

# **A66 Northern Trans-Pennine Project**

**TR010062**

## **7.26 Statement of Significance of Human Health Effects**

**Infrastructure Planning (Examination Procedure) Rules 2010**

**Deadline 4**

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Infrastructure Planning

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**The Infrastructure Planning  
(Examination Procedure)  
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A66 Northern Trans-Pennine project  
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**7.26 STATEMENT OF SIGNIFICANCE OF HUMAN HEALTH  
EFFECTS**

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## 1. Introduction

- 1.1.1 In response to the Relevant Representation submitted by the UK Health Security Agency (RR-083), National Highways has undertaken a supplemental assessment of significance for the health effects reported in Chapter 13 of the Environmental Statement (ES). This Statement of Significance should be read in conjunction with ES Chapter 13, Population and Human Health (Document Reference 3.2, APP-056).
- 1.1.2 This Statement of Significance provides information on the significance of the health effects identified in the ES. It is based entirely on information contained in the ES and does not introduce new information. It does not change the conclusions of the ES.
- 1.1.3 This Statement of Significance comprises the following sections:
- Section 2 describes the approach and methodology for assessing the significance of health effects;
  - Section 3 describes consultation undertaken for this study;
  - Section 4 presents the key findings and conclusions for the route-wide and scheme assessments of significance; and
  - Appendix 1 Detailed Assessment of Significance presents the detailed assessment of significance in table format, for the route-wide and scheme assessments of significance.

## 2. Approach and methodology

### 2.1 2.1 Approach to health assessment in the Environmental Statement

- 2.1.1 The ES (Para. 13.4.26 from original ES Chapter 13) has been completed in accordance with the DMRB standard LA112<sup>1</sup>, which confirms a conclusion on significance for human health is not required due to the lack of established appropriate methodology being available. The approach set out in LA112 includes identifying likely changes to health determinants, considering the sensitivity of the receptor population and ascertaining the likely health outcomes, which are reported as being positive, negative, neutral or uncertain. The health effects reported in the ES were assessed in line with LA112, based on qualitative judgement of the likely effects on health outcomes and taking into consideration:
- The nature, severity and geographic extent of an impact on a health determinant;
  - The size and sensitivity of the population exposed to the change (defined as low, medium or high and evidenced using health baseline data); and

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<sup>1</sup> Design Manual for Roads and Bridges Sustainability & Environment Appraisal, LA112 Population and human health. Highways England, Transport Scotland, Welsh Government and Department for Infrastructure Northern Ireland, Revision 1, 2020

- Knowledge of associations between health determinants and health outcomes, based on published research (Appendix 13.3, Health Evidence Review).

2.1.2 Assessment of significance relies on informed, expert judgement about what is important, desirable or acceptable with regard to changes triggered by the project in question<sup>2</sup>. In making reasoned, evidence-based judgements about likely health effects based on these considerations, the ES has gone some way towards assessing significance. However, the ES does not apply significance criteria nor draw conclusions on the significance of health effects expressly.

## 2.2 Assessing significance of health effects

2.2.1 The assessment of significance of human health effects draws on recent relevant guidance, principally:

- Determining Significance for Human Health In Environmental Impact Assessment (EIA), Institute of Environmental Management and Assessment (IEMA), 2022
- Human health: Ensuring a high level of protection. International Association for Impact Assessment (IAIA) & European Public Health Association (EPHA), 2020

2.2.2 The IAIA and EPHA provide guidance on the analysis of information to determine the significance of health effects in EIA. This is based primarily on the sensitivity of the population and the magnitude of effects on health determinants<sup>3</sup>, which are considered alongside other contextual information such as:

- Scientific literature relating to the health outcomes associated with health determinants;
- Baseline conditions for the study population;
- Consultation responses;
- Health policy and priorities in the project jurisdiction; and
- Regulatory standards (e.g. for air quality).

2.2.3 The IEMA guidance provides a framework that supports a proportionate approach to assessing significance, which can apply to all scales of EIA. Core principles include assessing effects on health at population level (as opposed to assessing health effects on individuals) and considering health inequalities.

2.2.4 In line with the IAIA and EPHA guidance, IEMA guidance recommends an approach based on the magnitude of change and the sensitivity of the receptor population, using a matrix as shown in Table 1 below. The IEMA guidance notes that the matrix is a tool to assist with professional

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<sup>2</sup> European Commission. Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (Directive 2011/92/ EU as amended by 2014/52/EU). Luxembourg: European Union. 2017

<sup>3</sup> Determinants of health are the environmental, socio-economic and lifestyle factors that influence health and wellbeing. [REDACTED]

judgement and there are no clear cut-off points between categories. Judgements on significance should be supported by contextual information as described above.

