to avoid, reduce or compensate adverse health impacts, including cumulative impacts.

2.4.5 The HIA has drawn upon the studies undertaken for the PEI Report including modelling data and potential impacts on the population and the environment, for air quality and noise and vibration and other health determinants. This information has been used to map the causal pathways and impact prediction for this HIA.

2.5 Identifying the Health Determinants

2.5.1 Health determinants are the factors that can influence health. These factors when altered, could result in impacts that might affect the physical and mental health and well-being of an individual, a group of people or that of a community.

2.5.2 The following health determinants have been scoped in to the project based on the information available on the type of works and on operations of the project and the potential links between these works and the health of an individual and affected communities:

- air quality and emissions;
- noise and vibration;
- light pollution;
- access to services such as shops, health or social services;
- access to the DCO Scheme;
- access to green space, open spaces and physical activity;
- townscape and quality of the local environment;
- crime and safety; and
- employment, access to work and local business.

2.5.3 This list may be updated following the formal statutory consultation and review of comments from the stakeholders.

2.5.4 The determinants that have been scoped out are as follows.

- **Housing and household wealth:** As the DCO Scheme will not result in relocation of residents, temporary or permanent, this determinant has been scoped out of the study.
- **Construction worker Health and Safety:** This HIA does not include construction worker related health and safety matters. However, the successful contractor(s) will be required to implement a Health and Safety Plan for the project.
- **Electromagnetic field impact:** The DCO Scheme will not be electrified. GSM-R masts will be required and will be installed at a safe minimum distance to the public as required by FTN/GSM-R standards. The impact of electromagnetic fields on health has been scoped out of the HIA.
- **Land contamination:** Some trackbed investigation has been undertaken and further site investigation of contaminated land is being planned. The results will be used to identify protocols for the safe handling and removal of any contaminated land present.
- **Ground water quality:** It is not considered likely that groundwater will be needed for construction and the DCO Scheme is unlikely to affect groundwater quality during construction and operation, as discussed in the PEI Report Chapter 17 Water Resources.

2.6 Key Receptors

2.6.1 The following groups have been considered as key receptors for this HIA.

Vulnerable Groups

2.6.2 Vulnerable groups comprise sets of people who are more susceptible to the impact of the project than the wider population.

- Children and young adults are more susceptible than others to air pollution, noise, and other environmental impacts. They are likely to have less experience and as a result lack judgement when moving around in traffic and other public spaces.
- The elderly and people with physical disabilities are more sensitive than young and middle-aged people. They are likely to have less able visual or other sensory perception

and may have physical mobility problems. Changes to access routes may create anxiety, or worry leading to withdrawal or isolation or reduced physical activity such as walking. They may or may not use public transport, depending on accessibility for family or other social visits, which could be affected as a result of the project programme.

- People with physical and mental health problems, such as sleep disturbance, depression, and anxiety, may be more sensitive than others to the changes in their local environment.
- Cyclists, pedestrians, equestrians and public transport users, are likely to be affected by diversions to their travel routes or road and footpath closures, which may change their exposure to health risks, such as safety, air quality and noise.
- People in low income groups (income deprivation) are more likely to live in areas affected by environmental pollution (World Health Organisation, 2010) and face barriers to housing, which may cause stress and anxiety.

Other Target Groups

2.6.3 Other target groups that may face health impacts disproportionately are:

- Population within 500 m of the operational railway;
- Population within 100 m of the construction sites;
- Residents affected by construction-related traffic plying along their roads for a longer period throughout the day;
- Residents affected by other projects that will be built in the area around the same time;
- Employees (in offices or commercial spaces) working within 300 m of the work site; and
- Tourists and visitors.

2.7 Defining the Baseline

2.7.1 In order to provide a detailed commentary on the health impact as a result of the construction works and railway operations along the route, the HIA refers to the census data at the Lower Super Output Area (“LSOA”) level, where possible. In the 2011 Census, the LSOAs were defined by a minimum population of 1,000 people and a maximum of 3,000 people, with minimum household numbers of 400 and a maximum of 1,000 households. The study area includes LSOAs from North Somerset Council and Bristol City Council for local area effects, and in addition Bath and North East Somerset Council for predicting the cumulative impacts.

2.7.2 To enable better understanding of the cause and effect relationship, the impact assessment for the DCO Scheme has been broken down to the project component level. For example, predicting the impact of operational noise on the residents near the Portishead station or construction vehicles noise on residents located near the proposed construction compounds along the route. Table 2-2 provides the Census LSOA codes that have been mapped against the project components while Figure 2-1 Study Area shows the locations of the LSOAs and project components.

2.7.3 The route along the south west main line from Parson Street Junction to Bedminster Station is included as part of the wider study area, as well as the locations of the Severn Beach/Avonmouth Signalling works and Bathampton Turnback works, for the cumulative impacts assessment.

Table 2-2: Location of Lower Super Output Areas within the Study Area

LSOA code	Scheme component	Area
<i>The DCO Scheme</i>		
North Somerset 001G (part), 003D and 003E	Proposed Portishead Station, Portishead construction compound and proposed footbridge to Trinity Primary School	Central Portishead
North Somerset 006F and 004B	Two construction compounds	East of Portishead and near Pill
North Somerset 004C and 004D	Proposed Pill Station and related construction compound, Ham Green construction compound, Avon Road/Lodway Close Underpass and three construction compounds	Northern Pill
North Somerset 004A	Avonmouth Signalling works and five micro compounds	Avon Gorge/Abbots Leigh/Leigh Woods
Bristol 036A and 041A	Bower Ashton and construction compounds	Ashton Junction
Bristol 041D	Ashton Vale, Barons Close Pedestrian Crossing and a construction compound	Ashton Junction
<i>Wider Study Area (includes works under permitted development rights and works as part of MetroWest Phase 1)</i>		
Bristol 046A, 039A	Parson Street Junction	Parson Street Junction
Bristol 039B, 039H	No scheme components	Between Parson Street Junction and Bedminster
Bristol 040B, 040C, 039E	Bedminster Down Relief Line	Bedminster
Bristol 008E, 008F	Severn Beach/Avonmouth Signalling	Avonmouth
Bath and North East Somerset 010E	Bathampton Turnback	Bathampton

2.8 Health Determinant Specific Assessment Approach

- 2.8.1 **Air quality and dust emissions:** This health determinant considers a combination of NO_x, SO_x, PM₁₀ and dust emissions. The baseline profile, including information on Air Quality Management Areas (“AQMA”), was taken into account. Any change to the baseline, as a result of the proposed works and cumulative effect from other projects executed in parallel with MetroWest, are modelled and assessed in the PEI Report Chapter 7 Air Quality. This information has been used to judge how the predicted change is likely to affect the population, including vulnerable groups such as the elderly and children, and people with illness such as asthma or respiratory diseases or any sensitive receptors such as schools, health centres and hospitals. Construction related emissions such as material transport, plant emissions and dust will be attenuated through measures to be implemented by the contractors. A Code of Construction Practice (“CoCP”) will be prepared setting out a framework of the measures to be adopted by the contractor in the management of construction.

- 2.8.2 **Noise and vibration:** The combined effect of noise and vibration, as predicted in the PEI Report Chapter 13 Noise and Vibration was taken as the basis for this assessment. The impact of the new passenger service as well as construction related-noise have been taken into account to predict the impact on:
- Residents in urban and rural areas;
 - Vulnerable groups of people with physical and mental illness;
 - Individuals with physical and mental illness, such as cardiovascular disorders or depression;
 - Office or factory staff, whose workplace might be located near the construction sites; and
 - Vulnerable groups of able people such as the elderly and children (for example near schools or sheltered homes or supported housing).
- 2.8.3 **Light pollution:** This determinant looks to capture the impact of changes in the night environment, as a result of the lighting along the track and at the stations and car parks on the residents in the study area. It will also look at the temporary changes to night-time lighting, such as light spillage from the construction compounds. The CoCP will include measures to limit light pollution during the construction stage, which has been taken into account to predict health impact on the receptors. The information available at this stage on lighting design has been used to predict the operational impact. Further design stages may consider incorporating low luminescence lighting, dimmer lighting or advanced technology to reduce lighting spillage from tracks, stations and car park facilities.
- 2.8.4 **Access to services such as shops, health or social services:** This determinant focuses on the impact of changes on all road users such as motorists, cyclists and pedestrians, to assess accessibility to amenities and services. Information from the Transport Assessment in Appendix 17 of the PEI Report, including diversions, traffic management, safety and change to road traffic, have been used to predict the impact on access to services.
- 2.8.5 **Access to the DCO Scheme:** This determinant looks at the experience of local residents and users near the DCO Scheme facilities, such as the stations from the point of view of accessibility, traveller stress and road safety. It looks at whether and how the baseline situation is likely to change with the proposed design, both during the construction and operation stages. The impacts could be either positive or negative and vary across the population depending on the age and physical ability of the population.
- 2.8.6 **Access to green spaces, open spaces and physical activity:** Physical access and visual access to green spaces and open spaces have been found to have a positive impact on the health of individuals. This determinant looks at the health impact of changes to the spaces that local residents may use for physical activities, such as walking and exercise as well as visual amenity.
- 2.8.7 **Townscape and quality of the local environment:** Local character and townscape contribute to the visual amenity of an area. This determinant looks at any health related impact as a result of both temporary and permanent changes, if any, at the construction and operations stage.
- 2.8.8 **Crime and safety:** Crime is an important determinant of health and well-being. This determinant looks at the impact of both construction and operation of the Portishead Branch Line on the local population. Fear of crime may restrict social and cultural activities, or parents may restrict children using public spaces and services. Vulnerable population, such as the elderly, young men, children, women and people with homosexual orientation may be affected disproportionately or may benefit from improved spaces and services.

- 2.8.9 **Employment, access to work and local business:** This determinant looks at the impact of changes on local employment and business activities e.g. disruption to business during construction. Adverse impacts such as disruption and relocation may lead to stress, anxiety, lower self-esteem and well-being. Conversely, improved connectivity may increase access to more employment opportunities in the wider sub-region, with beneficial impacts on well-being and mental health. The findings from Chapter 14 Socio-economic and Regeneration of the PEI Report have been used to conduct the HIA assessment.

2.9 Assessment Criteria

- 2.9.1 The HIA seeks to predict change in the health determinant. This involves considering the following points.
- *The aspect of the project causing the change* i.e., construction of the station, or footbridge or other components, or the operation of the rail along the route, track lighting during operations, or the presence and operation of construction compounds.
 - *The section of the population that might be affected by the change* i.e., dense urban area residents, or rural area residents or businesses and their staff or other vulnerable people such as the elderly, children or people diagnosed with mental illness or people with disabilities.
 - The strength of research evidence, to be able to conclude the cause and effect relationship between an identified source of impact, the change in health determinant and the health outcome. The strength of evidence could be weak (few peer reviewed studies available), moderate (range of international, but not national peer reviewed studies indicating health effects or widely accepted by the public health community or debates exist about specific causal factors and the mechanism of effect) and strong evidence (wide range of international and national peer reviewed studies and, or causal effect association widely accepted by the public health community).
 - The residual effect, both positive and negative, after taking into account the measures that have been already incorporated in the design and the measures to be covered in the CoCP.
- 2.9.2 Vulnerable groups are more likely to experience health effects as a result of change in a health determinant, than the wider population. The assessment looks for the health effect on particular communities, as well as effects on individual characteristics such as age, physical or mental health conditions or other physical or mental characteristics that make people vulnerable to health effects.
- 2.9.3 The assessment is qualitative in nature, and the significance of the identified effect and the health impact was carried out based on professional judgement, and taking account of the geographic scope and intensity of exposure.
- 2.9.4 Geographic scope: This refers to the density of the population and the geographic coverage in the study area. For example, urban areas with many residential units, isolated rural residential or farm buildings with few residents, commercial or office spaces with employees, manufacturing units, public open spaces, or similar, that have sporadic or regular usage from local residents or travellers.
- 2.9.5 Intensity of exposure. Intensity refers to the potential change in the health determinant as a result of the project construction or operations. It is expressed in terms of magnitude - low, moderate to high levels. The health impact on the population (receptors) as a result of the change in the health determinant is termed as 'effect', which could be positive or negative. Intensity of an impact is determined taking the following into account:

- duration of the effect (less than a minute to hours during the day or night);
- short term (up to 6 months) to long term (over 5 years); and
- source causing change in the health determinant i.e., point source or moving object (e.g., piling foundation works vs moving train).

2.9.6 Significance of the Effect. The significance of the effect is based on a combination of the scale or magnitude of the impact and the sensitivity of the population. To maintain consistency with the environment assessment definitions, the definition of significance of effects has been adopted from the best practice guidance contained within the Design Manual for Roads and Bridges Volume 11, Section 2, Part 5: HA 205/08 Assessment and Management of Environmental Effect.

Table 2-3: Significance matrix

Sensitivity	Magnitude of impact or degree of change				
	<i>No change</i>	<i>Negligible</i>	<i>Minor</i>	<i>Moderate</i>	<i>Major</i>
High	Neutral	Slight	Slight/Moderate	Moderate/Large	Large
Medium	Neutral	Slight	Slight	Moderate	Moderate/Large
Low	Neutral	Neutral/Slight	Neutral/Slight	Slight	Slight/Moderate

Table 2-4: Description of magnitude and sensitivity ranges

Magnitude of impact		Typical criteria descriptors
Major	Negative	Severe damage to human health.
	Positive	Large scale or major improvement to human health.
Moderate	Negative	Negative impact on human health.
	Positive	Benefit to human health.
Minor	Negative	Minor negative impact on human health.
	Positive	Minor benefit to human health; some beneficial impact or a reduced risk of negative impact occurring.
Sensitivity		Typical criteria descriptors
High		High vulnerability, population groups very sensitive to change
Medium		Medium vulnerability, population groups sensitive to change
Low		Low vulnerability, healthy population

Table 2-5: Definition of Significance of Effects

Significance Category		Typical criteria descriptors
Large	Negative	These beneficial or adverse effects are considered to be very important considerations and are likely to be material in the decision-making process.
	Positive	
Moderate	Negative	These beneficial or adverse effects may be important, but are not likely to be key decision-making factors. The cumulative effects of such issues may become a decision-making issue if leading to an increase in the overall adverse effect on a particular resource or receptor.
	Positive	
Slight	Negative	These beneficial or adverse effects may be raised as local issues. They are unlikely to be critical in the decision-making process, but are important in enhancing the subsequent design of the project.
	Positive	
Neutral		No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

Adapted from DMRB Volume 11, Section 2 Part 5, Table 2-4.

- 2.9.7 Those residual effects described as having a Moderate or Large effect upon a receptor are considered to be significant in terms of the EIA Regulations and thus are material considerations when determining planning applications. The use of the terms neutral and slight are used to acknowledge that there will be some change from the baseline conditions but that these effects are not significant.

SECTION 3

Policy and Literature Review

3.1 Introduction

3.1.1 The following documents have been reviewed to develop the approach and the scope of the HIA:

- National Policy Statement for National Networks (Department for Transport, December 2014)
- North Somerset Council's ("NSC") Core Strategy
- Bristol City Council's ("BCC") Core Strategy
- Bath and North East Somerset's ("B&NES") Core Strategy
- HIA reports of projects of a similar type or scale
- Scientific research literature on the health and well-being impacts of similar infrastructure projects (see the reference list at the end of this report), and
- Health-related topic-specific studies, statistical analyses and other literature that informs about factors affecting health. These studies, along with scientific research literature, form part of the evidence based research that is useful to identify health determinants and health issues relevant for this project.

3.2 Policy Review

National Policy

National Policy Statement for National Networks

3.2.1 The National Policy Statement for National Networks ("NPSNN") sets out the Government's vision and strategic objectives for the national networks to meet the country's long-term needs, supporting a prosperous and competitive economy and improving overall quality of life, as part of a wider transport system: "*this means*:

- *Networks with the capacity and connectivity and resilience to support the national and local economic activity and facilitate growth and create jobs.*
- *Networks which support and improve journey quality, reliability and safety.*
- *Networks which support the delivery of environmental goals and the move to a low carbon economy.*
- *Networks which join up our communities and link effectively to each other" (p.9, DfT, 2014).*

3.2.2 The NPSNN notes that national road and rail networks can affect the population's health, well-being and quality of life both directly (for example due to noise impacts) and indirectly (for example if they affect access to key public services). It states that when a proposed project would result in significant environmental impacts that affect human beings, the project's environmental statement should identify and assess likely significant adverse health impacts (including cumulative impacts) and identify appropriate mitigation measures.

3.2.3 Regarding projects that may cause noise or vibration impacts, the NPSNN (paragraph 5.195, p85) states that:

“The Secretary of State should not grant development consent unless satisfied that the proposals will meet, the following aims, within the context of Government policy on sustainable development:

- *avoid significant adverse impacts on health and quality of life from noise as a result of the new development;*
- *mitigate and minimise other adverse impacts on health and quality of life from noise from the new development; and*
- *contribute to improvements to health and quality of life through the effective management and control of noise, where possible.*

In determining an application, the Secretary of State should consider whether requirements are needed which specify that the mitigation measures put forward by the applicant are put in place to ensure that the noise levels from the project do not exceed those described in the assessment or any other estimates on which the decision was based.”