- 2.2.5 DMRB environmental assessment guidance<sup>4</sup> also provides a matrix to assess significance based on magnitude and sensitivity. The two assessment matrices are broadly consistent, with the following key differences:
- The DMRB matrix includes a 'no change' magnitude category, which is not included in the IEMA matrix. Health effects are scoped out where there is no change to a health determinant and therefore the absence of this category does not affect the assessment
  - The DMRB matrix includes a 'very high' sensitivity category, which is not included in the IEMA matrix. Receptors that would be classed as 'very high' under DMRB fall within the 'high' sensitivity category on the IEMA matrix
  - The DMRB matrix includes a 'very large' assessment rating, for which there is no equivalent in the IEMA matrix. Effects assessed as 'very large' under the DMRB guidance would be assessed as 'major' under the IEMA guidance
- 2.2.6 Both the DMRB and IEMA guidance documents state that effects identified as 'moderate' or 'above' should be considered significant. The sensitivity and magnitude categories resulting in a 'moderate' effect are consistent across both matrices, meaning there is no difference in terms of defining significance.
- 2.2.7 The IEMA significance matrix has been selected for use in this supplemental assessment as it is consistent with the DMRB guidance and is designed to be used in conjunction with the IEMA assessment criteria (Tables 2 and 3) to assess health effects. Table 1 below shows the IEMA significance matrix, with the equivalent DMRB terminology included in brackets. The selected significance matrix has been reviewed by relevant statutory consultees (See Section 3 Table 4).

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<sup>4</sup> Design Manual for Roads and Bridges Sustainability & Environment Appraisal, LA104 Environmental assessment and monitoring. Highways England, Transport Scotland, Welsh Government and Department for Infrastructure Northern Ireland, Revision 1, 2019 (See Table 3.8.1 Significance Matrix)

**Table 1. IEMA generic EIA significance matrix (DMRB equivalents in brackets)**

		Sensitivity			
		High (High)	Medium (Medium)	Low (Low)	Negligible (Negligible)
Magnitude	High (Major)	Major (Large or very large)	Major/moderate (Moderate or large)	Moderate/minor (Slight or moderate)	Minor/negligible (Slight)
	Medium (Moderate)	Major/moderate (Moderate or large)	Moderate (Moderate)	Minor (Slight)	Minor/negligible (Neutral or slight)
	Low (Minor)	Moderate/minor (Slight or moderate)	Minor (Slight)	Minor (Neutral or slight)	Negligible (Neutral or slight)
	Negligible (Negligible)	Minor/negligible (Slight)	Minor/negligible (Neutral or slight)	Negligible (Neutral or slight)	Negligible (Neutral)

2.2.8 An assessment of significance has been applied to all effects identified in the ES, including those identified as positive, negative, neutral or uncertain according to LA112. A reasonable worst-case approach has been applied in all cases.

## 2.3 Assessing population sensitivity

2.3.1 The IEMA guidance provides indicative criteria to inform judgements of population sensitivity, which are presented in Table 2 below. The guidance recommends that the use of these terms is supported by a narrative explaining the rationale for the assessment.

**Table 2. IEMA health sensitivity methodology criteria**

Category/ Level	Indicative criteria (judgement based on most relevant criteria; it is likely in any given analysis that some criteria will span categories) The narrative explains that the population or sub-population's sensitivity is driven by (select as appropriate):
High	High levels of deprivation (including pockets of deprivation); reliance on resources shared (between the population and the project); existing wide inequalities between the most and least healthy; a community whose outlook is predominantly anxiety or concern; people who are prevented from undertaking daily activities; dependants; people with very poor health status; and/or people with a very low capacity to adapt
Medium	Moderate levels of deprivation; few alternatives to shared resources; existing widening inequalities between the most and least healthy; a community whose outlook is predominantly uncertainty with some concern; people who are highly limited from undertaking daily activities; people providing or requiring a lot of care; people with poor health status; and/or people with a limited capacity to adapt
Low	Low levels of deprivation; many alternatives to shared resources; existing narrowing inequalities between the most and least healthy; a community whose outlook is predominantly ambivalence with some concern; people who are slightly limited from undertaking daily activities; people providing or requiring some care; people with fair health status; and/or people with a high capacity to adapt

Category/ Level	<b>Indicative criteria (judgement based on most relevant criteria; it is likely in any given analysis that some criteria will span categories)</b> The narrative explains that the population or sub-population's sensitivity is driven by (select as appropriate):
<b>Negligible</b>	Very low levels of deprivation; no shared resources; existing narrow inequalities between the most and least healthy; a community whose outlook is predominantly support with some concern; people who are not limited from undertaking daily activities; people who are independent (not a carer or dependant); people with good health status; and/or people with a very high capacity to adapt.

2.3.2 Section 13.7 of the ES provided an overall assessment of sensitivity for the study population within each scheme area and highlighted vulnerable groups with above-average representation within all or parts of the study area (APP-056).

2.3.3 For this Statement of Significance, the specific receptor population for each health effect has been categorised as having high, medium or low sensitivity to health effects, based on the IEMA sensitivity criteria. Assigning sensitivity to these categories has been undertaken through professional judgement, guided by the indicative criteria in Table 2. A commentary has been provided to explain the rationale for assigning sensitivity categories, with reference to the IEMA criteria and other relevant information. Populations with characteristics described as negligible in the IEMA methodology criteria have been assigned to the low sensitivity category, since it is considered that all populations will have a non-negligible level of sensitivity to health effects.

2.3.4 The assessment of sensitivity is based on the information available when the ES assessment was undertaken. This includes health baseline information (ES Section 13.7) and relevant information from other topic assessments, in particular the community facilities and receptors described in the population baseline (also in ES Section 13.7).

## 2.4 Assessing magnitude of change

2.4.1 The IEMA guidance provides indicative criteria to inform judgements of magnitude of change, which is presented in Table 3 below. The guidance recommends that the use of these terms is supported by a narrative explaining the rationale for the assessment.



**Table 3. IEMA health magnitude methodology criteria**

<b>Category/Level</b>	<b>Indicative criteria (judgement based on most relevant criteria; it is likely in any given analysis that some criteria will span categories)</b> The narrative explains that the magnitude of change due to the project is driven by (select as appropriate):
<b>High</b>	High exposure or scale; long-term duration; continuous frequency; severity predominantly related to mortality or changes in morbidity (physical or mental health) for very severe illness/ injury outcomes; majority of population affected; permanent change; substantial service quality implications
<b>Medium</b>	Low exposure or medium scale; medium-term duration; frequent events; severity predominantly related to moderate changes in morbidity or major change in quality-of-life; large minority of population affected; gradual reversal; small service quality implications
<b>Low</b>	Very low exposure or small scale; short-term duration; occasional events; severity predominantly related to minor change in morbidity or moderate change in quality-of-life; small minority of population affected; rapid reversal; slight service quality implications
<b>Negligible</b>	Negligible exposure or scale; very short-term duration; one-off frequency; severity predominantly relates to a minor change in quality-of-life; very few people affected; immediate reversal once activity complete; no service quality implication.

2.4.2 In accordance with LA112, the ES did not identify the magnitude of effects on health determinants using defined categories.

2.4.3 For this Statement of Significance, a magnitude category has been assigned to the identified effects on health determinants, using the IEMA magnitude criteria. The assessment considers both the magnitude of change in a health determinant and the nature of potential health outcomes associated with this change. A commentary has been provided to explain the rationale for assigning sensitivity categories, with reference to the IEMA criteria and any other relevant information.

2.4.4 The assessment of magnitude is based on the information available at the time the ES assessment was undertaken, which includes:

- Scheme information (e.g. construction activities and compounds, location, nature and scale of new infrastructure etc).
- Relevant information from other topic assessments, in particular population, noise, air quality, landscape and visual, traffic and transport assessment and equalities impact assessment (EqIA).
- Knowledge of associations between health determinants and health outcomes, based on published research (see Appendix 13.3, Health Evidence Review).

### 3. Consultation

3.1.1 The proposed methodology for the supplemental assessment of significance was sent to key stakeholder organisations for review in January 2023 prior to the completion of the supplemental assessment. Details of this consultation are provided in Table 4 below.