- 3.2.4 The NPSNN identifies that impacts on air quality are likely to be particularly important for schemes within and near to Air Quality Management Areas (“AQMA”) and other areas where ambient pollutant concentrations are close to or exceed EU limits. The NPSNN also highlights the significance of open space and the need to maintain the functionality and connectivity of green infrastructure.

Transport for Everyone

- 3.2.5 The NPSNN refers to the paper *Transport for Everyone: an Action Plan to Improve Accessibility for All* (Department for Transport, 2012) for the Government’s strategy for improving the accessibility of the transport network for disabled people. This strategy states that transport schemes should build the accessibility requirements of all transport network users into the project design. In addition, improvements to reduce the severance of communities should be considered.

Noise Policy Statement for England

- 3.2.6 The Noise Policy Statement for England (“NPSE”) sets out the Government’s approach to noise management. It promotes good health and good quality of life, in line with the Government’s principles of sustainable development.

Environment Act 1995

- 3.2.7 The Environment Act requires local authorities to assess whether air quality standards or objectives are being achieved or are likely to be achieved in their area within the period prescribed by regulations. If an objective is unlikely to be met in an area before the relevant deadline, the local authority must designate the area as an AQMA and take action to achieve the objectives.

Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007

- 3.2.8 The Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 explains the Government’s air quality objectives and policy to improve air quality in order to improve public health and quality of life and to protect the environment. The objectives to protect human health are presented in Table 3-1 below.

Table 3-1: Air Quality Strategy Objectives to Protect Human Health

Pollutant	EU Limit Value/ UK Objective (pollutant concentration in $\mu\text{g}/\text{m}^3$)	Averaging period	Date for compliance
Nitrogen Dioxide (NO_2)	200 $\mu\text{g}/\text{m}^3$ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2005
Particles (PM_{10}) (gravimetric)	50 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 35 times a year	24-hour mean	31.12.2010
	40 $\mu\text{g}/\text{m}^3$	Annual Mean	31.12.2004

- 3.2.9 The Strategy recognises that most AQMAs have been designated due to the risk of exceeding, or actual exceedances of NO_2 and PM_{10} , mainly as a result of road transport emissions.

Public Health Outcomes Framework for England (2013-2016)

- 3.2.10 The Public Health Outcomes Framework for England (2013 – 2016) aims to “*improve and protect the nation’s health and well-being, and improve the health of the poorest fastest.*” The framework’s two high-level outcomes to be achieved are:

- Increased healthy life expectancy
- Reduced differences in life expectancy and healthy life expectancy between communities.

- 3.2.11 The Department of Health has developed supporting indicators to monitor progress towards achievement of the high level outcomes. These are grouped into four domains:

- Improving the wider determinants of health
- Health improvement
- Health protection
- Health care, public health and preventing premature mortality.

- 3.2.12 These indicators (among other data) have been used to compile the baseline community profiles for this HIA.

Local Policy

- 3.2.13 The following key local policies are relevant to the HIA for the DCO Scheme. These have been extracted from North Somerset Council’s and Bristol City Council’s Core Strategies:

North Somerset Council Core Strategy

- Policy CS3: Environmental impacts and flood risk assessment – Mitigation must be implemented for environmental impacts and impacts on health, safety and amenity resulting from developments.
- Policy CS10: Transportation and movement – Connectivity will improve and facilities will be enhanced for users, including people with reduced mobility.
- Policy CS26: Supporting healthy living and the provision of health care facilities – Developments that increase and improve health services, promote healthier lifestyles and aim to reduce health inequalities will be supported. All large-scale developments require

an HIA and physical activity will be encouraged through provision of easily accessible green spaces and sports facilities.

- Policy CS31: Clevedon, Nailsea and Portishead – Development proposals that improve transport links to other towns are supported; the re-opening of the Portishead Branch Line (MetroWest Phase 1) is prioritised.
- Policy CS32: Service villages – Public transport proposals will be supported to improve accessibility (includes village of Easton-in-Gordano/Pill).

Bristol City Council Core Strategy

- Policy BCS1: South Bristol – The regeneration of South Bristol will involve improving transport links (including provision of the South Bristol Link) and creating new jobs, thus increasing accessibility to employment and services. It will also involve a new hospital, leisure facilities and open space, new homes and an academy, helping to address health, environment, housing and education deprivation in the area.
- Policy BCS6: Green Belt – Countryside and other open land around the existing built-up areas of the city will be safeguarded by maintaining the current extent of the Green Belt.
- Policy BCS9: Green Infrastructure – The integrity and connectivity of the strategic green infrastructure network will be maintained, protected and enhanced. BCC will work with adjacent local authorities, Natural England and others to enhance the wider area's strategic green infrastructure network.
- Policy BCS10: Transport and Access Improvements - This policy links to the Joint Local Transport Plan for the West of England and highlights the need to promote less environmentally damaging modes of transport. The policy supports the DCO Scheme and other rail improvements, as well as new/expanded park and ride schemes and the South Bristol Link, subject to environmental impact assessment. It supports walking and cycling route networks and remodelling existing transport infrastructure to improve accessibility.
- Policy BCS21: Quality Urban Design – New developments are required to promote accessibility, be coherently structured, contribute to a multi-functional, lively and well-maintained public realm that integrates different modes of transport and be adaptable to changing conditions (social, technological, economic and environmental).
- Policy BCS23: Pollution – Developments should take into account potential noise or other pollution impacts on nearby sensitive receptors.

Bath and North East Somerset Core Strategy

- Policy CP2: Sustainable Construction – New developments should conserve water resources, minimise vulnerability to flooding, allow for future modification of use/layout and consider climate change adaptation. All applications for development must be accompanied by a B&NES Sustainable Construction Checklist.
- Policy CP6: Environmental Quality – Designs must be high quality and contribute to specific local context. The historic environment, landscape character and wildlife sites will be protected and enhanced.
- Policy CP7: Green Infrastructure – Opportunities will be taken to connect, improve and extend the Green Infrastructure network.
- Policy CP8: Green Belt – The openness of the Green Belt will be protected from inappropriate development.

- 3.2.14 North Somerset Council's Sites and policies plan part 1 (Development Management Policies) was adopted in July 2016. This document aligns with the Core Strategy's policies, and includes more specific policies that are relevant to this HIA:
- Policy DM24: Safety, traffic and provision of infrastructure, etc. associated with development – Developments must not prejudice highway safety or operation and ensure that they are accessible and integrated with other forms of transport.
 - Policy DM25: Public rights of way, pedestrian and cycle access – the use, amenity and safety of public rights of way and other forms of public access must not be compromised by developments. Developments will provide, improve, or contribute to providing or improving multi-user infrastructure appropriate to its size and type.
 - Policy DM32: High quality design and place-making – New development designs should contribute to the creation of high quality, distinctive, function and sustainable places where opportunities for physical activity and recreation are maximised.
 - Policy DM33: Inclusive access into non-residential buildings and spaces – Building entrances should be designed so that disabled and able-bodied people have equal access to the same buildings and spaces.

3.3 Literature Review

Air Quality, Dust and Emissions

- 3.3.1 Diesel-powered trains, such as those proposed for the Portishead Branch Line, emit carbon dioxide ("CO₂"), PM₁₀ (atmospheric particulate matter less than 10 µm in diameter) and nitrogen oxides ("NO_x"). PM₁₀ and NO_x are damaging to human health and also emitted by road traffic. Health and eco-system-based limits for NO₂ and PM₁₀ are set by the European Union ("EU").
- 3.3.2 PM₁₀ and PM_{2.5} (particles less than 2.5 µm in diameter) are emitted by combustion engines and produced during construction. These particles are thought to cause the most damage to human health of all air pollutants (World Health Organisation ("WHO"), 2014). They have been found to cause respiratory and cardiovascular morbidity, exacerbation of asthma in people who already have the condition, respiratory symptoms and increased hospital admissions. In addition, PM inhalation can cause mortality from cardiovascular and respiratory diseases and from lung cancer (World Health Organisation, 2013). PM_{2.5} is associated with a greater risk of mortality than coarser particles of PM₁₀.
- 3.3.3 There is less certainty surrounding the effects of NO₂ on human health than PM₁₀ (World Health Organisation, 2000a). Time-series studies reviewed by Searl (2004) suggest that NO₂ has a small effect on daily mortality, hospital admission for respiratory and cardiovascular illness, emergency hospital and GP visits for respiratory illness and lung function. However, serious effects are generally only seen at concentrations very rarely reached in ambient air (World Health Organisation, 2000a). The magnitude of health effects of NO₂ depends more on the concentration than the exposure duration; short-term peak concentrations seem to have a greater effect than long-term lower concentrations (Searl, 2004).
- 3.3.4 Overall, ambient air pollution is a major health problem. A report by King's College London, commissioned by the Greater London Authority and Transport for London, estimated that up to 9,416 people die each year from long-term exposure to air pollution (both NO₂ and PM₁₀) (Walton *et al.*, 2015).

Noise and Vibration

- 3.3.5 In 2009, the World Health Organisation report Night Noise Guidelines for Europe stated that *“Environmental noise is a threat to public health, having negative impacts on human health and well-being”* (World Health Organisation, 2009, p. VII).
- 3.3.6 One of the main effects of environmental noise is sleep disturbance; this includes biological effects such as increased heart rate and self-reported disturbance such as insomnia and increased medicine use (World Health Organisation, 2009). Sleep disturbance has also been linked to reduced performance and fatigue, although there is no strong evidence that noise can cause these effects (World Health Organisation, 2009). There are also studies linking night-time noise with mental health problems and cardiovascular illness, but there may not be enough evidence to identify a causal relationship (World Health Organisation, 1995). However the problem with night time noise in residential areas is the low background noise and combinations of noise and vibrations produced by trains or trucks (for example construction vehicles). Low frequency noise may have significant detrimental health effect on people (Leventhall, 2004).
- 3.3.7 Environmental noise can cause annoyance; the level of annoyance depends on sound level, noise source and frequency among other factors (World Health Organisation, 2000b).
- 3.3.8 Demographic variables such as age, sex and socio-economic status, are less strongly associated with annoyance. The correlation between noise exposure and general annoyance is much higher at the group level than at an individual level (World Health Organisation, 1999).
- 3.3.9 Besides annoyance, noise can produce social (disengagement, unfriendliness and sometimes aggression) and behavioural effects (closure of windows or not using a balcony) on residents. Noise level exposure over 80 dB(A) is found to be associated with reduced helping behaviour or increased aggression among people (World Health Organisation, 1999). High level continuous levels of noise exposure may increase the susceptibility to a feeling of helplessness among schoolchildren (Evans G, 1993).
- 3.3.10 Transport is the main source of noise pollution in Europe (World Health Organisation, 2000b). Studies have found that rail noise generally causes less annoyance than other forms of transport (for example Miedema and Vos, 1998). However, people are still affected by it, especially when rail noise is accompanied by vibration, as this enhances the perception of noise and thus increases annoyance (Shigenori *et al.*, 2013; European Commission DG, 2012). Communities near the railway can adapt to noise levels so that they are no longer affected by it (Fenech *et al.*, 2013).
- 3.3.11 Noise and vibration resulting from the operational phase of a development is likely to be long-term and thus may be associated with long-term effects.
- 3.3.12 Construction noise and vibration impacts on human health (such as sleep disturbance and annoyance as discussed above) are often short-term and can be effectively managed through the implementation of procedures to control noise at construction sites.
- 3.3.13 The WHO Guidelines for Community Noise (World Health Organisation, 1999) report rightly recognises that most investigative studies are typically carried out on the general population, typically adults. Vulnerable groups, such as the elderly or children are likely to be under-represented and the report notes that the risk of harmful effects may be higher on these groups by comparison the wider general population. Although noise pollution is not likely to cause mental illness, children, the elderly, and those with issues of mental illness such as depression may be particularly vulnerable to effects of noise pollution because they may lack adequate coping mechanisms

Lighting and Pollution

- 3.3.14 Artificial lighting, especially at night, is thought to have an impact on human health. There is some evidence to suggest that night-time lighting may also be linked to sleep disturbance, gastrointestinal and cardiovascular disorders, and affective disorders (EU, 2012). However, it is unclear what the relative roles of sleep and darkness are contributing to some of these disorders (Blask *et al.*, 2012).
- 3.3.15 Disability (physiological – temporary blindness) and discomfort (psychological) glare can occur from overhead lighting. Older people are especially vulnerable to these effects. Solid state technologies and LED lighting may cause greater glare impact than single source lights if not designed and angled appropriately, as each light has a high luminance (Blask *et al.*, 2012).

Access to Housing and Services

- 3.3.16 Important community services include shops, post offices, healthcare facilities, schools and leisure facilities. The accessibility of these services can affect the health and well-being of the population. These services can have a positive effect on people's physical, social, emotional and cognitive health (coping, adjustment and diversion). Accessibility can refer to the capacity of the services to serve customers, the distance to the services, public transport connections, communication issues or separation caused by physical infrastructure (Quigley and Thornley, 2011). If services are not accessible, the health and well-being of the population may suffer. A survey in 2011 found that 5% of the adult population of Great Britain felt isolated because of difficulties in accessing local shops and services (Randall, 2012).
- 3.3.17 A Social Exclusion Unit Government report (Social Exclusion Unit, 2003) suggests that accessibility of transport modes and the location of health care affect the capacity of people to reach healthcare services. People of a certain age or with a disability may experience greater barriers to access healthcare services.
- 3.3.18 People with physical disability, including sensory impairment, are likely to be discouraged from accessing amenities from impacts such as footpath diversions, road or path closures.

Physical Activity

- 3.3.19 Physical activity is important for maintaining both physical and mental health. Exercise reduces the risk of coronary heart disease, stroke, type 2 diabetes, cancer, obesity and osteoarthritis and also improves psychological well-being, lowering the risk of depression and dementia (NHS, 2015).
- 3.3.20 Participation in physical activity is partly determined by the characteristics of the built environment, such as access to green spaces and sports facilities and street connectivity (for example by footpaths or cycle lanes) (Glasgow Centre for Population Health, 2013). Improving the built environment can therefore encourage communities to increase their physical activity and consequently improve their health.

Local Environment

- 3.3.21 Characteristics of the local environment that can affect health include green spaces, landscape, townscape, aesthetic quality and crime. As well as providing space for physical activity, green spaces can also encourage social interaction, reduce stress and enhance mood, thus improving well-being (O'Brien *et al.*, 2010). The Landscape Institute (2013) stresses the importance of providing aesthetically pleasing and safe spaces for communities to enable them to relax and engage with nature.
- 3.3.22 Green spaces and open spaces are important for many reasons; they can improve people's sense of well-being, bring communities together, encourage physical activity and help improve

air quality. They include sports pitches, country parks, linear corridors and open spaces within developments (Department for Communities and Local Government, 2014). The Forestry Commission literature review (O'Brien, 2010) lists key health benefits of green spaces. Among other things, it includes attention and cognitive benefits associated with restoration, mood and self-esteem. The Green Space Scotland review also found compelling evidence on the restorative effects of green spaces on mental health.

- 3.3.23 Crime adversely affects mental well-being on a local scale in urban areas (Dustmann and Fasani, 2012). Research found that in addition to causing physical harm (through crime-related violence), indirect effects such as stress, sleep disturbance, loss of confidence and increase in smoking or alcohol consumption can occur due to fear of crime (perceived crime) (Hirschfield, 2003). Some groups of population, such as the elderly, disabled people, minority ethnic groups, lone parents, asylum seekers and ex-offenders may be at risk of social exclusion and potentially vulnerable to crime (actual and perceived). Crime (perceived and actual) is considered as a factor that affects well-being of individuals.

Employment and Income

- 3.3.24 Good physical health and social and psychological well-being has been linked to having a secure job (Marmot *et al.*, 2010). Income is also important for health as it partly determines living standards and quality of life (Waddell and Burton, 2007).
- 3.3.25 Unemployment has been linked to higher mortality, poorer general health, long-term illness, coronary heart disease and poorer mental health (Waddell and Burton, 2007; Greater London Authority, 2005). The strength of work-health relationships is uncertain as many other closely related variables also affect health. However, overall it is thought that the health benefits of work outweigh the risks (Waddell and Burton, 2007).

Water Pollution

- 3.3.26 Water pollution decreases the recreational value of the natural environment and can therefore adversely affect the well-being of the population (Defra, 2012). In addition, this pollution may lead to contamination of drinking water supplies and consequent adverse effects on physical human health.
- 3.3.27 Mitigation measures to prevent water pollution from the construction and operation of railways are considered in the project design stage (Network Rail, 2009).

Pests

- 3.3.28 Many species of birds may be infected by diseases such as psittacosis and salmonella, which can be passed on to humans through inhalation of dust or water droplets containing contaminated bird droppings. Psittacosis causes a flu-like illness and in some cases pneumonia while Salmonella infection causes diarrhoea and vomiting (Health and Safety Executive, undated). While pigeons and gulls often inhabit railway stations, people most likely to be at risk work closely with birds such as in the poultry trade or keep birds. Design features, such as pigeon spikes are used in various projects to address the issue.
- 3.3.29 Rodents are widespread and also carry disease. In particular Weil's disease is carried by rats and workers likely to be exposed to areas frequented by rats such as wastewater engineers need to be aware of the risks of contracting this disease.

Transport

- 3.3.30 The principal effects of transport on health are covered in other sections of this report. These effects are related to air quality, noise and vibration, access to services, physical activity and

community severance. Other effects on health may be related to accessibility; for example, frustration may be felt by disabled users of public transport if train stations do not accommodate their needs.

- 3.3.31 The incidence rate of fatal or serious accidents involving heavy goods vehicles (“HGV”) is decreasing with time, but increases in the number of HGVs on the road (e.g. for the transportation of construction material) may increase fear of accidents (Transport Analysis Guidance, 2003).

SECTION 4

Baseline

4.1 Community Profiling

4.1.1 This section provides socio-economic information about the local community covering the population, ethnicity, social grade, employment status, housing (provision), and health related indicators within the DCO scheme areas and the wider study area for the following:

- population with Long Term Limiting Illness;
- female Health Life Expectancy;
- male Health Life Expectancy;
- Index of Multiple Deprivation – overall, Health and Disability sub-domain and Outdoor Living sub-domain;
- rates and incidence of disease – coronary heart disease, cancer mortality, respiratory mortality, asthma, and circulatory mortality;
- mental health – prevalence of depression.

4.1.2 The following local environment profile related indicators are also included:

- local character, heritage and townscape;
- ambient noise and air quality condition;
- access to services (Index of Multiple Deprivation – barriers to housing and services sub-domain); and
- access to green spaces and open spaces.

4.1.3 Baseline data for community profiling in areas close to the works, including the temporary construction compounds, have been obtained from specific Lower Super Output Areas (“LSOA”). In the 2011 Census, the LSOAs were defined as areas with a minimum population of 1,000 people and a maximum of 3,000 people, with a minimum household number of 400 and a maximum of 1,000 households. The LSOAs are shown in Figure 2-1 Study Area. Where LSOA data are not available, Local Authority data are used.

4.1.4 The most recent data are from the UK 2011 Census, mid-year population estimates for 2014 from the Office for National Statistics, 2009-2011 data on Disability-Free Life Expectancy from the Office for National Statistics, 2014 disease and mental health data from Public Health England, 2014 asthma mortality data from the Office for National Statistics, 2014-2015 data on child obesity from the National Child Measurement Programme and 2015 data on the Index of Multiple Deprivation (“IMD”). Although from different years, these data provide an understanding of the present situation that is as accurate and up-to-date as possible.

4.2 Demography

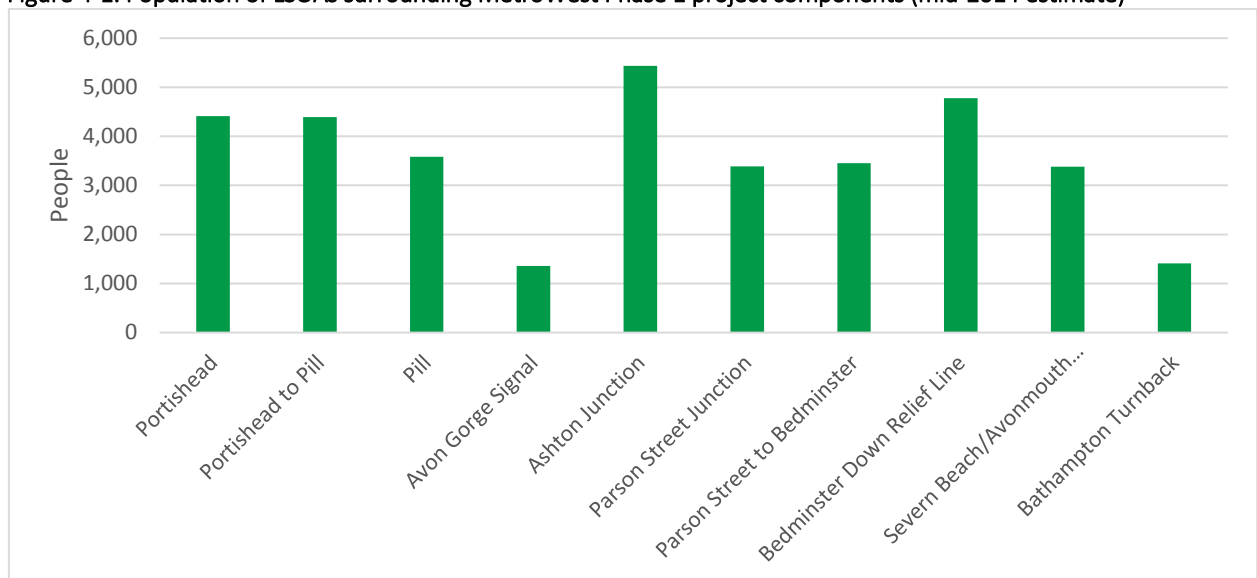
4.2.1 This section uses population data for mid-2014 from the Office for National Statistics and data from the 2011 Census for ethnicity. These are the most up-to-date sources available at the LSOA level.

Population

The DCO Scheme

- 4.2.2 Mid-2014 population estimates for each section of the route are shown in Figure 4-1. The Portishead LSOAs had a combined population of 4,414 while Pill LSOAs had a combined population of 3,583 (Office for National Statistics, 2015). The Ashton Junction LSOAs had the largest combined population (5,438).

Figure 4-1. Population of LSOAs surrounding MetroWest Phase 1 project components (mid-2014 estimate)



Source: Office for National Statistics (2015)

The Wider Study Area

- 4.2.3 The LSOAs between Parson Street Junction and Bedminster Station had a combined population of 11,616 in mid-2014. The combined population around Severn Beach/Avonmouth Signalling works was 3,380 and around the Bathampton Turnback the population was 1,413.

Ethnicity

The DCO Scheme

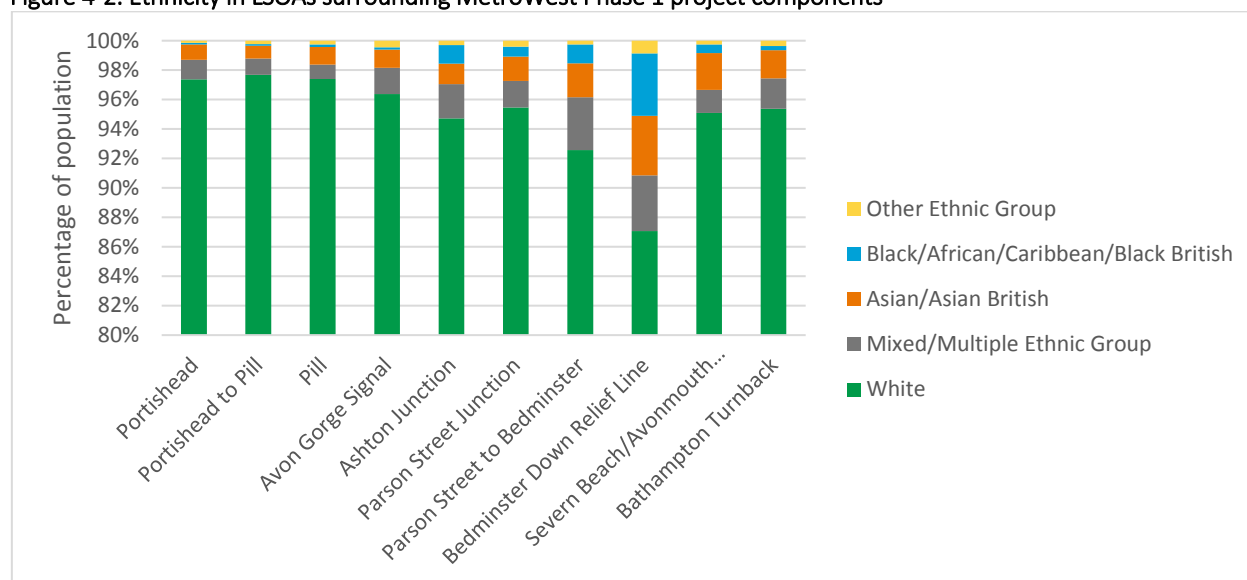
- 4.2.4 Ethnicity data were sourced from the 2011 Census (Office for National Statistics, 2013) and the results are summarised in Figure 4-2.
- 4.2.5 Across the three LSOAs in Portishead, 97.4% of the population was white, with low percentages of mixed/multiple ethnic groups and Asian/Asian British and very low percentages of Black/African/Caribbean/Black British and people of other ethnic origins.
- 4.2.6 Between Portishead and Pill, 97.7% of the population was found to be white in 2011 and at Pill this was at 97.4% followed by people of mixed ethnicity and Asian/ Asian British and Black, Minority and other Ethnic ("BME") communities, respectively.
- 4.2.7 In the LSOA surrounding the Avon Gorge Signal, 96.4 % of the population was white in 2011. The next largest ethnic group was the mixed/multiple ethnic group (1.8 %), followed by the Asian/Asian British group (1.3 %). This LSOA had the highest percentage of the population that was non-white out of all North Somerset LSOAs.

- 4.2.8 Across the three LSOAs located around Ashton Junction, 94.7% of the population was white, 2.3% was of mixed/multiple ethnic origin, 1.4% was Asian/Asian British and 1.3% was Black/African/Caribbean/Black British. Bristol 0036A had the highest percentage of all non-white ethnicities, with mixed/multiple ethnicity being the highest overall at 3.0%.

The Wider Study Area

- 4.2.9 Around Parson Street Junction, 95.5% of the population was white, and this dropped to 92.6% between Parson Street Junction and Bedminster and lower again to 87.1% near the Bedminster Down Relief Line works, making this the area with the highest proportion of minority ethnic groups in the wider study area.
- 4.2.10 Around the Severn Beach/Avonmouth Signalling works area 95.1% of the population was white, with the second largest ethnic group being Asian/Asian British at 2.5%.
- 4.2.11 Around the Bathampton Turnback works area 95.4% of the population was white, with the second largest proportion of people being from mixed/multiple ethnic groups (2.1%).

Figure 4-2. Ethnicity in LSOAs surrounding MetroWest Phase 1 project components



Source: Census 2011

4.3 Social Grade

- 4.3.1 This section uses data from the 2011 Census. Social grade is a socio-economic classification based on employment type Table 4-1. Data refer to residents aged 16 to 64.

Table 4-1. Social grade classifications

Social grade classification	Explanation
AB	Higher and intermediate managerial/administrative/ professional occupations
C1	Supervisory, clerical and junior managerial/administrative/ professional occupations
C2	Skilled manual occupations
DE	Semi-skilled and unskilled manual occupations; unemployed and lowest grade occupations

Source: 2011 Census

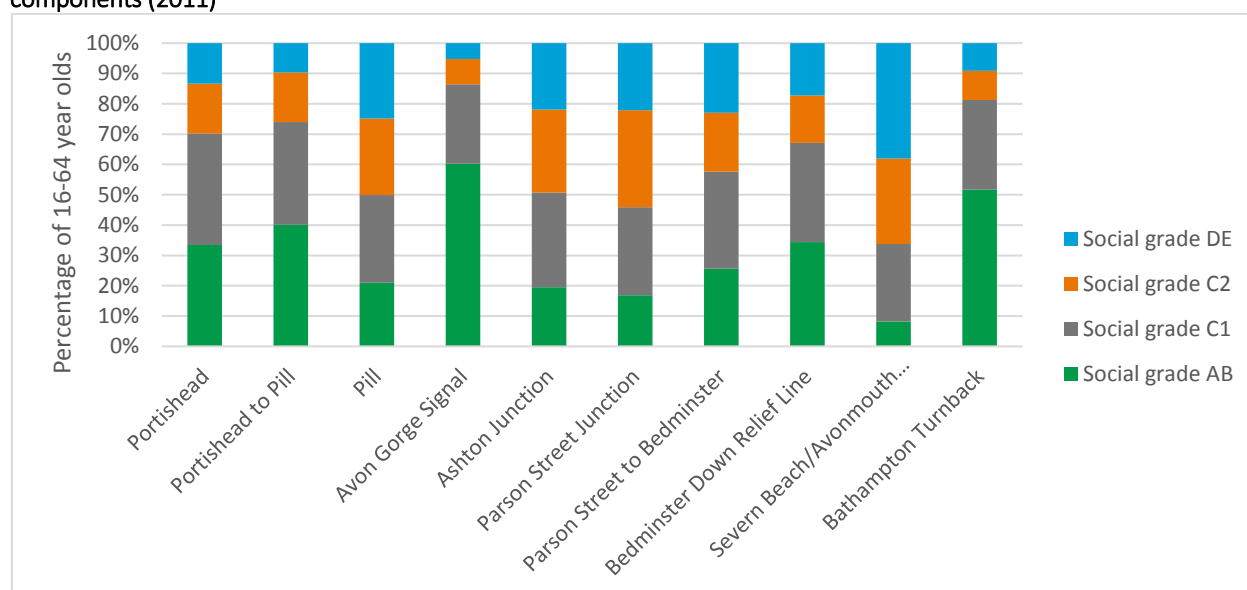
The DCO Scheme

- 4.3.2 In Portishead, approximately one third of residents aged 16 to 64 were classed as AB, one third as C1 and the remaining third was divided between C2 (which accounted for a slightly larger proportion) and DE (Figure 4-3).
- 4.3.3 Between Portishead and Pill the percentage of people in AB social grade was higher than in Portishead at around 40%, with around 33% placed in C1 grade.
- 4.3.4 Pill had contrasting distributions of social grade. The North Somerset LSOA 004C (which includes the proposed Pill Station) classed 11.3% of 16 to 64 year olds as AB, with higher C1 and C2 grade percentages, and 33.8% classed as DE. North Somerset 004D had higher percentage of people classed as C1 (31.7%), followed by AB, C2 and finally DE.
- 4.3.5 Near the Avon Gorge Signal area, 60.2% of the population was classed as AB social grade, 26.2% as C1 and the small remainder as C2 and DE.
- 4.3.6 The majority of the area surrounding Ashton Gate had relatively low percentages of 16 to 64 year olds classed as AB social grade (average 14%) and the rest of the population almost evenly spread among the other grades. However one of the LSOA near Ashton Junction (Bristol 036A) had roughly equal percentages of AB and C1 grades (around 30%) and the rest C2 and DE, with slightly more DE grades than C2.

The Wider Study Area

- 4.3.7 Around Parson Street Junction the percentage of 16 to 64 year olds in AB was lower (13.2 %), with the rest of the population spread quite evenly across the other social grades (although the percentage of people with a DE grade is slightly lower than C1 and C2).
- 4.3.8 Between Parson Street Junction and Bedminster, the two LSOAs had different distributions of social grade. In Bristol 039B only 16.6% of 16 to 64 year olds were in the AB grade, whereas in Bristol 039H 34.4% were in this band. The remaining population in Bristol 039B was spread across the other grades, whereas 34.4% of 16 to 64 year olds in Bristol 039H were in the C1 grade and around 15% were in each of the other grades.
- 4.3.9 Around the Bedminster Down Relief Line, the highest percentages of the population were in social grades AB and C1, while 40.5% of the population in Bristol 040C were in AB.
- 4.3.10 In the LSOA covering the Bathampton Turnback area the highest percentage of AB grade was recorded of all LSOAs in the study area at 51.8%. Social grade DE had a low percentage of 9.1%.
- 4.3.11 Around the Severn Beach/Avonmouth Signalling works, only 9.7% and 6.6% of 16 to 64 year olds were in grade AB for Bristol 008E and 008F respectively, and the grade with the highest percentage of the population was DE at 34.0% and 42.2% for the LSOAs respectively.