**Table 4. Consultation**

Consultee	Method of consultation	Comments	Response
<b>UK Health Security Agency (HSA)</b>	Email	<p>Joint response received from UKHSA and OHID. Points raised were:</p> <ul style="list-style-type: none"> <li>• Ensure adequate cross referencing between this assessment and the EqlA</li> <li>• Assessments of moderate or above should be considered significant for the purposes of the ES</li> <li>• Report should follow a structure where a route wide assessment is provided, followed by an individual assessment for each of the 8 schemes</li> </ul>	<ul style="list-style-type: none"> <li>• This study is based on ES Chapter 13, which is aligned with the EqlA. It is noted that the EqlA does not include a sensitivity assessment, since all protected characteristics groups are assumed to be sensitive.</li> <li>• Assessments of moderate or above are considered significant.</li> <li>• Suggested structure has been followed in this report.</li> </ul>
<b>Office for Health Improvement and Disparities (OHID)</b>	Email	As above	As above
<b>Director of Public Health for Cumbria</b>	Email	Acknowledgement received. No detailed comments.	N/A
<b>Director of Public Health for North Yorkshire</b>	Email	Acknowledgement received. No detailed comments.	N/A
<b>Director of Public Health for County Durham</b>	Email and meeting	Meeting requested by DCC.	Meeting held via Teams with DCC Public Health Strategic Manager to discuss the proposed methodology. No required changes identified.

### 3.2 Summary of significance assessment by scheme

#### *Route-wide construction assessment*

3.2.1 The ES reported one positive and two uncertain health effects in the route-wide construction assessment. Of these, none have been assessed as significant.

3.2.2 The assessment identified two positive and three negative non-significant health effects. Information on the supplemental assessment is presented in Appendix 1, Table 1.

### *Route-wide operational assessment*

3.2.3 The ES reported one uncertain health effect in the route-wide operational assessment, which was assessed as non-significant. Information on the supplemental assessment is presented in Appendix 1, Table 2.

### *M6 Junction 40 to Kemplay Bank construction assessment*

3.2.4 The ES health assessment reported one uncertain and four negative health effects in the M6 Junction 40 to Kemplay Bank area. Of these, the following have been assessed as significant effects:

- Moderate negative health effect resulting from combined visual, noise and vibration effects from construction activities.
- Moderate negative health effect resulting from HGV movements potentially affecting local amenity and severance.
- Moderate negative health effect resulting from direct and indirect temporary effects on parks and PRow, resulting in reduced availability and quality of green space.
- Major negative health effect resulting from loss of opportunity for access to green space, educational and therapeutic activities for vulnerable children at Happy Hooves Riding Centre.
- Moderate negative health effect resulting from traffic congestion leading to longer journey times, affecting access to services and facilities.

3.2.5 The assessment identified two negative non-significant health effects. Information on the supplemental assessment is presented in Appendix 1, Table 3.

### *M6 Junction 40 to Kemplay Bank operational assessment*

3.2.6 The ES health assessment reported one positive and one negative health effect in the M6 Junction 40 to Kemplay Bank area. Of these, the following have been assessed as significant effects:

- Moderate negative health effect resulting from visual effects of new road infrastructure.
- Moderate positive effect resulting from improved road safety on the A66 and associated junctions and links.

3.2.7 The assessment identified three negative non-significant health effects. Information on the supplemental assessment is presented in Appendix 1, Table 4.

### *Penrith to Temple Sowerby construction assessment*

3.2.8 The ES health assessment reported one negative health effect within the Penrith to Temple Sowerby area. This has been assessed as a significant effect:

- Moderate negative health effect resulting from increased journey times on the A66 and increased congestion on the surrounding road network, affecting access to local services and facilities.

3.2.9 The assessment identified two negative non-significant health effects. Information on the supplemental assessment is presented in Appendix 1, Table 5.

*Penrith to Temple Sowerby operational assessment*

3.2.10 The ES health assessment reported four positive health effects in the Penrith to Temple Sowerby operational assessment. Of these, the following have been assessed as significant effects:

- Moderate positive health effect resulting from changes in local traffic flows, reducing journey times and improving access to services and facilities.
- Moderate positive health effect resulting from reduced driver stress due to improved junction design.
- Major positive health effect resulting from road safety improvements.
- Moderate positive health effect resulting from improved opportunities for physical activity and access to green space following provision of shared cycle/footway to north side of A66 between Penrith and Temple Sowerby.

3.2.11 The assessment identified three negative non-significant health effects. Information on the supplemental assessment is presented in Appendix 1, Table 6.