Figure 4-3. Social grade classification of 16 to 64 year olds in LSOAs surrounding MetroWest Phase 1 project components (2011)



Source: 2011 Census

4.4 Economy and Employment

Unemployment

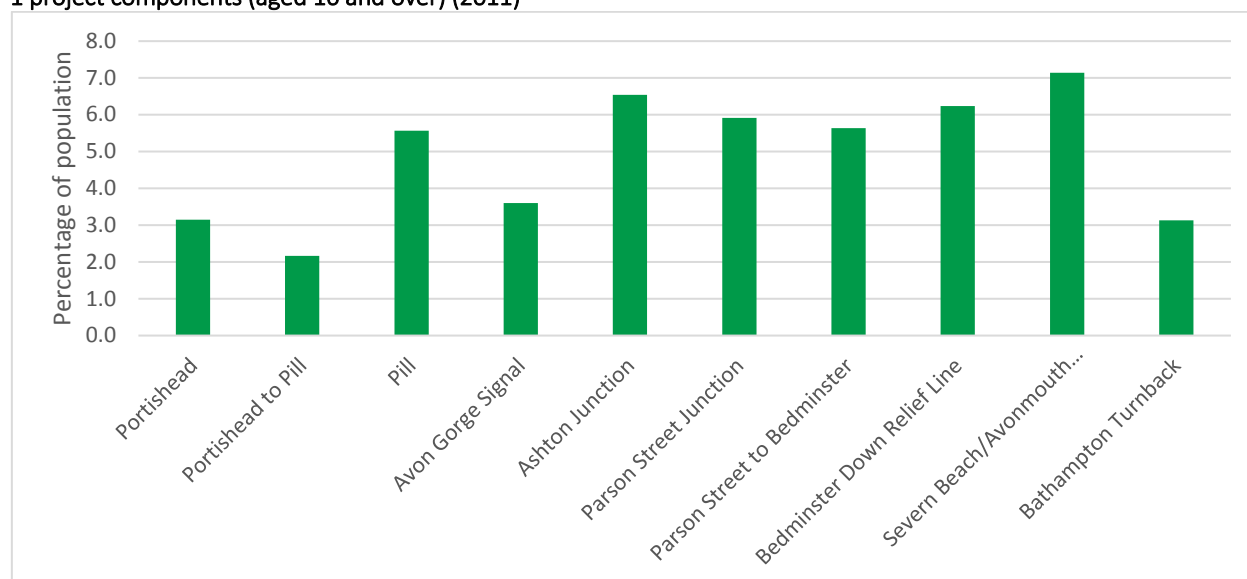
The DCO Scheme

- 4.4.1 The 2011 Census reveals that unemployment rates in the economically active population (aged 16 to 64, including full-time students) in the Portishead LSOAs and those between Portishead and Pill were between 1.8% and 4%, compared to the West of England average of 3.5%. The two LSOAs covering Pill had contrasting unemployment levels. North Somerset 004C (where the proposed station would be located) had 7.8% unemployment, while North Somerset 004D (further east of the proposed station) had 3.8% unemployment.
- 4.4.2 In the area surrounding the Avon Gorge Signal the unemployment rate was 3.6%. In the LSOAs around Ashton Junction unemployment was relatively higher than in Portishead with the highest level in Bristol 036A at 7.9%.

The Wider Study Area

- 4.4.3 Rates of unemployment were mixed in the Parson Street Junction area with Bristol 039A at 4.7% and Bristol 046A at 7.1% (Figure 4-4). Between Parson Street Junction and Bedminster, unemployment rates were 6.0% for Bristol 039B and 5.3% for Bristol 039H.
- 4.4.4 In the LSOAs around the Bedminster Down Relief Line, unemployment measured between 5.1% and 7.9%, with the highest level in Bristol 039E. The LSOA surrounding the Bathampton Turnback was found to have only 3.1% of the economically active population unemployed, whereas at Avonmouth it was relatively high at 7.3%.

Figure 4-4. Percentage of economically active people who are unemployed in LSOAs surrounding the MetroWest Phase 1 project components (aged 16 and over) (2011)



Source: 2011 Census

Income Deprivation

The DCO Scheme

- 4.4.5 Income is a sub-domain reported within the IMD. Data are from 2015. No LSOAs along the DCO Scheme are among the 10% or 20% most deprived LSOAs in England. However, North Somerset 004C in Pill and Bristol 041A in Ashton Junction are among the 30% most deprived LSOAs in the country (see Figure 4-5 Index of Multiple Deprivation - Income Deprivation).

The Wider Study Area

- 4.4.6 There are no LSOAs among the 10% or 20% most deprived in the country within the wider study area. However, Bristol 039B between Parson Street Junction and Bedminster Station, Bristol 039E near the Bedminster Down Relief Line and Bristol 008F near the Severn Beach/Avonmouth Signalling works are among the 30% most deprived LSOAs in the country.

4.5 Physical Health

Index of Multiple Deprivation - Health sub-domain

- 4.5.1 The IMD also includes the Health Deprivation and Disability domain, which assesses the effect of poor physical and mental health and measures morbidity, disability and premature mortality (Department for Communities and Local Government, 2015).

The DCO Scheme

- 4.5.2 Only Bristol 036A near Ashton Junction is among the 20% most deprived in the country for the Health Deprivation and Disability domain (Figure 4-6). All other LSOAs along the DCO Scheme route are in the 30% most deprived category or higher, implying the population is generally in good health.

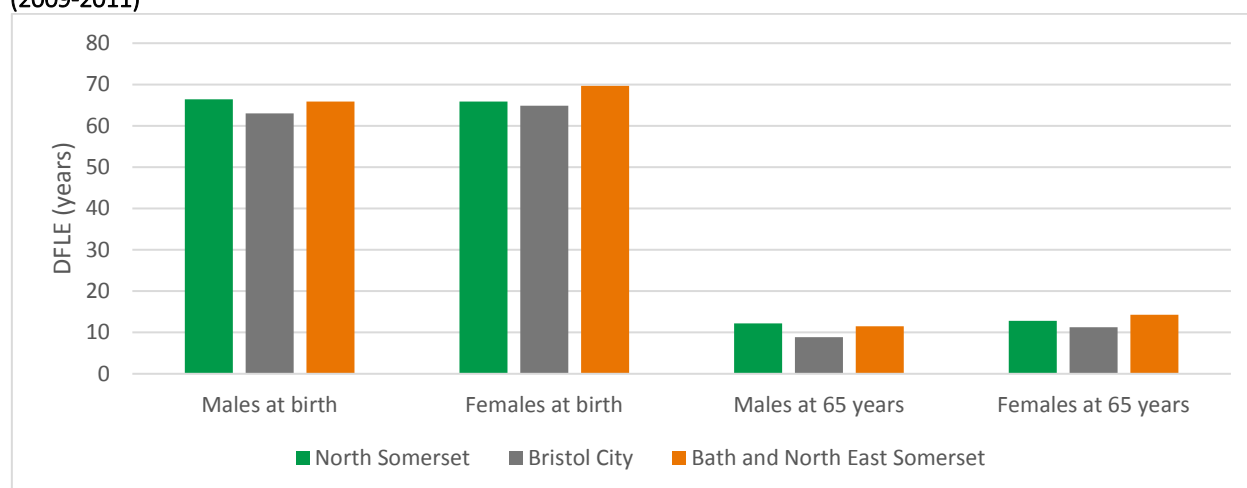
The Wider Study Area

- 4.5.3 The LSOA Bristol 039E near the Bedminster Down Relief Line is among the 10% most deprived LSOAs in England for this domain, and among the 20% most deprived neighbourhoods is Bristol 008F in Avonmouth. All other LSOAs in the wider study area are less deprived.

Life Expectancy – Male and Female

- 4.5.4 Disability-Free Life Expectancy (“DFLE”) is a measure of the number of years a person is expected to live without a disability (defined as a persistent illness or condition that limits day-to-day activities). Here it is assessed at birth and at the age of 65 at the Unitary Authority level (as lower level data were not available), for the years 2009 to 2011.
- 4.5.5 In North Somerset the DFLE at birth was 66.4 years for males and 65.9 years for females. At the age of 65 the DFLE was 12.2 years for males and 12.8 years for females (Figure 4-7).
- 4.5.6 In the Bristol City area the DFLE at birth was 63.0 years for males and 64.9 years for females. The DFLE at the age of 65 was 8.9 years for males and 11.3 years for females.
- 4.5.7 In Bath and North East Somerset the DFLE at birth was 65.9 years for males and 69.7 years for females. At the age of 65 the DFLE was 11.5 years for males and 14.3 years for females.

Figure 4-7: Disability-Free Life Expectancy at birth and 65 years of age in for Unitary Authorities in the wider study area (2009-2011)

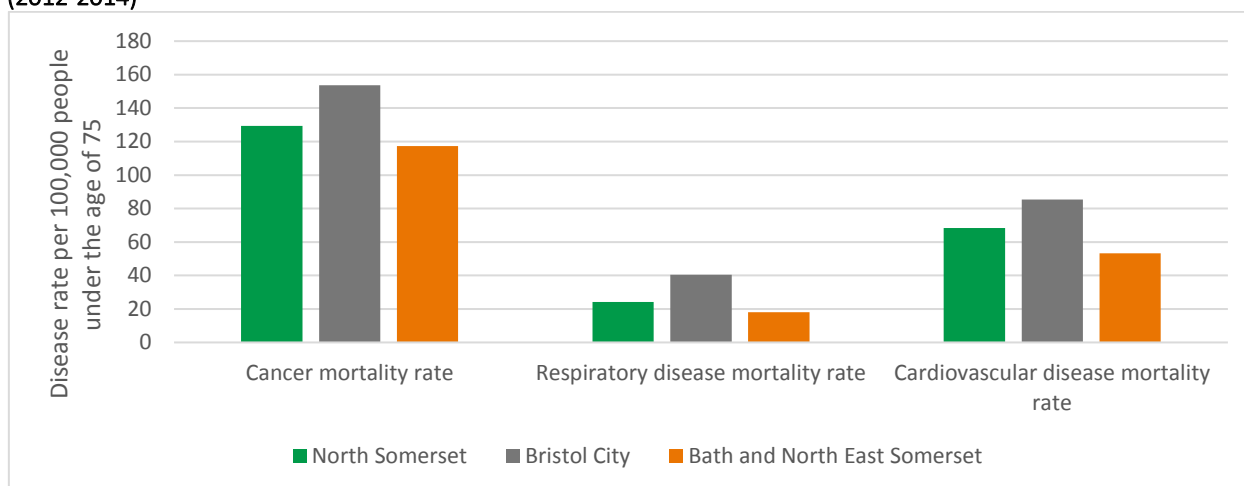


Source: Office for National Statistics, 2009-2011

Rates of Incidence of Diseases

- 4.5.8 Public Health England (“PHE”) has published data on mortality rates from diseases as part of the Public Health Outcomes Framework (Public Health England, 2014a). The rates are age-standardised mortality rates in people under the age of 75 per 100,000 population for the years 2012 to 2014. LSOA-level data were unavailable so Unitary Authority (“UA”) data were used instead. Figure 4-8 suggests that cancer mortality rate was the highest of all three diseases in all UAs, followed by cardiovascular disease. Bristol City had the highest mortality rate for each disease while Bath and North Somerset District Council had the lowest.

Figure 4-8: Rates of incidence of disease in people under the age of 75 for unitary authorities in the wider study area (2012-2014)



Source: Public Health England, 2014a

- 4.5.9 Data on asthma mortality on a Clinical Commissioning Group (“CCG”) level was gained from the Office for National Statistics. The number of deaths due to asthma in 2014 was much higher in Bristol (6) than in North Somerset (3) and Bath and North East Somerset (1).

Childhood Obesity

- 4.5.10 The National Child Measurement Programme data reveal that for the period 2014-2015, prevalence of overweight (including obese) reception class children (aged 4 to 5 years) was similar to the national value in all three UAs, at between 21.6 and 23.5% (Table 4-2). In contrast, the prevalence of overweight (including obese) year 6 children (aged 10 to 11) was better or lower than the national value in North Somerset and Bath and North East Somerset and worse or higher in Bristol City.

Table 4-2: Prevalence of overweight (including obese) children in the wider study area

Region	Percentage of Reception-age children overweight (including obese)	Percentage of Year 6 children overweight (including obese)
England	21.9	33.2
North Somerset UA	21.6	29.4
Bristol City UA	23.0	35.0
Bath and North East Somerset UA	23.5	27.3

4.6 Mental Health

The DCO Scheme

- 4.6.1 According to Public Health England, both North Somerset and Bristol CCGs have a significantly higher prevalence of depression in adults than the national value, while the Bath and North East Somerset CCG has a significantly lower prevalence (Table 4-3) (Public Health England, 2014b).
- 4.6.2 The Harbourside Family Practice GP surgery in Portishead reported a prevalence of depression of 6.7%, which is classified by Public Health England as significantly higher than the national value of 5.8% from 2012 to 2014 (Public Health England, 2014b). This practice is located very

close to the proposed Portishead Station. In contrast, another GP in Portishead (Portishead Medical Practice) reported a prevalence of depression of 5.7%. However, both practices have a lower prevalence than North Somerset CCG as a whole (Table 4-3).

- 4.6.3 In Bristol, Gaywood House and Merrywood Practice near Ashton Junction reported a significantly higher prevalence of depression than the national value (8.2% and 7.9% respectively). These prevalence levels are both higher than the prevalence for Bristol CCG as a whole (Table 4-3).

The Wider Study Area

- 4.6.4 Around Bedminster, The Southville Surgery reported the highest prevalence of depression, at 9.8%, while The Malago Surgery and Bedminster Family Practice also reported high prevalences at 8.3% and 8.0% respectively.
- 4.6.5 Around Bathampton Turnback, Fairfield Park Health Centre reported a significantly higher prevalence than the national value at 9.0%.
- 4.6.6 The Avonmouth Medical Centre reported a significantly lower prevalence of depression than the national value at 4.6%.

Table 4-3: Indication of mental health in the wider study area

Geography	Prevalence of depression in adults (aged 18 or over)	Comparison with the national value	Percentage of GP practices in CCG reporting depression prevalence significantly higher than the national value
England	5.8%	N/A	N/A
North Somerset	7.0%	Significantly higher	61.5%
Bristol	6.2%	Significantly higher	50.9%
Bath and North East Somerset	5.6%	Significantly lower	22.2%

4.7 Physical Environment

Index of Deprivation - Outdoor Living Environment

The DCO Scheme

- 4.7.1 The outdoor living environment sub-domain of the IMD measures air quality, road traffic accident occurrence and similar issues (Department for Communities and Local Government, 2015). Bristol 036A (around Ashton Junction) is among the 10% most deprived neighbourhoods for this sub-domain, but all other LSOAs along the DCO Scheme are in the 30% most deprived category or above (Figure 4-9).

The Wider Study Area

- 4.7.2 Bristol 039E near the Bedminster Down Relief Line is among the 10% most deprived neighbourhoods for this sub-domain and the two other LSOAs near the Bedminster Down Relief Line (Bristol 040B and 040C) are among the 20% most deprived, along with one LSOA between Parson Street Junction and Bedminster Station (Bristol 039H). All other LSOAs within the wider study area were less deprived.

Crime (Actual and Perceived)

- 4.7.3 The crime domain of the IMD measures personal and material victimisation including violence, burglary, theft and criminal damage (Department for Communities and Local Government, 2015). While the areas along the DCO route appear to have lower risk of crime, areas in Bristol, areas near the Bedminster Down Relief and between Parson Street Junction and Bedminster are among the least 10% and 20% most deprived for the crime sub-domain.
- 4.7.4 Perceived risk of crime is not recorded by the Census at LSOA or regional level. According to Office for National Statistics data for the year ending March 2015, 59.5% of the population of Avon and Somerset strongly agree or tend to agree that police and the local council are dealing with crime issues (Office for National Statistics, 2015). This is slightly lower than the national average at 62.1% and the average for the South West at 60.6%.
- 4.7.5 Table 4-4 details the incidence of race-motivated hate crime between 2010 and 2014 for the whole of the Avon and Somerset police force area, including the three local authorities relevant to this study as well as Somerset and South Gloucestershire (Avon and Somerset Constabulary, 2015).

Table 4-4: Incidence of race-motivated hate crime in Avon and Somerset police force area between 2010 and 2014

Year	Race-motivated hate crime incidents
2010	1,395
2011	1,288
2012	1,071
2013	1,114
2014	1,366

- 4.7.6 Table 4-5 shows how the incidence of different types of hate crime varied by Unitary Authority in 2014 (please note that some crimes may be flagged as being of more than one type, for example a single crime could be related to both faith and disability). Bristol had the highest incidence rate for all hate crime and for each type of hate crime. Race-related hate crime was by far the most common type in each Unitary Authority (Avon and North Somerset Constabulary, data procured via Freedom of Information route).

Table 4-5: Incidence of hate crime across the Unitary Authorities in 2014

Unitary Authority	All Hate	Disability	Faith	Race
North Somerset	136	11	6	108
Bristol	948	46	63	791
Bath and North East Somerset	153	16	2	115

- 4.7.7 The number of race-motivated hate crime incidents reported in 2014 were 791 in Bristol, 108 in North Somerset, and 115 in Bath and North East Somerset (Avon and Somerset Constabulary, 2015b). As a percentage of the population, these figures indicate levels less than 2%.

Green Spaces and Open Spaces

The DCO Scheme

- 4.7.8 The Vale Park in Portishead, bounded by the disused railway line to the north, is designated as Amenity in North Somerset Adopted Local Plan and Local Green Space on North Somerset's emerging proposals map.
- 4.7.9 Between Portishead and Pill, allotment gardens lie on the eastern side of Sheepway, north of the disused railway line. South of the disused railway line, playing fields are located to the east of Portbury, south of the M5.
- 4.7.10 The land between Yew Tree Gardens and Hardwick Road, Pill and Victoria Park, Pill, are designated as Amenity in North Somerset Adopted Local Plan and Local Green Space on North Somerset's emerging proposals map. Crockerne Pill (which includes Pill viaduct) and Watchhouse Hill (to the east of Pill) are also designated as Local Green Space on North Somerset's emerging proposals map. Common Land and Town or Village Greens exist to the north and east of Pill, including Pump Square, Victoria Park and Waterloo Wharf and The Point, Chapel Pill. Open space at Ham Green Hospital is designated an Unregistered Park and Garden in North Somerset Adopted Local Plan and North Somerset's emerging proposals map. In addition to these designated sites, Pill also has a playing field and playground south of the railway line on Hardwick Road and a playground near Water Lane west of the railway line. In Ham Green a Cricket Ground is located south of Pill Tunnel and there is a playground near Fitzharding Road south of the railway line.
- 4.7.11 In the Avon Gorge area, Leigh Court Registered Park and Garden is located adjacent to the railway line on the western side and the Leigh Court house is a business venue. Other ecological designations in this area are Leigh Woods National Nature Reserve, Avon Gorge Woodlands Special Area of Conservation ("SAC") and Avon Gorge Site of Special Scientific Interest ("SSSI"). Leigh Woods is owned by the National Trust is open to the public, and includes land designated as the Avon Gorge Woodlands SAC and SSSI.
- 4.7.12 Closer to Ashton Junction, Ashton Court Registered Park and Garden is located adjacent to the western side of the railway line. A sports ground, several allotment gardens and Gore's Marsh park and playground are located in close proximity to the railway line in the Ashton Junction area.
- 4.7.13 North Somerset Council has drawn up area profiles of current provision of open space within the District, to accompany its Developer Contributions Draft Supplementary Planning Document (January 2016). In Portishead there is currently an under supply of conservation sites and woodland, and sufficient supply of formal park and public garden and neighbourhood open space. Pill has an under supply of conservation sites, formal and public garden and woodland but sufficient neighbourhood open space.

The Wider Study Area

- 4.7.14 Informal and formal green spaces, seasonal and fixed active sports space, natural green space, young persons' space and children's play areas exist close to the Portbury Freight Line section that runs through the Bristol City Council area and to Parson Street Junction and Bedminster Station.
- 4.7.15 In the Bathampton area accessible natural green space, park and recreation ground, outdoor sport pitches and children's play space exist.
- 4.7.16 Bedminster Down Relief Line is located next to Victoria Park, a large area of open space.

Townscape and Local Character

- 4.7.17 The landscape of the study area is described in detail in the PEI Report Chapter 11 Landscape and Visual Impact. This section provides an overview of landscape character areas.
- 4.7.18 Commercial Portishead has a predominantly urban character with commercial 'box' units, modern apartments, car parking areas and managed amenity landscaping of trees and shrubs. Units are quite spread out with little connectivity between them. There are also large areas of undeveloped land with unmanaged grassland and scrub. Views are variable, with open views across the car parks and areas of grassland and scrubland, and constrained by industrial units in places.
- 4.7.19 Residential Portishead consists of residential estates with occasional amenity landscape features such as The Vale Park and Trinity Primary School and associated playing fields. The residential properties are modern and of brick construction. Views are generally enclosed due to tightly packed properties, narrow streets and small front gardens. Occasional areas of amenity landscape, such as The Vale Park offer more open views.
- 4.7.20 Sheepway is predominately rural and is characterised by small, regular fields bounded by a mix of fences and hedgerows with occasional mature trees. Settlement is generally limited to small, traditional stone farmsteads and rendered residential properties, which tend to cluster around the Sheepway road. There are a number of listed buildings in the area. To the west, the edge of Portishead is visible, slightly diluting the rural feel, although the Portbury Wharf Nature Reserve is present on the edge of the residential area. To the south, the Portbury Hundred and M5 are generally screened by vegetation, however, they are clearly visible to the east of the character area. Footpaths and Sustrans cycle paths provide a recreational facility in this character area. There are patches of woodland identified in the National Forest Inventory to the north and south of the DCO Scheme centreline.
- 4.7.21 Royal Portbury Dock has a predominantly industrial character, with industrial units and an extensive car store area on the west side of the railway. The units are generally large, box developments. Associated amenity landscape, embankments, as well as poorly managed grassland and woodland/shrub belt contribute to the character. To the east of this character area, the visually intrusive and elevated M5 stretches above the cycle path.
- 4.7.22 Pill is a village with a compact, enclosed character, resulting from small, traditional properties, undulating landform and narrow roads. The properties tend to be brick and render, with stone detailing. The red brick viaduct is a dominant feature of this character area, which contributes to the sense of history. Adjacent to the viaduct is the village green, with its grass, perennial planting beds and mature trees. Elsewhere, vegetation is limited to front gardens and woodland and scrub alongside the railway line. The railway line passes through the village, and is overlooked from the two bridges which cross it. To the west of this character area, there are views to the dominant, elevated M5.
- 4.7.23 The route section between Pill and Ashton Gate is generally rural in character with scattered properties. The railway crosses open farmland between Ham Green and Leigh Court, and then turns southwards to follow the western shore of the Avon Gorge. The landscape of the gorge is characterised by the steeply wooded slopes, the tidal river, and the urban fringe of Bristol and the A4 (Portway) on the eastern shore. The railway passes underneath the Clifton Suspension Bridge, a Grade I listed structure and an iconic landmark in Bristol. The route emerges through the gorge into the more open landscape around Bower Ashton, with recreational grounds, allotments and parkland of Ashton Court.
- 4.7.24 The railway passes in the outskirts of Bristol in the Ashton Gate area. Here the road network is more developed and the area has a complex urban character with industrial estates,

residential areas, and the Alderman Moores allotments. Ashton Vale has a strong urban-fringe feel with wide distributor roads, 'box' units with predominately commercial and office uses and associated metal security fences, lighting and car parks.

Housing and Access to Services

The DCO Scheme

- 4.7.25 The IMD *Geographical Barriers* sub-domain of barriers to housing and services highlights several neighbourhoods which are among the 10% and 20% most deprived neighbourhoods in England in terms of their physical proximity to local services (Figure 4-10). The Avon Gorge represents a material geographical barrier to North Somerset 004A. North Somerset 006F (between Portishead and Pill) is among the 20% most deprived, again reflecting its geographical position and restricted transport links to Portishead and Bristol. All other LSOAs along the DCO Scheme route are less affected.
- 4.7.26 In Portishead, the NHS Marina health centre and the Haven Lodge Care Centre, lodging about 108 residents with various care categories such as physical disability, dementia, old age and young adults are located adjacent to the proposed new access to Portishead Station forecourt.

The Wider Study Area

- 4.7.27 In the wider study area, Bath and North East Somerset 010E (Bathampton Turnback) is among the 20% most deprived LSOAs in England for the 'Geographical Barriers' IMD sub-domain and no LSOAs were among the 10% most deprived.

4.8 Transport and Accessibility

- 4.8.1 The main highway network in the area is dominated by the M5. Junction 18 in Avonmouth connects to the A4 into Bristol along the north side of the River Avon and Junction 19 at Gordano connects with the A369 between Portishead and Bristol along the south side of the River Avon. Junction 18a on the M5 serves the M49 for South Wales. The B3128 from Clevedon and B3130 from Nailsea provide more circuitous routes into Bristol via the A370 from Weston-super-Mare. The Long Ashton Park and Ride lies to the south west of Bristol.
- 4.8.2 The A370 connects with the A369, Brunel Way and the A3029 Winterstoke Road at a complicated junction in Ashton Gate. Brunel Way links with the western end of the A4 Hotwells Road and Bristol city centre on the northern side of the River Avon while the A3029 Winterstoke Road links to the south with the A38 between Bristol and Taunton in the vicinity of Parson Street railway station.
- 4.8.3 The main railway network centred on Bristol provides mainline services up to London, to the Midlands, west into Wales and south west to Taunton, Exeter and Plymouth. The local railway network within Bristol comprises the Severn Beach / Avonmouth / Bristol Temple Meads, Henbury to Bristol Temple Meads, and local stations between Bristol Temple Meads and Bath Spa.
- 4.8.4 There is an operational railway between Royal Portbury Dock and the south west mainline between Bristol Temple Meads and Exeter which currently is only open for freight. There is an existing level crossing over the operational railway on Ashton Vale Road which connects the A3029 Winterstoke Road and the Ashton Vale Industrial Estate. The industrial estate is bounded by the railway to the east, the A370 to the north, the Long Ashton Park and Ride to the west, and allotments and open land to the south.

There are two long distance cycle routes, public rights of way, bridleways and permissive paths that cross or run close to the proposed DCO Scheme. There are two Sustrans National Cycle Network ("NCN") routes crossing or close to the DCO Scheme. NCN 26 uses parts of the

disused railway corridor between the M5 overbridge and Royal Portbury Dock Road overbridge under temporary licence from Network Rail. At the Royal Portbury Dock Road overbridge, Marsh Lane overbridge and M5 overbridge the route diverts off the bridleway on to permissive paths to go under the road bridges. NCN 41 crosses the River Avon alongside the southbound carriageway of the M5 motorway bridge and continues through Pill and along the River Avon Tow Path towards Bristol. There are also several footpaths and bridleways criss-crossing the countryside.

SECTION 4

Stakeholder Engagement

- 5.1.1 The determinants of health are diverse and the assessment of the DCO Scheme on health is by nature qualitative. As part of the assessment, the developer engages with the stakeholders to provide feedback on the study approach, community profiling and baseline analysis, and on project matters that may raise concerns about health.
- 5.1.2 Two types of stakeholders are involved in the process, (a) key informants, such as the North Somerset Council and Bristol City Council Health and Equalities teams; and, (b) wider stakeholders, including members of the public, non-governmental agencies and community groups and statutory authorities.
- 5.1.3 A meeting for the key informants was held on 12 January 2016 to inform them about the DCO Scheme and to discuss the potential sources of further information, refinement of the assessment methodology, as well as further leads on community groups who should be involved in the stakeholder engagement process.
- 5.1.4 This document is now presented for stakeholder consultation as part of the statutory Section 42 consultation for the DCO scheme. The responses will be reviewed and this HIA will be revised in the light of consultations prior to submission to the Planning Inspectorate with the DCO Application.

SECTION 6

Mitigation

- 6.1.1 An overview of measures incorporated into the DCO Scheme is provided in the PEI Report Chapter 4 Description of the Proposed Works. Key features that have a bearing on health and well-being are summarised below.
- 6.1.2 Overarching design objectives incorporated into the DCO Scheme include:
- ensuring that the new stations are accessible by all modes of transport and in particular, facilitates walking, cycling and other public transport trips to and from the stations;
 - improving the quality of transport infrastructure along the DCO Scheme to enhance the local environment, quality of life and social well-being; and
 - ensuring that any adverse localised transport impacts are minimised through supporting measures.
- 6.1.3 The public realm in and around Portishead Station is being designed to facilitate multi-modal interchange and minimise conflict between travellers in private cars, public transport by bus and taxi, cyclists and pedestrians. Some of the main features being proposed are described below.
- New car park (car park A) with bus and taxi drop off and disabled parking at Portishead Station;
 - New overspill car park (car park B) to the west of the new station;
 - Provision of crossings at Phoenix Way and Quays Avenue in Portishead;
 - Provision of a toucan crossing south west of junction with Newfoundland Way in Portishead and at Quays Avenue;
 - Extension of shared footway and cycleway on the west side of Quays Avenue in Portishead;
 - Replacement of the traffic island with a pedestrian island at Quays Avenue (between the proposed station and Serbert Way in Portishead);
 - Provision of a raised table with priority for pedestrian and cycling movements at Quays Avenue junction with Conference Avenue in Portishead;
- 6.1.4 Portishead station is being designed to avoid stepped access from the car park and it is proposed to provide washroom facilities for disabled users.
- 6.1.5 Minor modifications are proposed to the footpaths and bridleways along the disused section of the railway to avoid the need to divert them.
- Modifications to the existing uncontrolled bridleway crossing point on Royal Portbury Dock Road to improve safety for equestrians crossing the road;
 - The NCN26 under the Royal Portbury Dock Road and Marsh Lane will be widened slightly and separated from the railway by security fencing;
 - Construct a new bridleway under the M5 between Portbury and Pill to separate equestrians from the railway alignment and maintain the existing NCN26 under the M5 for cyclists and pedestrians.
- 6.1.6 The design of pedestrian and, or cycle ramps is being designed for disabled access under the Equalities Act, (2010), including shallow gradients, ramped access and lighting.

- 6.1.7 The DCO Scheme includes a 2 m high noise barrier in Portishead on the south side of the railway corridor between the new station and Trinity Primary School footbridge to minimise the effects of operational noise on residents.
- 6.1.8 At the station platforms, directional speakers (point sources) and related measures to reduce noise related disturbance for line side neighbours are being developed in the design.
- 6.1.9 The lighting design for the station buildings and station car parks are being designed to take into account site specific issues such as the location of luminaires, their light distribution, and the selection of lamps with appropriate luminaires to reduce glare and light spill for the lineside neighbours.
- 6.1.10 The successful contractor(s) will be required to comply with the Code of Construction Practice ("CoCP"), a document that will provide an over-arching framework to control adverse effects during construction, including dust and air quality, ecology, landscape including visual clutter and the protection of amenities near construction sites, noise, the risk of pollution of soils and water resources, and pests and vermin. The CoCP will be prepared and submitted to the Planning Inspectorate as part of the DCO Application.
- 6.1.11 The contractor(s) will be required to produce a Construction Environmental Management Plan ("CEMP") to demonstrate how they will comply with the CoCP and implement best practicable measures ("BPM") at all the construction sites and compounds to mitigate the adverse effects of construction on people, communities and the environment.
- 6.1.12 Works associated with the new railway service will improve safety for pedestrians and cyclists, thus potentially decreasing the chances of road accidents and related injuries.
- 6.1.13 As indicated in Chapter 7 Air Quality and Greenhouse Gases of the PEI Report, one of the Scheme's supporting objectives is to contribute to reducing traffic congestion on the Portishead, Bath and Avonmouth, and Severn Beach arterial corridors. The new railway services will reduce emissions per passenger kilometre travelled compared with equivalent road transport through modal shift from car to rail. No additional mitigation is required for air quality or greenhouse gases during the operational phase.
- 6.1.14 Increase in ambient noise is likely for the residential receptors from operational traffic, including traffic to arrive into the station. The DCO Scheme will follow Network Rail standards on noise levels from public address systems to address noise impact at station platforms (and potentially to lineside neighbours).

SECTION 7

Assessment of Effects

7.1 Construction Phase

Portishead Station

- 7.1.1 The proposed construction works are likely to cause disruption in terms of construction noise, lighting, pedestrian safety, construction traffic, and temporary blight. The health determinants that are likely to be altered are *construction noise, air quality and emissions, light pollution and access to services*.
- 7.1.2 The Haven Lodge Care Centre houses about 108 vulnerable people. A number of 20 rooms at the Haven Lodge Care Centre currently face the Harbour Road-Phoenix Way roundabout and during construction will face onto the highway modification works and the construction compound for Portishead station. The Marina Health Centre/Harbourside Family Practice provides a range of clinical services to over 9000 people. (Sensitivity=High).
- 7.1.3 Staff and residents at these health facilities may be adversely affected by construction noise, for example due to annoyance, stress and at residential premises, sleep disturbance (Magnitude=Minor to moderate). The significance of the effect for construction disturbance on health determinant is assessed to be a **short term, moderate to large negative effect** at a worse case during peak noisy activities, but could be **slight** or **neutral** depending on the average construction noise levels and noise insulation at these properties.
- 7.1.4 The highway modification works, the temporary construction compound and construction of Portishead station have the potential to increase dust in the air, which in turn could be a discomfort for many people, and disproportionately affect the young, the elderly, and people with respiratory problems. There are a range of good housekeeping measures to control dust, such as regularly watering of bare surfaces and containment of stockpiles. The CoCP will require the contractor to implement a dust control plan. The significance of effect of construction dust on human health is assessed to be a **short term slight negative effect**.
- 7.1.5 Temporary night-time lighting around the highway modification works at the proposed construction compound in front of the new Portishead station and at the construction sites for the new car parks and station could affect vulnerable residents through sleep disruption. The significance of the effect of light pollution is assessed to be a **short term slight/moderate negative effect**, as a worse case, reducing to **slight** or **neutral** depending on the intrusion of light into the building and the sensitivity of residents to light pollution.
- 7.1.6 Disruption to access and navigating around the construction sites and compounds in the vicinity of the Marina Health Centre and Haven Lodge Care Centre could affect patients accessing the service, particularly those with physical disability, which in turn could cause stress and anxiety for the patients. The significance of the effect of the construction works on the accessibility to services for vulnerable people is assessed to be a **short term slight/moderate negative effect**.
- 7.1.7 Construction works around the proposed Portishead station may result in temporary blight and thus affect the local character. The impact of the reduced amenity value on the health determinant has not been evaluated.