*Temple Sowerby to Appleby construction assessment*

3.2.12 The ES health assessment reported one uncertain and three negative health effects within the Temple Sowerby to Appleby area. Of these, the following have been assessed as significant effects:

- Moderate negative health effect resulting from combined visual, noise and vibration effects from construction activities at Kirkby Thore Primary School and residential areas including Low Moor Park and Sanderson's Croft.
- Moderate negative health effect resulting from HGV movements affecting local amenity and severance.
- Moderate negative health effect resulting from a reduction in access to green space and physical activity from direct and indirect effects on PRow and cycle routes close to Kirkby Thore and Crackenthorpe.
- Moderate negative health effect resulting from temporary loss of Kirkby Thore School sports pitch for utility diversion.

3.2.13 The assessment identified two negative non-significant health effects. Information on the supplemental assessment is presented in Appendix 1, Table 7.

### *Temple Sowerby to Appleby operational assessment*

3.2.14 The ES health assessment reported four positive and two negative health effects within the Temple Sowerby to Appleby area. Of these, the following have been assessed as significant effects:

- Moderate positive health effect resulting from reduced noise exposure in central southern and eastern areas of Kirkby Thore.
- Moderate positive health effect resulting from changes in local traffic flows, reducing journey times and improving access to services.
- Major positive health effect resulting from road safety improvements.
- Moderate positive health effect resulting from increased opportunities for physical activity and access to green space due to the provision of a new shared footway / cycleway from Kirkby Thore to Appleby.
- Moderate negative health effect resulting from combined visual and noise effects of the new road at Kirkby Thore.
- Moderate negative health effect resulting from reduced opportunities for physical activity and access to green space due to direct and indirect impacts on rural PRow close to Kirkby Thore and Crackenthorpe.

3.2.15 The assessment identified one negative non-significant health effect. Information on the supplemental assessment is presented in Appendix 1, Table 8.

### *Appleby to Brough construction assessment*

3.2.16 The ES health assessment reported no positive or negative health effects within the Appleby to Brough area.

3.2.17 The assessment identified four negative non-significant health effects. Information on the supplemental assessment is presented in Appendix 1, Table 9.

### *Appleby to Brough operational assessment*

3.2.18 The ES health assessment reported four positive health effects within the Appleby to Brough area. All of these have been assessed as significant effects:

- Moderate positive health effect resulting from changes in local traffic flows, reducing journey times and improving access to services for rural communities.
- Moderate positive health effect resulting from reduced driver stress.
- Major positive health effect resulting from road safety improvements.
- Moderate positive effect at operational phase resulting from improved opportunities for physical activity and access to green space following provision of a shared cycle/footway.

3.2.19 The assessment identified two negative non-significant health effects. Information on the supplemental assessment is presented in Appendix 1, Table 10.

### *Bowes Bypass construction assessment*

3.2.20 The ES health assessment reported one negative and one uncertain health effect within the Bowes Bypass area. Of these, one has been assessed as a significant effect:

- Moderate negative health effect at construction phase resulting from changes in local traffic flows, affecting journey times and accessibility.

3.2.21 The assessment identified three negative non-significant health effects. Information on the supplemental assessment is presented in Appendix 1, Table 11.

### *Bowes Bypass operational assessment*

3.2.22 The ES health assessment reported two positive health effects within the Bowes Bypass area. Of these, the following have been assessed as significant effects:

- Moderate positive health effect at operational phase resulting from changes in local traffic flows, affecting journey times and accessibility.
- Moderate positive health effect at operational phase resulting from road safety improvements.

3.2.23 The assessment identified one positive and two negative non-significant health effects. Information on the supplemental assessment is presented in Appendix 1, Table 12.

### *Cross Lanes to Rokeby construction assessment*

3.2.24 The ES health assessment reported no positive or negative health effects within the Cross Lanes to Rokeby area.

3.2.25 The assessment identified three negative non-significant health effects. Information on the supplemental assessment is presented in Appendix 1, Table 13.

### *Cross Lanes to Rokeby operational assessment*

3.2.26 The ES health assessment reported one positive health effect within the Cross Lanes to Rokeby area, which has been assessed as a significant effect. A further positive effect has been identified as a result of a net reduction in traffic flow through Barnard Castle, which was assessed as neutral in the ES. The significant effects identified include:

- Moderate positive health effect resulting from reduced traffic and noise impacts on residential areas and community facilities in Barnard Castle.
- Major positive health effect resulting from road safety improvements.