Trinity Primary School Pedestrian and Cycle Bridge

- 7.1.8 The proposed construction works are likely to cause disruption in terms of noise, construction traffic, temporary blight and potential safety risk along this stretch of the route. The health determinants that are likely to be altered are *noise and vibration, crime and safety, and access to green space*.
- 7.1.9 Construction noise, especially piling for the bridge foundations, could result in annoyance or stress for pedestrians, nearby residents and school children. The sensitivity at this site is high due to the school and nearby housing and the magnitude of noise impact is major negative in the short term i.e. during piling works. The significance of the effect for the noise health determinant is assessed to be **short term, large negative** during the piling works but reducing to **short term, slight negative** during the remaining construction works.
- 7.1.10 The existing informal crossing is heavily used by children going to and from Trinity Primary School and is also an important link for residents living along the north and south side of the railway line and is well used by dog walkers and cyclists (potentially for leisure and physical exercise). During non-school hours the playground along Tansy Lane may be used by children.
- 7.1.11 Access for construction plant and workers to the new bridge will be from the temporary construction compound within what will become the car park in front of the new Portishead station and along the railway line.
- 7.1.12 During the construction of the new bridge, it will be necessary to divert people from the existing informal crossing either to a temporary crossing further east or to the west and via the highway network to avoid conflict between construction activities and pedestrians and cyclists.
- 7.1.13 Careful consideration will be given to the separation of construction works and pedestrians to minimise the risk of accidents. Road safety, particularly with the movement of construction vehicles, for school children (Sensitivity=High) when they walk or cycle to school will be taken into account in developing the traffic management plan for construction traffic. The CoCP will include measures for pedestrian and cyclist safety (including children), which would reduce the identified effect (Magnitude=Minor negative) on road safety. Early construction of the new bridge would reduce the risk of accidents during the remainder of the construction period. The significance of the effect of construction works on public safety is assessed to be **short term slight to moderate negative**.
- 7.1.14 The temporary severance of the informal crossing over the railway during the construction of the bridge may dissuade people from taking their usual leisure walks or brisk exercise. This is assessed to be a **short term neutral to slight negative effect**.

Portishead to Pill

- 7.1.15 The proposed construction works along the disused section of the railway and activities at the construction compounds are likely to cause disruption due to noise, construction traffic, temporary blight and potential changes in air quality. The health determinants considered are *noise and vibration, air emissions and dust, light pollution, access to green space, open space and physical activity*.
- 7.1.16 Although largely rural and only a few residential buildings are located along this part of the route, some properties are located close to the railway corridor and construction compounds at Sheepway and The Portbury Hundred off Sheepway and Station Road. The health effects for local residents may range from annoyance to sleep disturbance. The increase in ambient noise levels for this stretch may peak between 15 dB(A) and 20 dB(A) for properties close to the

- construction sites, representing a **short term neutral to slight negative effect** on human health for line side neighbours and the residential receptors near the construction sites.
- 7.1.17 The construction works are likely to increase dust emissions along the disused railway corridor, which will be mitigated by the contractor who will be required to implement a construction dust control plan. The residual effect of air quality on the health determinant for local residents is assessed to be a **short term neutral to slight negative effect**.
- 7.1.18 Much of the construction works along the disused section will be undertaken during daylight hours. There may be a need for temporary lighting to extend the working day during the winter and at the construction compounds. However, any temporary lighting would be designed to minimise glare and light spill as far as possible. While the introduction of night-time lighting in a rural area with few other sources of lighting could cause disturbance and loss of sleep for nearby properties, the magnitude of the impact is considered to be minor or negligible given the scope for mitigation, distance between properties and the construction sites, and screening afforded by existing hedgerows and trees. The significance of the effect of night-time lighting on residents is assessed to be **neutral**.
- 7.1.19 The proposed works along the Sustrans NCN 26 and bridleways may affect the amenity of these routes and accessibility for cyclists, pedestrians and equestrians during construction. While appropriate alternative routes will be provided during construction, some users may be discouraged from undertaking outdoor activities. The introduction of construction compounds and construction areas will alter the landscape and visual amenity features along this section which may affect the sense of well-being of local residents. Overall, the significance of the effect of works on the public rights of way ("PRoW") and enjoyment of the countryside is assessed to be a **short term slight negative effect**.

Portbury Junction to Pill Junction

- 7.1.20 The proposed construction works are likely to cause disruption in terms of noise, construction traffic, temporary blight and potential changes in air quality at the proposed station site and along the stretch of the operational railway between Pill and Ashton Junction. The health determinants considered are *noise and vibration, air quality and emissions, light pollution, access to services, access to green space, open spaces and physical activity, townscape and quality of the local environment, and employment and access to work and local business*.

Lodway/Avon Road Underpass

- 7.1.21 A construction compound is proposed at Lodway Farm, located south of the railway corridor and west of Pill, with access via three haulage routes, from Marsh Lane and M5 underbridge, north via the port, and via Pill through The Breaches. This compound could be used as a location to store temporarily waste ballast coming out of the disused section and new ballast to be taken onto the disused section. It may also be used to support the demolition and construction of Avon Road underbridge and associated embankment stabilisation works. While efforts would be made to maximise rail haulage, construction traffic to the compound, especially via Pill may cause disruption and severance in the village. The health determinants that are likely to be affected are *noise and vibration, air quality and emissions, light pollution, and access to green space, open spaces and physical activity*.
- 7.1.22 In Pill there is a higher percentage of people over 65 years of age compared with other areas in the vicinity of the DCO Scheme and the elderly are considered to have high sensitivity to health impacts.
- 7.1.23 Construction noise is likely to be arise at this site, including potentially noisy activities such as the demolition of Avon Road underbridge, piling works to stabilise the Avon Road earthworks and handling of aggregate (namely the ballast). Night-time works may be required for example

for the railway formation in this section. Construction noise could cause annoyance, stress and sleep disturbance for nearby residents and users of NCN 26 and bridleway. The significance of the effect for the noise health determinant is assessed to be a **short term large negative effect**.

- 7.1.24 Various activities are likely to cause construction dust in the vicinity of Lodway and Avon Road underbridge, including demolition of the bridge and garages off Avon Road, the embankment stabilisation earthworks, and the handling of materials at the construction compound. The movement of construction vehicles is unlikely to affect the local air quality. The significance of the effect of construction on air quality and emissions is assessed to be a **short term slight to moderate effect**, depending on the construction phase.
- 7.1.25 Night-time lighting may be required at the Lodway construction compound and along the railway in this section to illuminate working areas and for security. Night-time lighting may affect nearby residents, particularly at houses on The Breaches which back onto the compound, through sleep disturbance. However, temporary lighting can be designed to reduce glare and light spill, and existing vegetation may help to screen views of night-time lighting. The significance of effect of construction lighting on health is assessed to be a **short term neutral to slight negative effect** for the residents in the locality.
- 7.1.26 The construction compound at Lodway Farm would temporarily alter the landscape and views of green space for local residents living off The Breaches and users of the NCN 26 which would be temporarily diverted across Jenny's Meadow. These changes may lead to a range of responses, from reduced physical activity to limited social interaction - all of which could lead to a reduced sense of well-being and change in mood (particularly for the vulnerable group such as the elderly). The significance of effect is assessed to be a **short term slight negative effect** on the local residents.

Pill Station

- 7.1.27 The construction works in the vicinity of Pill Station and car park include: the demolition of No. 7 Station Road; the reconstruction of the railway station in Pill on the southern platform, including the new forecourt and entrance, the ramped access to the platform, the slope stability works to Hardwick Road Cutting, and building works; and activities at two small construction compounds, one at the site of the proposed pill station car park and the other in the proposed forecourt of the station. The railway works through Pill are likely include night-time and weekend working, due to the need for night-time possessions and weekend possessions to minimise impacts on the existing freight train operations. The health determinants that are likely to be affected are *noise and vibration, air quality and emissions, light pollution, access to services such as shops, health or social services and crime and safety*.
- 7.1.28 The construction activities in the vicinity of Pill station are likely to increase day time and night-time ambient noise levels, with peak levels increasing by 15 dB(A) to 20 dB(A) over ambient levels of about 50 dB(A). The increase in noise levels may cause discomfort in terms of sleep disturbance, self-reported disturbance such as insomnia for residents near the proposed construction sites. Census data point to an increased percentage of the elderly age group residing in Pill, so the area may have an increased number of people from this vulnerable group population (Sensitivity=High). The health impact on local residents is assessed to be **short term moderate to large negative effect**.
- 7.1.29 The works in and around Pill Station require demolition of property, earthworks to the cutting slope, breaking out of the existing platform, concreting works, etc, all of which contribute to construction dust. Construction dust generated at the station level is more likely to affect residents on Monmouth Road which is almost at the same level as the station. Residential properties off Sambourne Road and Hardwick Road are at higher elevation than the station

and screened by vegetation at the bottom of their gardens. Construction dust can be an irritant, for example if blown into the eyes, but can be a problem for people with respiratory problems. The significance of the effect of the works on air quality and emissions is assessed to be a **short term slight negative effect**.

- 7.1.30 If required, temporary lighting at the construction compounds on the proposed Pill station forecourt and at the proposed Pill station car park, and night time lighting related to construction works at the Pill Station site, may cause discomfort to residents such as sleep disturbance (Sensitivity = Moderate). Areas potentially affected may include Monmouth Road, Monmouth Court, and Station Road. Mitigation measures can reduce the impact of lighting through appropriate lighting design and existing vegetation can help screen lighting. The significance of the effect of light pollution on the wellbeing of residents is assessed to be a **short term slight negative effect**.
- 7.1.31 The concentration of construction works in and around the proposed Pill station and car park sites, as well as the haulage routes through Pill into the Avon Road area and the Lodway construction compound, will potentially affect the ease of access for residents to existing services, such as shops and services in the village. These effects could be mitigated to some extent through traffic management and community consultations. Nonetheless, the impact of the construction works on accessibility could affect the mood and well-being of residents, particularly those who are elderly or unwell. The significance of the effect of construction works on the accessibility to services is assessed to be a **short term moderate negative effect**.
- 7.1.32 In a similar vein, the circulation of construction traffic through Pill, including heavy goods vehicles, could pose a risk to other road users, cyclists and pedestrians, given the narrow winding streets, steep gradients and lack of parking. The NCN 26 along the railway will be closed and probably temporarily diverted through Pill, increasing the exposure of cyclists to heavy construction traffic. Traffic management during construction can reduce the risks to road users. The significance of the effect of construction traffic on the safety of other road users is assessed to be a **short term large negative effect**.

Pill Viaduct to Pill Junction

- 7.1.33 The construction works along this section include repair works to Pill Viaduct, stabilisation of the Mount Pleasant embankment on the east side of the viaduct and construction of the new Pill Junction where the double tracking will merge to single tracking before Pill Tunnel. Much of the works will be undertaken from the railway itself, maximising the use of rail haulage. The railway works for the track formation will require night-time working to avoid impacting on the freight train movements, although the repair works for Pill Viaduct will be done during a month long possession, possibly in August 2019. The health determinants that are likely to be affected are *noise and vibration, air quality and emissions, and light pollution*.
- 7.1.34 The construction works in this section will raise ambient noise levels in this built up area of Pill. Peak levels may reach 20 dB(A) above ambient levels although average construction noise levels will be much lower. Night-time working will be required for the track formation works, to avoid affecting the freight train movements. The works on the viaduct and embankment are at elevation so the noise may carry further compared with other sections of the route. Construction noise can cause annoyance, stress and sleep disturbance. The significance of the effect of construction noise on the well-being of nearby residents is assessed to be a **short term large negative effect**.
- 7.1.35 The construction works are likely to raise dust, in particular the Mount Pleasant earthworks stabilisation, which back onto a small number of private gardens. The significance of effect of construction dust on the well-being of nearby residents is assessed to be a **short term slight negative effect**.

- 7.1.36 If temporary lighting is required along this section of the DCO Scheme it may increase light pollution in an urban setting where night-time lighting already exists. Temporary lighting can be designed to minimise glare and light spill, which are important considerations for works to an elevated section. Overall, given the urban setting, the significance of the effect is assessed to be **neutral**.

Pill Junction to Ashton Junction

Ham Green

- 7.1.37 The proposed construction compound at Ham Green is an open space near Ham Green Lake which is used for fishing. The Penny Brohn Cancer Centre is located off Chapel Pill Lane near the proposed entrance to the construction compound. The temporary intrusion of construction works could lead to reduced sense of well-being and change in mood for visitors to the area. The significance of the effect of the construction works on access to green space, open spaces and physical activity is assessed to be a **short term slight negative effect**.

The Avon Gorge

- 7.1.38 Through the Avon Gorge the main construction works include vegetation removal; minor trackbed formation works to straighten the alignment in some locations which may involve removing the existing sub-base and ballast along the operational railway, ground improvement works and relaying of fresh ballast; works to Quarry Underbridge No. 2; minor repairs to other structures; stabilisation works along the Avon Gorge cliff faces; trenching for cabling and signalling; and installation of signals and masts. The main human receptors along this section of the DCO Scheme are pedestrians and cyclists on the River Avon Tow Path. The health determinant that is likely to be affected is *access to green space, open spaces and physical activity*.
- 7.1.39 The works along the railway will be accessed via the railway itself with only foot access to six micro-compounds through the Avon Gorge. The construction works are likely to reduce the amenity value of the River Avon Tow Path, due to dust, noise, night-time lighting, and the aesthetic appearance due to the works, stockpiling, vegetation removal, etc. The River Avon Tow Path is used for commuting (by cyclists) and for leisure, and while most users are likely to be in good health, some may be disabled, elderly or in poor health. The works may discourage some users to travel along the River Avon Tow Path during the construction period. Overall, the significance of the effect of the works on the access to green space, open spaces and physical activity is assessed to be a **short term slight negative effect**.

Bower Ashton to Ashton Vale

- 7.1.40 The construction works in this section of the scheme comprise a temporary access and construction compound off Clanage Road and towards the end of the works the creation of a smaller permanent maintenance compound at the same site. The nearby receptors include players and spectators at the Bedminster Cricket Club, a pre-school nursery, a small number of residential property in Bower Ashton, allotmenters and pedestrians on local footpaths. The health determinants that are likely to be affected are *noise and vibration, air quality and emissions, light pollution, access green space, open spaces and physical activity*.
- 7.1.41 Construction noise will raise ambient noise levels, with peaks potentially up to 20 dB(A) above ambient, although the average noise levels will be much lower. There are few residents close to the railway and users of outdoor facilities, such as sports grounds and allotments are assumed to have low sensitivity to noise and are unlikely to be present for prolonged periods. The significance of effect of construction noise on well-being is assessed to be **neutral**.

- 7.1.42 Similarly, there are few human receptors likely to be affected by construction dust, and users of outdoor space are only likely to be exposed to dust for relatively short periods. The significance of the effect of construction dust on well-being is assessed to be **neutral**.
- 7.1.43 While temporary night-time lighting may be needed along this section, the effect of glare and light spill can be mitigated and the small number of residential property in the area are set back from the railway and partially screened by vegetation. The significance of the effect of the works on the well-being of local residents is assessed to be **neutral**.
- 7.1.44 While this section of the scheme passes several areas of outdoor space, the construction works are unlikely to discourage people from using these facilities. The significance of the effect of the works on access to open space and physical activity is assessed to be **neutral**.

Ashton Vale to Ashton Junction

- 7.1.45 The main construction works in this section are the construction of a new pedestrian and cyclists ramp from Ashton Vale Road to Ashton Road and modification of Winterstoke Road to provide a flare left hand turn across. The land use along this section of the scheme is mostly industrial and commercial, with some residential areas, the Alderman Moore's allotments, and footpaths.
- 7.1.46 The proposed construction works are likely to cause short term disruption in terms of noise, construction traffic, traffic management to access the industrial estate, and potential changes in air quality. The health determinants that are likely to be affected are *noise and vibration, air quality and emissions, light pollution, crime and safety and employment, access to work and local business*.
- 7.1.47 While any construction works along the railway would raise ambient noise levels, there are few sensitive receptors close to the railway. The significance of the effect of construction noise on the well-being of human receptors is assessed to be **neutral**.
- 7.1.48 The construction of the highway modifications on Winterstoke Road and the pedestrian and cycle ramp would also increase day-time ambient noise levels, potentially affecting occupants near the entrance of the Ashton Vale Industrial estate. The significance of the effect of construction noise on the well-being of human receptors in the industrial estate is assessed to be **short term, slight negative**.
- 7.1.49 The works on Winterstoke Road may need traffic management to maintain access into the estate while the highway is modified. The significance of the effect of the road works on travellers to and from the industrial estate is assessed to be **neutral**.
- 7.1.50 Although the proposed works have a potential for dust emissions, the contractor will be required to implement a construction dust management plan which would reduce the impact. The significance of the effect of construction dust on health is assessed to be **neutral**.
- 7.1.51 Any temporary lighting required for construction is unlikely to have a significant effect on local residents given the industrial and highway setting. The significance of effect is assessed to be **neutral**.
- 7.1.52 The site largely comprises industrial/commercial land use and as such is likely to be largely unoccupied at night. The construction site and possibly a small construction compound may present an opportunity for crime-related activity (actual and perceived). However consideration will be given to the need for site security which may discourage such activity. The MetroBus stop proposed near the Barons Close pedestrian crossing will be operational and will be lit and may have CCTV. The significance of the effect of the construction works on perceived and actual safety is assessed to be a **short term slight negative effect**.

7.2 Operations Phase

Portishead Station

- 7.2.1 When the passenger and freight lines are in operation along the DCO Scheme, receptors near Portishead Station and along the route between Portishead and Trinity Footbridge may experience changes to the following health determinants: *noise and vibration, light pollution, access to services, access to the DCO Scheme, access to green space, open space and physical activity, and townscape and quality of the local environment.*
- 7.2.2 The PEI Report Chapter 13 discusses noise impacts for residential receptors near Portishead Station. Ambient noise levels are predicted to increase due to the movement of trains in and out of Portishead, the idling of trains in the station, and changes in traffic circulation in the vicinity of the station and car parks. The DCO Scheme includes the provision of a noise barrier between the station and Trinity Primary School Footbridge on the south side of the railway to mitigate the increase in noise levels.
- 7.2.3 Ambient noise levels at property on the south side of the railway are predicted to rise up to 2 dB(A) in the short term. This may still affect the well-being of residents through annoyance, sleep disturbance, and self-reported disturbance such as insomnia, dependent on the residents' current health condition and age and the noise insulation of these properties. As a worse case the significance of the effect of operations on the wellbeing of residents closest to the southern boundary of the railway is assessed to be a **slight negative** effect. Similarly the residents along Tansy Lane, Holmlea, Tydeman Road, and area around Fennel Road and Tarragon Place are likely to experience a slight increase in noise levels and the significance of the effect of operations on health due to noise is assessed to be **slight negative**.
- 7.2.4 Ambient noise levels decrease with distance from the source and with screening provided by intervening buildings. Beyond the first line of houses next to the railway, the increase in ambient noise levels fall to less than 1 dB(A) which is a negligible change in the short term. It is also assumed that the buildings which have been built recently in this part of Portishead have been built with adequate noise insulation to attenuate external noise levels for occupants. The significance of effect of operational noise levels on the well-being of occupants of residential property set back from the railway and at facilities such as the Harbourside Family Practice and Haven Lodge Care centre is assessed to be a **neutral effect**.
- 7.2.5 The new station platform and car parks will be lit at night. The lighting design will include measures to avoid glare through appropriate choice of luminaires and angle (such as downward lighting) to limit the light disturbance on the high sensitivity receptors. Light intrusion into property can be further mitigated by the treatment of windows such as black out curtains. Lighting may cause discomfort for vulnerable groups such as residents at the nearby health facilities on Harbour Road. As a worse case, the significance of effect is assessed to be a **slight negative effect**.
- 7.2.6 Visitors, including patients to the Marina Health Centre, will benefit from using spaces that have been allocated for their use at the Portishead Station car park, improving the current situation. The significance of the effect of improved access to services is assessed to be a **slight positive effect** and relieve short term stress for the visitors.
- 7.2.7 The provision of the new passenger service will improve public transport into Bristol, with shorter journey times and ease of access. This could facilitate residents in Portishead making use of medical facilities in Bristol, as well as widen opportunities for accessing other services as well as leisure activities. The significance of the effect of improve transport access is assessed to be a **moderate beneficial effect**.

- 7.2.8 The Haven Lodge Care Centre enjoys views and access to some green spaces (although not parks or gardens) that are within easy access from the building (line of trees adjoining Phoenix Way). The proposal may result in removal of trees and greenery along Phoenix Way but landscape design proposals allow for new planting along Harbour Road and car parks, which will mitigate the impact in the long term. The significance of the effect for the local environment health determinant is assessed to be **neutral**.
- 7.2.9 For residents along Tansy Lane, Galingale Way and Quays Avenue, the proposed station and related facilities will present a permanent alteration to the landscape and potentially limit access to informal open spaces and green spaces closest to their property, particularly for the Tansy Lane residents. However with landscaping proposals, which are within accessible distance to the farthest resident at Tansy Lane, no significant effect on access to green space and amenity is predicted. Loss of visual amenity feature may affect sense of well-being for some residents located lineside. Overall the significance of the effect on access to green space and townscape and quality of the local environment is assessed to be a **slight negative effect** in the short term and reducing to **neutral** in the long term.

Trinity Primary School Footbridge

- 7.2.10 When the passenger and freight lines are in operation along the DCO Scheme, receptors near Trinity Primary School Footbridge are likely to experience changes to the following health determinants: *noise and vibration, access to services, and the local environment (aesthetic quality)*.
- 7.2.11 The PEI Report Chapter 13 Noise and Vibration predicts a slight adverse effect in terms of noise level increase for the school site. As school children form part of the vulnerable group (Sensitivity=High) and the predicted noise effect is minor (Magnitude=Minor), the health impact for the local receptors, particularly children, is assessed to be a **slight negative effect**.
- 7.2.12 As the new pedestrian/cycle bridge has been designed to meet accessibility requirements under the Equalities Act, access will be via long ramps at a shallow gradient. This will mean that people will have to walk longer distances to cross the railway line compared to the existing informal crossing. This might discourage elderly, infirm or disabled people who currently use the crossing from making this journey, to meet with friends, access services (including the school), and exercise. The significance of the effect of the new crossing on accessibility and severance is assessed to be a **slight to moderate negative effect** on their well-being.
- 7.2.13 For residents to the north and south of the proposed footbridge, the proposals will present a permanent alteration to the character of the area, but equally it will result in making some improvements in terms of landscape design (north of the route near Tansy Lane). No significant loss of accessible green space is predicted but the loss of visual amenity and the introduction of a ramp and footbridge may affect their sense of well-being. The significance of the effect for some residents located along the railway is assessed to be a **slight negative effect** but this is likely to be limited and potentially short term as over time residents may accept the new landscape.

Portishead to Portbury Junction

- 7.2.14 In the rural section between Portishead and Pill, human receptors at residential property and along public rights of way alongside the route may experience changes to the following health determinants: *noise and vibration, access to green space, open spaces and physical activity, and crime and safety*.
- 7.2.15 For residential receptors along Sheepway the predicted increase in noise levels for day time and night time in the long term and in the short term will be below 1 dB(A). At the Old Station

House the noise levels are predicted to increase by 5.9 dB(A) in the long term, therefore a 2 m high noise barrier has been recommended for this location, which would reduce the noise increase to just above 1 dB(A). Overall, the significance of effect of noise on well-being is assessed to be a **slight negative effect**.

- 7.2.16 Although the proposed design will reduce the current width of NCN26 where it passes under three bridges, these modifications are minor and cyclists will still be able to use the route. The improved crossing on Royal Portbury Dock Road and the proposed new bridleway under the M5 will improve the safety of movements for equestrians. The significance of the effect on crime and safety is assessed to be a **slight positive effect**. There will be no change in the access to green space, open spaces and physical activity, which is a **neutral** significance of effect.

Portbury Junction to Pill Junction

- 7.2.17 When the passenger and freight lines are in operation along the DCO Scheme, receptors in Pill may experience changes to the following health determinants: *noise and vibration, light pollution, and access to the DCO Scheme*.
- 7.2.18 The daytime noise level increases at various locations in Pill, such as Lodway Close (west of Pill), near Monmouth Road (Pill Station), eastern side of Pill and to the eastern side of Pill Tunnel, are predicted range up to 2.5 dB(A) in the short term and 3 dB(A) in the long term. The impact of the operational noise on people's health may range from annoyance to sleep disturbance, dependent on the health condition and age of the residents. However research suggests that communities near railways can adapt to noise levels. The significance of the effect of operational noise is assessed to be a **slight negative effect**.
- 7.2.19 The vibration levels measured near Pill Station for freight trains are considered to be 'just perceptible in residential environments' and will present a negligible risk to building damage (see the PEI Report, Chapter 13 Noise and Vibration). The impact of vibration on people's well-being may range from annoyance to sleep disturbance, dependent on the health condition and age of the residents. Research suggests that rail noise when accompanied by vibration enhances the perception of noise and thus increases annoyance. At Pill this cumulative effect of combined noise and vibration levels is applicable to properties within 20 m of the railway line. Vibration measurements show that the freight trains cause more vibration than passenger trains, which is unsurprising given the weight difference between the two train types, and as the vibration from freight trains is deemed to be just perceptible, any vibration from passenger trains would be less so. The significance of the effect of vibration on residential receptors is assessed to be a **neutral**.
- 7.2.20 Light pollution from Pill station and car park could cause psychological discomfort for neighbours along Monmouth Road which front onto the new railway platform. The lighting design will consider measures to reduce glare from the luminaries and light spill. Screening vegetation will be maintained as far as possible and light intrusion into properties can be further reduced by the treatment of windows such as blackout curtains. The effect on nearby residents is assessed to be a **slight negative effect**.
- 7.2.21 Residents in Pill will benefit from access to the DCO Scheme which will provide a safe, comfortable and fast service into Bristol, opening up access to services and leisure activities in Bristol. The significance of the effect is assessed to be a **moderate positive effect**.

Pill Junction to Ashton Junction

Avon Gorge

- 7.2.22 There are few human receptors along the railway between Pill Junction and Clifton Junction. There are a small number of residential properties off Chapel Pill Lane near Ham Green and other settlements such as Leigh Woods on the west side of the gorge and the suburbs of Clifton on the east side of the gorge are at some distance from the DCO Scheme. Pedestrians and cyclists use the River Avon Tow Path which follows the railway through the gorge, but the DCO Scheme will have no impact on the use of the tow path. When the passenger and freight lines are in operation along the DCO Scheme, the only health determinant considered is: *noise and vibration*.
- 7.2.23 The noise assessment forecasts an increase of about 1 dB(A) for properties off Chapel Pill Lane and 0.5 dB(A) for the nearest properties in Shirehampton. Property on the east side of the gorge in Bristol are more affected by traffic noise from major roads such as the Portway. The significance of the effect of the scheme on a small number of properties off Chapel Pill Lane is assessed to be a **slight negative effect**.

Bower Ashton to Ashton Junction

- 7.2.24 When the passenger and freight lines are in operation along the DCO Scheme, receptors along the route between Bower Ashton and Ashton Junction are likely to experience changes to the following health determinants: *noise and vibration*, and *employment, access to work and local business*.
- 7.2.25 In this section of the route, there are few residential properties close to the railway. Predicted increased in noise level are just under 1 dB(A) for residents near Brunel Way and on Paxton Way. The significance of increase noise levels on health and well-being is assessed to be a **slight negative effect**.
- 7.2.26 The extent of change to the opportunities for physical activity health determinant as a result of the closure of the Barons Close Pedestrian Crossing is **uncertain**. The crossing was closed for the construction of the Ashton Vale to Temple Meads Bus Rapid Transit Scheme and it is not proposed to re-open the crossing.
- 7.2.27 To mitigate the permanent closure of the Barons Closed Pedestrian Crossing and the operation of the Ashton Vale level crossing, a new pedestrian and cycle ramp is proposed from Ashton Vale Road to Ashton Road which will link with footpaths onto Winterstoke Road, providing an east-west link. The design of the ramp is compliant with the Equalities Act. When the Ashton Vale level crossing is down for passing trains, pedestrians and cyclists will have an alternative route to cross Winterstoke Road. With an hourly plus services, the Ashton Vale level crossing will be closed for a relatively short period each hour. The impact on vehicles turning into the Ashton Vale Industrial Estate will be mitigated by the new flare lane on Winterstoke Road and the changes to the traffic light regime. The significance of the changes to access into the industrial estate on access to work and local business is assessed to be a **slight negative effect**.

Other Issues

- 7.2.28 The PEI Report Chapter 7 Air Quality indicates that the NO₂ and PM₁₀ concentration for the receptors along the DCO Scheme is below the limit that will trigger any effect on human health. Overall operational impact on air quality is not significant; therefore the effect on health of receptors in the study area is assessed to be **neutral**.

7.3 Cumulative Effects

- 7.3.1 This HIA considers the potential for cumulative effects on vulnerable groups relating to air quality, noise and access. Other proposed developments along the DCO Scheme have the potential to cause cumulative effects in conjunction with the DCO Scheme. Appendix 18.1 contains a long list of other projects considered for the cumulative effects assessment and Appendix 18.2 contains a short list of other projects together with an assessment of the cumulative effects. The other projects include other NSIPs within 10 km of the DCO Scheme, developments identified on the NSC and BCC planning portals within 0.5 km of the DCO Scheme, other works required for MetroWest Phase 1, and other major applications recommended by the NSC and BCC planning officers.

Other Projects along the Portishead Branch Line

- 7.3.2 Mixed-use, residential and employment developments have been proposed at locations along the DCO Scheme. None of the proposed developments are expected to have significant impacts on health. However, as the number of people living, working and shopping in the area will increase, especially in Portishead, beneficial cumulative effects relating to enhanced access between Portishead and Bristol may occur once the DCO Scheme is completed. In particular, an assisted living development consisting of 118 apartments for the over 60s has been proposed for a site in close proximity to the Portishead Station site. Once these apartments are occupied and the Portishead Branch Line is operating, residents would be able to travel easily to Bristol, for example, to access services and visit the Bristol Arena and Bristol Temple Quarter proposed developments near Bristol Temple Meads Station.
- 7.3.3 The proposed residential developments have the potential to increase the number of residential receptors within the study area, and result in changes in road traffic, which in turn may lead to changes in ambient noise and air quality. Committed developments are considered in the traffic modelling for future scenarios, which have been used for the air quality and noise assessments.
- 7.3.4 In addition to the proposed developments above, further beneficial cumulative effects relating to increased access and connectivity across the wider Bristol area may occur between the Portishead Branch Line and MetroBus schemes, Network Rail infrastructure improvements, and Highways England proposed new M49 junction near Avonmouth.
- 7.3.5 Cumulative effects resulting from overlapping construction programmes for the other projects and the DCO Scheme could be avoided by phasing developments and by implementing a range of mitigation measures to reduce construction-related impacts to be incorporated into the CoCP. Any residual cumulative effect is assessed to be **neutral**.

Other Works for MetroWest Phase 1

- 7.3.6 Other elements of MetroWest Phase 1, namely the Parson Street Junction works, Bedminster Down Relief Line, Severn Beach/Avonmouth Signalling and Bathampton Turnback comprise small scale works, confined within the existing railway land. These works are to be undertaken by Network Rail under their permitted development rights and do not form part of the DCO Application.
- 7.3.7 Network Rail undertakes their own procedures to prepare environmental appraisals and action plans, and environmental risk registers of permitted development works as part of their internal reporting for Network Rail's Governance for Railway Investment Projects ("GRIP") process. This process will identify the potential impacts and capture the need for mitigation during design and construction. The results will be carried forward from the present GRIP 3/4 phase into the detailed design phase (GRIP 5) and construction (GRIP 6).

- 7.3.8 Given the small scale nature of these works and the distances between these projects and the DCO Scheme route, it is considered that there are no significant cumulative effects during the construction of these projects on health determinands.
- 7.3.9 The DCO Scheme will result in additional railway services on the main line between Parson Street Station and Bristol Temple Meads. This may affect the *noise and vibration* and *air quality and emissions* determinands.
- 7.3.10 The hourly plus service will increase noise levels along the main line. In the vicinity of Parson Street Junction and Station, the highest noise increases are expected to be at those properties along Nelson Street and Trafalgar Terrace. Increases in day time noise are predicted to be up to 1 dB(A) for the short term and 1.5 dB(A) for the long term. These increases are assessed to be a **slight adverse effect**.
- 7.3.11 The main line between Parson Street Station and Bristol Temple Meads mostly lies within the Bristol Air Quality Management Area, which has been designated due to exceedances of NO₂ and PM₁₀. In Chapter 7 Air Quality and Greenhouse Gases the addition of an hourly service is estimated to increase NO₂ by 0.5 µg/m³ at two receptors close to Parson Street Junction, which represents a 1% increase. However, as the NO₂ concentration already exceeds the standard of 40 µg/m³ this is assessed to be a **moderate adverse effect**. At the other receptors modelled, the increase in NO₂ and all the PM₁₀ was negligible and did not exceed the air quality objectives, which is assessed to be a **neutral** effect.

Other Stations on the Local Network

- 7.3.12 In order for seamless and easily accessible travel to be experienced by the local population, other stations in the local network must also cater for vulnerable groups.

7.4 Summary of effects

- 7.4.1 A summary of the effects predicted for the construction and operation phases is presented in Tables 7-1 and 7-2 below.