3.2.27 The assessment identified two positive and three negative non-significant health effects. Information on the supplemental assessment is presented in Appendix 1, Table 14.

### *Stephen Bank to Carkin Moor construction assessment*

3.2.28 The ES health assessment reported no positive or negative health effects within the Stephen Bank to Carkin Moor area.



- 3.2.29 The assessment identified four negative non-significant health effects. Further information on the assessment is presented in Appendix 1, Table 15.
- Stephen Bank to Carkin Moor operational assessment*
- 3.2.30 The ES health assessment reported one negative and four positive health effects within the Stephen Bank to Carkin Moor area. Of these, the following have been assessed as significant effects:
- Moderate positive health effect resulting from changes in local traffic flows, reducing journey times improving access to services for rural communities.
  - Moderate positive health effect resulting from improved junction design leading to reduced driver stress.
  - Major positive health effect resulting from road safety improvements.
  - Moderate positive effect resulting from improved opportunities for physical activity and access to green space following provision of shared cycle/footway.
- 3.2.31 The assessment identified two negative non-significant health effects. Information on the supplemental assessment is presented in Appendix 1, Table 16.
- A1(M) Junction 53 to Scotch Corner construction assessment*
- 3.2.32 The ES health assessment reported no positive or negative health effects within the A1 (M) Junction 53 to Scotch Corner area.
- 3.2.33 The assessment identified three negative non-significant health effects. Information on the supplemental assessment is presented in Appendix 1, Table 17.
- A1(M) Junction 53 to Scotch Corner operational assessment*
- 3.2.34 The ES health assessment reported one negative health effect within the A1 (M) Junction 53 to Scotch Corner area. This has been assessed as a significant effect:
- Moderate negative health effect resulting from increased risk of road traffic accidents due to increased traffic flows on A1 (M) Junction 53.
- 3.2.35 The assessment identified one negative non-significant health effect. Information on the supplemental assessment is presented in Appendix 1, Table 18.

## Appendix 1 - Significance assessment tables

The tables below present the health effects identified in Chapter 13 of the Environmental Statement. For each health effect a significance assessment is provided, based on a supplemental assessment of the sensitivity of receptors and magnitude of change (see Sections 3 and 4 of this report). A commentary is provided within the table to explain the judgements made on sensitivity and magnitude.

**Table 1. Route-wide - Construction effects**

Route-wide – Construction effects				
ES Ref (para)	ES assessment of effect on health determinant and outcomes	Sensitivity assessment	Magnitude assessment	Significance
13.10.40	Change in level and distribution of traffic emissions (NO <sub>2</sub> , PM <sub>10</sub> and PM <sub>2.5</sub> ). <b>Neutral</b> health effect.	<b>Low.</b> There are no AQMA in the study area. NO <sub>2</sub> , PM <sub>10</sub> and PM <sub>2.5</sub> concentrations are well within the relevant air quality objectives, meaning that the ambient air quality is good. There is an above average proportion of older people in the study area, who are likely to be more sensitive to the effects of air pollution. However, under 75s mortality rate from respiratory disease is below the national average in all local authority areas apart from County Durham.	<b>Low.</b> Evidence links air quality to respiratory health and mortality rates. Five-year construction programme is considered medium-term duration in the context of air quality effects (health outcomes are based on studies of long-term exposure). Seven receptors exceed DMRB threshold for a non-imperceptible effect on human exposure to NO <sub>2</sub> . No receptors exceed this threshold for PM <sub>10</sub> and PM <sub>2.5</sub> . Overall change in population exposure to NO <sub>2</sub> , PM <sub>10</sub> and PM <sub>2.5</sub> is negligible.	<b>Minor negative (not significant)</b>
13.10.41 – 13.10.42	Increase in employment opportunities during construction. <b>Positive</b> health effect.	<b>Low.</b> Overall low levels of unemployment and deprivation at route-wide level, with no LSOAs in the 10-20% most deprived areas for employment deprivation and two LSOAs in the 30-40% most deprived areas for employment.	<b>Medium.</b> Evidence links employment and income to life expectancy and a range of mental and physical health outcomes. Estimated maximum monthly workforce of 540 staff over a five-year construction programme, considered medium-term duration in the context of employment effects.	<b>Minor positive (not significant)</b>