Table 7-1: Summary of construction phase health impacts along the DCO Scheme

Site	Health determinant altered	Significance of the effect
Portishead Station	Noise and vibration	Construction noise may result in increased daytime noise peaking between 15 dB(A) and 20 dB(A) which may potentially affect a large number of lineside receptors such as residents and vulnerable groups such as residents of the Haven Lodge Centre, visitors to the health centre and children at Busy Bees Nursery on Serbert Way. Sensitivity = High Magnitude = Minor-moderate negative Significance = Short term moderate/large negative effect reducing to slight or neutral, depending on the average construction noise levels and noise insulation properties of the buildings.
	Air quality and emissions	Elevated dust levels causing an irritant to many people and a potential risk for people with respiratory problems including the young and the elderly. Sensitivity = High Magnitude = Minor negative Significance = Short term slight negative effect after mitigation

Table 7-1: Summary of construction phase health impacts along the DCO Scheme

Site	Health determinant altered	Significance of the effect
	Light pollution	<p>Glare from lighting of construction compounds near Portishead Station may affect vulnerable group of people living near the construction site.</p> <p>Sensitivity = High</p> <p>Magnitude = Minor negative</p> <p>Significance = short term slight/moderate negative effect at worse case reducing to slight or neutral depending on the intrusion of light into buildings and the sensitivity of residents to light pollution.</p>
	Access to services	<p>Route diversions and footpath alterations or closures may be confusing for some people, such as those with dementia or visual impairment which may affect their ability to access services and therefore affect their sense of well-being. Measures such as good housekeeping at construction sites and temporary diversions would help to minimise obstacles to access, nevertheless short term impacts are likely.</p> <p>Sensitivity = High</p> <p>Magnitude = Minor negative</p> <p>Significance = Short term slight/moderate negative effect.</p>
Trinity School Footbridge	Noise and vibration	<p>Construction noise (piling works) may result in increased daytime noise up to 20 dB(A) that may affect a large number of lineside receptors such as residents and vulnerable groups such as school children at Trinity Primary School.</p> <p>Sensitivity = High</p> <p>Magnitude = Moderate negative</p> <p>Significance = Short term large negative impact during piling works reducing to slight negative during the remainder of the construction phase.</p>
	Crime and safety	<p>Construction traffic may pose safety risk to school children who will access Trinity Primary School from various routes near the site. The implementation of an appropriate construction traffic management plan together with measures to be implemented by the contractor to protect local communities from construction sites would help to mitigate the risk.</p> <p>Sensitivity = High</p> <p>Magnitude = Moderate</p> <p>Significance = Short term slight to moderate negative effect.</p>
	Access to green space	<p>During construction, the current path that connects northern and southern side of the disused railway will be diverted, which some people, such as the elderly and disabled may be reluctant to use. The proposed works will alter current visual character of the area which may affect the sense of well-being of local residents.</p> <p>Sensitivity = Low-high</p> <p>Magnitude = Minor negative</p> <p>Significance = Short term neutral to slight effect</p>
Portishead to Pill	Noise and vibration	<p>Construction noise may result in peak daytime noise between 15 dB(A) and 20 dB(A) which may affect a small number of lineside residential receptors.</p> <p>Sensitivity = Low-medium</p>

Table 7-1: Summary of construction phase health impacts along the DCO Scheme

Site	Health determinant altered	Significance of the effect
		<p>Magnitude = Minor-moderate negative</p> <p>Significance = Short term neutral to slight negative effect</p>
	Air quality and emissions	<p>Elevated dust levels along the railway corridor, haul route and construction compounds potentially affecting a small number of nearby residences.</p> <p>Sensitivity = Low</p> <p>Magnitude = Minor negative</p> <p>Significance = short term neutral to slight negative effect.</p>
	Light pollution	<p>Temporary night-time lighting may be required, but this can be shielded to reduce glare and spill, and would be screened from nearby properties by hedgerows and trees.</p> <p>Sensitivity = Low</p> <p>Magnitude = Minor</p> <p>Significance = Neutral</p>
	Access to green space, open space and physical activity	<p>Works along Sustrans NCN26 and on bridleways and PRoWs under the Royal Portbury Dock, Marsh Lane and M5 Avon Bridge may locally reduce the amenity value of these routes and may discourage regular users.</p> <p>Sensitivity = Low-medium</p> <p>Magnitude = Minor negative</p> <p>Significance = short term slight negative effect.</p>
Lodway Farm/Avon Road Underpass	Noise and vibration	<p>Construction activities including the import of plant and equipment to a construction compound at Lodway Farm and the movement of construction vehicle around Lodway Close and The Breaches has potential to cause intermittent increase in noise levels in the short term. Pill has a higher percentage of people over 65 years of age. For this reason a short term intermittent Large (negative) impact is predicted for the noise health determinant.</p> <p>Sensitivity = High</p> <p>Magnitude = Minor to moderate negative</p> <p>Significance = Short term large negative effect (intermittent)</p>
	Air quality and emissions	<p>A number of construction activities are likely to cause dust potentially affecting properties off Avon Road, Lodway Close and The Breaches. The contractor will be required to implement measures to control dust.</p> <p>Sensitivity = High</p> <p>Magnitude = Moderate negative</p> <p>Significance = Short term, moderate negative effect during peak dusty construction activities reducing to slight negative effect.</p>
	Light pollution	<p>Construction compound lighting and night time lighting near the Lodway Farm site may affect nearby residents, particularly houses on The Breaches with views towards the compound. Night time lighting may cause sleep disturbance.</p> <p>Sensitivity = High</p> <p>Magnitude = Moderate negative</p> <p>Significance = Short term neutral to slight negative effect</p>

Table 7-1: Summary of construction phase health impacts along the DCO Scheme

Site	Health determinant altered	Significance of the effect
	Access to green space, open spaces and physical activity	<p>The construction compound at Lodway Farm and the numerous major activities at this “pinchpoint” on both sides of the railway would significantly alter the landscape, severely limit visual access to green space for local residents and possibly reduce physical activity for users of the NCN26 and Jenny’s Meadow.</p> <p>Sensitivity = Low-high</p> <p>Magnitude = Minor negative</p> <p>Significance = Short term slight negative effect</p>
Pill Station	Noise and vibration	<p>Construction noise may result in peak daytime noise up to 20 dB(A) above ambient which may affect lineside receptors such as residents. By comparison to the rest of the scheme route, Pill is reported to have a higher proportion of the elderly age group.</p> <p>Sensitivity = High</p> <p>Magnitude = Minor-moderate negative</p> <p>Significance = Short term moderate to large negative effect</p>
	Air quality and emissions	<p>Construction activities include a number of dust-generating works, which are most likely to affect residents to the north of the railway given the topography.</p> <p>Sensitivity = High</p> <p>Magnitude = Minor negative</p> <p>Significance = Short term slight negative effect</p>
	Light pollution	<p>Glare from overhead lighting of construction compounds near Pill Station may affect lineside neighbours.</p> <p>Sensitivity = Medium</p> <p>Magnitude = Minor negative</p> <p>Significance = Short term slight negative effect</p>
	Access to services such as shops, health, or social services	<p>The large concentration of construction sites and haulage through Pill could hinder access to local services for residents, especially the elderly and people who are unwell.</p> <p>Sensitivity = High</p> <p>Magnitude = Moderate</p> <p>Significance = Short term moderate negative effect</p>
	Crime and safety	<p>Increased construction traffic through Pill, including HGVs, potentially increases the risk of accidents for local road users, cyclists and pedestrians.</p> <p>Sensitivity = High</p> <p>Magnitude = Major</p> <p>Significance = Short term large negative effect</p>
Pill Viaduct to Pill Junction	Noise and vibration	<p>Construction works at elevation through this section with limited scope for noise attenuation.</p> <p>Sensitivity = High</p> <p>Magnitude = Major</p> <p>Significance = Short term large negative effect</p>

Table 7-1: Summary of construction phase health impacts along the DCO Scheme

Site	Health determinant altered	Significance of the effect
	Air quality and emissions	<p>The construction works, especially the Mount Pleasant embankment stabilisation, may affect a small number of properties.</p> <p>Sensitivity = High</p> <p>Magnitude = Minor</p> <p>Significance = Short term slight negative effect</p>
	Light pollution	<p>If required temporary lighting at elevation through this section may increase light pollution, but within the context of an urban setting with existing night-time lighting.</p> <p>Sensitivity = Low</p> <p>Magnitude = Minor</p> <p>Significance = Neutral</p>
Ham Green	Access to green space, open spaces and physical activity	<p>One construction compound is located off Chapel Pill Lane near the Penny Brohn Cancer Centre. Although the centre is unlikely to have in-patients, route diversions and construction activities may change the accessibility and the visual amenity, which in turn could influence the sense of well-being of the receptors in the area.</p> <p>Sensitivity = Low-high</p> <p>Magnitude = Minor negative</p> <p>Significance = Short term slight negative effect</p>
Avon Gorge	Access to green space, open spaces and physical activity	<p>The human receptors along this section are the users of the River Avon Tow Path, who are, in the most part, assumed to be in good health.</p> <p>Sensitivity = Low</p> <p>Magnitude = Moderate negative</p> <p>Significance = Short term slight negative effect</p>
Bower Ashton to Ashton Vale	Noise and vibration	<p>The main human receptors are likely to be users of outdoor space such as the Bedminster cricket ground and allotment. Low levels of exposure. There are a few residential properties in Bower Ashton.</p> <p>Sensitivity = Low</p> <p>Magnitude = Minor negative</p> <p>Significance = Neutral</p>
	Air quality and emissions	<p>The main human receptors are likely to be users of outdoor space such as the Bedminster cricket ground and allotment. Low levels of exposure. There are a few residential properties in Bower Ashton.</p> <p>Sensitivity = Low</p> <p>Magnitude = Minor negative</p> <p>Significance = Neutral</p>
	Light pollution	<p>The main human receptors are likely to be users of outdoor space such as the Bedminster cricket ground and allotment. Low levels of exposure. There are a few residential properties in Bower Ashton and these are set back from the railway and partially screened by vegetation.</p> <p>Sensitivity = Low</p> <p>Magnitude = Minor negative</p> <p>Significance = Neutral</p>

Table 7-1: Summary of construction phase health impacts along the DCO Scheme

Site	Health determinant altered	Significance of the effect
	Access green space, open spaces and physical activity	<p>The main human receptors are likely to be users of outdoor space such as the Bedminster cricket ground, footpaths, and allotments. While construction of the DCO Scheme may reduce the quality of the ambience, they are unlikely to stop people accessing these facilities.</p> <p>Sensitivity = Low</p> <p>Magnitude = Minor negative</p> <p>Significance = Neutral</p>
Ashton Vale to Ashton Junction	Noise and vibration	<p>The land use is mostly commercial / industrial, so construction noise is not expected to affect people's health.</p> <p>Sensitivity = Low</p> <p>Magnitude = Minor negative</p> <p>Significance = Neutral along the railway rising to short, term slight negative for pedestrians in the vicinity of the Winterstoke Work and new pedestrian / cyclists ramp.</p>
	Air quality and emissions	<p>The works are likely to have a limited effect on construction dust and there are few sensitive receptors in this area.</p> <p>Sensitivity = Low</p> <p>Magnitude = Minor negative</p> <p>Significance = Neutral</p>
	Light pollution	<p>Temporary lighting may be required, but this is in the context of an urban environment with existing night-time lighting from highways and industrial/commercial areas.</p> <p>Sensitivity = Low</p> <p>Magnitude = Minor negative</p> <p>Significance = Neutral</p>
	Crime and safety	<p>Combined with this isolated construction compounds may present ideal locations for anti-social activities. The CoCP requires appropriate lighting and CCTV surveillance which may limit the potential for occurrence of crime (actual and perceived).</p> <p>Sensitivity = Low-high</p> <p>Magnitude = Minor negative</p> <p>Significance = short term, slight-negative effect</p>
	Employment, access to work and local business	<p>The works to Winterstoke Road and pedestrian/cycle ramp in the Ashton Vale Industrial Estate will be completed prior to the closure of the Ashton Vale level crossing and railway works.</p> <p>Sensitivity = High</p> <p>Magnitude = No change</p> <p>Significance = Neutral</p>

Table 7-2: Summary of health impacts along the DCO Scheme during the operations phase

Site	Health determinant altered	Significance of the effect
Portishead Station	Noise and vibration	<p>Ambient noise levels for lineside neighbours will increase slightly, but with distance and intervening screening by properties, the noise increases fall to negligible levels. The health impact could range from annoyance to sleep disturbance, dependent on the age and health condition of receptors and the noise insulation properties of buildings.</p> <p>Sensitivity = Low-medium</p> <p>Magnitude = Minor negative</p> <p>Significance = Neutral to slight negative effect</p>
	Light pollution	<p>Light pollution may cause psychological discomfort to vulnerable groups. The lighting for the stations and car parks will be designed to avoid glare and light spill. The light intrusion into property can be further reduced by window treatments such as black out curtains.</p> <p>Sensitivity = Low-high</p> <p>Magnitude = Minor negative</p> <p>Significance = Slight negative effect</p>
	Access to services	<p>Visitors, including patients to the Marina Health Centre will benefit from using spaces that have been allocated for their use at the Portishead Station car park</p> <p>Sensitivity = High</p> <p>Magnitude = Minor positive</p> <p>Significance = Slight positive effect</p>
	Access to the DCO Scheme	<p>Access to a new, fast public transport service between Portishead and Bristol will facilitate journeys to a wider range of services (medical, social, and commercial) and leisure activities in Bristol.</p> <p>Sensitivity = High</p> <p>Magnitude = Moderate positive</p> <p>Significance = Moderate positive effect</p>
	Access to green space, open space and physical activity	<p>The proposals are likely to remove trees and greenery along Phoenix Way and alter informal open spaces and green spaces but landscaping proposals are planned along Harbour Road and around the car parks.</p> <p>Sensitivity = High</p> <p>Magnitude = Neutral</p> <p>Significance = Neutral effect</p>
	Townscape and quality of the local environment	<p>For local residents and lineside neighbours the station premises will present a permanent change to the landscape. The loss of visual amenity may affect the sense of well-being for some residents located along the lineside but this is likely to be limited and potentially short term (over time residents may accept the new landscape).</p>

Table 7-2: Summary of health impacts along the DCO Scheme during the operations phase

Site	Health determinant altered	Significance of the effect
		<p>Sensitivity = Low-medium</p> <p>Magnitude = Minor negative</p> <p>Significance = Slight negative effect reducing to neutral in the long term</p>
Trinity Primary School Footbridge	Noise and vibration	<p>A slight increase in noise levels at the school is predicted in the short term. The effect of noise on children can lead to annoyance who have less coping mechanisms than adults. This modern building should have adequate noise insulation.</p> <p>Sensitivity = High</p> <p>Magnitude = Minor negative</p> <p>Significance = Slight negative effect</p>
	<p>Access to services</p> <p>Access to green space, open spaces, and physical activity</p>	<p>By comparison to the present day, accessing the northern or southern section of the route from either side will require effort to navigate the lengthy ramp, particularly the elderly and those with disabilities. For this group of population who may be local residents, there may be a negative health impact (sense of well-being). For other residents, neutral effect is predicted.</p> <p>Sensitivity = High</p> <p>Magnitude = Minor negative</p> <p>Significance = Neutral to moderate negative effect</p>
	Townscape and quality of the local environment	<p>Although the proposals will permanently alter the landscape, the enhancements to the landscape near Tansy Lane are likely to compensate for this change and therefore may have a slight negative impact on the sense of well-being for the adjoining neighbours.</p> <p>Sensitivity = Low-medium</p> <p>Magnitude = Negligible</p> <p>Significance = Slight negative effect</p>
Portishead to Portbury Junction	Noise and vibration	<p>The residential property closest to the DCO Scheme will experience slight increases in ambient noise levels. The health impact could range from annoyance to sleep disturbance, depending on the age and health condition of receptors and the acoustic properties of the buildings.</p> <p>Sensitivity = High</p> <p>Magnitude = Minor negative</p> <p>Significance = Slight negative effect</p>
	Crime and safety	<p>Minor improvements in safety for equestrians through modified crossing on Royal Portbury Dock Road and new bridleway under the M5.</p> <p>Sensitivity = High</p> <p>Magnitude = Minor positive</p> <p>Significance = Slight positive effect</p>

Table 7-2: Summary of health impacts along the DCO Scheme during the operations phase

Site	Health determinant altered	Significance of the effect
Portbury Junction to Pill Junction	Noise and vibration	Noise will be introduced into the area from the trains and activity at Pill Station and car park. This could cause annoyance and sleep disturbance for people in nearby properties. Sensitivity = Low-medium Magnitude = Minor negative Significance = Slight negative effect for noise from the trains and station, Neutral for vibration
	Light pollution	Lighting pollution (including glare) from the station and station car park may cause psychological discomfort to neighbours along Monmouth Road. Sensitivity = Low-medium Magnitude = Minor negative Significance = Slight negative effect
	Access to the DCO Scheme	The new station and passenger service will offer a safe, comfortable and fast service into Bristol for residents in Pill, which includes an above average elderly population. Sensitivity = Low-high Magnitude = Moderate negative Significance = Moderate positive effect
Avon Gorge	Noise and vibration	The increase in noise levels is forecast to affect a small number of properties off Chapel Pill Lane. Sensitivity = Low Magnitude = Minor negative Significance = Slight negative effect
Bower Ashton to Ashton Junction	Noise and vibration	The closest residential receptors around Brunel Way and Paxton Way may experience slight increases in day and night time levels, which may cause annoyance or sleep disturbance to the residents. Sensitivity = Low-medium Magnitude = Minor negative Significance = Slight negative effect
	Access to work and local business	The DCO Scheme will result in more frequent closure of the Ashton Vale Level Crossing but the effects on highway traffic will be mitigated through highway modifications and changes to traffic lights. Pedestrians and cyclists will be able to use the new ramp while the level crossing is closed. Sensitivity = Low Magnitude = Minor negative Significance = Slight negative effect

7.5 Limitations in Conducting the Assessment

- 7.5.1 At the time of writing this report the construction strategy was under development, therefore specific impacts from construction vehicle traffic cannot be predicted. However, the emerging construction strategy will use rail haulage as much as possible, particularly through the Avon Gorge where access and space is constrained, which will reduce the amount of road haulage required to build the DCO Scheme.
- 7.5.2 The baseline data on demography and health patterns of the local residents have largely been based on secondary sources and information collected from initial consultation with key stakeholders. While this search has provided information on vulnerable groups along the proposed route, it is possible that not all specific cases have been captured.

7.6 Further Steps

- 7.6.1 This document will be presented for consultation with members of the public and the responses will be analysed and the HIA be updated for the DCO Application.

SECTION 8

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Figures