<b>Route-wide – Construction effects</b>				
<b>ES Ref (para)</b>	<b>ES assessment of effect on health determinant and outcomes</b>	<b>Sensitivity assessment</b>	<b>Magnitude assessment</b>	<b>Significance</b>
			Majority of professional and skilled workers likely to come from outside the local area. Skills and Employment Strategy will set out proposals for working with local training infrastructure to maximise local skills and employment outcomes.	
13.10.43	Increased spend on local services and supply chains, leading to economic & employment benefits. Indirect employment is not quantified. <b>Uncertain</b> health effect.	<b>Low.</b> Overall low levels of unemployment and deprivation at route-wide level, with no LSOAs in the 10-20% most deprived areas for employment deprivation and two LSOAs in the 30-40% most deprived areas for employment.	<b>Medium.</b> Evidence links employment and income to life expectancy and a range of mental and physical health outcomes. Five-year construction programme is considered medium-term duration in the context of employment and economic effects. Increased spend by the construction workforce on accommodation, retail and hospitality is likely to be small compared with overall spend in the area. Skills and Employment Strategy will set out open procurement processes and measures to support local enterprises. Therefore, a reasonable worst case assumption has been made	<b>Minor positive (not significant)</b>
13.10.44 – 13.10.45	Increased demand for housing from the construction workforce, resulting in increased rental costs and displacement of tourists. <b>Uncertain</b> health effect.	<b>Low.</b> The ES population baseline identifies sufficient housing supply in the study area and wider region. Property price to earnings ratios <sup>5</sup> are below the national average (more affordable than average) in County Durham and close to the national average in the other local authority areas. There are low levels of health and social deprivation across the study area.	<b>Medium.</b> Evidence links housing quality to a range of mental and physical health outcomes (Appendix 1). Five-year construction programme is considered medium-term duration in the context of housing market effects. Accommodation Strategy will be prepared in consultation with the Local Planning Authorities, which will aim to ensure that additional demand created by non-home-based workers does not place excessive pressure on the local housing market and visitor	<b>Minor negative (not significant)</b>

<sup>5</sup> <https://www.ons.gov.uk/peoplepopulationandcommunity/housing/bulletins/housingaffordabilityinenglandandwales/2021#local-authority-housing-affordability>

Route-wide – Construction effects				
ES Ref (para)	ES assessment of effect on health determinant and outcomes	Sensitivity assessment	Magnitude assessment	Significance
			accommodation supply. Details of the strategy are not yet available, including whether accommodation will be provided for workers. Therefore, a reasonable worst case assumption has been made.	
13.10.46	Increased demand for public services from the construction workforce, resulting in increased rental costs and pressure on service provision. Also potential for workers to displace tourists. <b>Neutral</b> health effect.	<b>Medium.</b> Communities in rural areas have limited local services and rely on buses and private car to access services in towns such as Penrith and Barnard Castle. There are low levels of health and social deprivation across the study area, but an above average proportion of older people, who are more likely to rely on public services.	<b>Low.</b> Evidence links access to health services to a range of mental and physical health outcomes. Five-year construction programme is considered long-term duration in the context of effects on public services. It is considered that the majority of non-home-based workers will continue to be registered with their existing GPs rather than registering with a GP in the local area. Occupational healthcare and first aid provided by the contractor(s) will reduce the additional demand for local services, including A&E services.	<b>Minor negative (not significant)</b>

Table 2. Route-wide - Operational effects

Route-wide – Operational effects				
ES Ref (para)	ES assessment of effect on health determinant and outcomes	Sensitivity assessment	Magnitude assessment	Significance
13.10.47 – 13.10.50	Local employment and economic benefits resulting from improved access and reduced	<b>Medium.</b> Overall low levels of unemployment and deprivation at route-wide level, with no LSOAs in the 10-20% most deprived areas for employment deprivation and two LSOAs	<b>Low.</b> Evidence links employment and income to life expectancy and a range of mental and physical health outcomes. Economic benefits in study area are unknown, although local	<b>Minor positive (not significant)</b>

Route-wide – Operational effects				
ES Ref (para)	ES assessment of effect on health determinant and outcomes	Sensitivity assessment	Magnitude assessment	Significance
	journey times. <b>Uncertain</b> health effect.	in the 30-40% most deprived areas for employment. However, discussion with local businesses (see Outline Business Case) indicated that existing congestion on the A66 and unreliable journey times is seen as a restraint to economic growth.	communities will benefit from shorter, more reliable journey times, which may help support the growth of local businesses and improve commuting times. Due to uncertainty about the scale of local employment and economic benefits, a reasonable worst case assessment has been made.	

**Table 3: M6 Junction 40 to Kemplay Bank - Construction effects**

M6 Junction 40 to Kemplay Bank – Construction effects				
ES Ref (para)	ES assessment of effect on health determinant and outcomes	Sensitivity assessment	Magnitude assessment	Significance
13.10.90	Local air emissions and dust risk from construction activities. <b>Neutral</b> health effect.	<b>Medium.</b> There are no AQMAs in the study area. NO <sub>2</sub> , PM <sub>10</sub> and PM <sub>2.5</sub> concentrations are well within the relevant air quality objectives, meaning that the ambient air quality is good. Two out of three directly affected LSOAs have above average proportions of older people and people living with disabilities or long-term health problems, who are likely to be more sensitive to the effects of air pollution. The under 75s mortality rate from respiratory disease in Eden District is below the national average.	<b>Low.</b> Evidence links air quality to respiratory health and mortality rates. Activities giving rise to emissions will occur periodically throughout the five-year construction period - considered short-term duration in the context of air quality effects (health outcomes are based on studies of long-term exposure). The Air Quality assessment has not identified any significant effects on NO <sub>x</sub> and PM <sub>10</sub> concentrations resulting from construction activities. Dust mitigation set out in Chapter 5 of the ES is considered to remove any significant impacts.	<b>Minor negative (not significant)</b>

<b>M6 Junction 40 to Kemplay Bank – Construction effects</b>				
<b>ES Ref (para)</b>	<b>ES assessment of effect on health determinant and outcomes</b>	<b>Sensitivity assessment</b>	<b>Magnitude assessment</b>	<b>Significance</b>
13.10.91	Combined visual, noise and vibration effects from construction activities. <b>Negative</b> health effect.	<b>High.</b> Two of the three directly affected LSOAs have above average levels of deprivation (30 to 40% most deprived) and above average proportions of people living with disabilities or long-term health problems, some of whom may be more sensitive to the effects of noise and vibration. All LSOAs are in the 40 to 50% least deprived areas in terms of mental health. Residential areas in the study area are affected by traffic noise from the existing A66 and views of the existing road infrastructure.	<b>Medium.</b> Evidence links noise and visual amenity to mental wellbeing and quality of life. The scheme is located close to residential areas and public parks, which will be exposed to intermittent construction noise, visual intrusion and light spill. Significant adverse effects on sensitive receptors are identified in the relevant topic assessments, and there will be noticeable changes in noise and visual amenity in the public realm close to the scheme. The level of impact will vary depending on construction activities throughout the five-year construction period. Due to the intermittent nature of exposure, the health effect is assessed as moderate.	<b>Moderate negative (significant)</b>
13.10.92	HGV movements affecting local amenity. <b>Uncertain</b> health effect.	<b>High.</b> Penrith has low levels of deprivation overall, with pockets of above average deprivation (30 to 40% most deprived) in the Castle Hill and Pategill area. Penrith contains an above average proportion of people over 65, who may be more sensitive to the effects of HGV traffic due to issues such as impaired mobility. The proportion of children is close to the national average. The study area contains sensitive receptors including schools, care homes and Penrith Hospital,	<b>Medium.</b> Evidence shows the link between increase of HGVs on road and perceptions of safety and increased noise levels and visual severance. The scheme is located in a suburban area on the edge of Penrith. The location of construction traffic routes and the number of HGV movements on local roads is not known at this stage. A Construction Traffic Management Plan (CTMP) will be developed to minimise as far as possible the adverse effects of construction traffic. A reasonable worst-case assumption has been made of a medium magnitude effect. Based on the commitment to prepare a CTMP, the health effect is assessed as moderate.	<b>Moderate negative (significant)</b>

<b>M6 Junction 40 to Kemplay Bank – Construction effects</b>				
<b>ES Ref (para)</b>	<b>ES assessment of effect on health determinant and outcomes</b>	<b>Sensitivity assessment</b>	<b>Magnitude assessment</b>	<b>Significance</b>
13.10.94	Reduced availability and quality of green space. <b>Negative</b> health effect.	<b>Medium.</b> The community in the study area has access to parks, playing fields, rural PRow and cycleways. Two of the three directly affected LSOAs have above average levels of deprivation (30 to 40% most deprived) and above average proportions of people living with disabilities or long-term health problems, some of whom may be more sensitive to the effects of availability of green space. All LSOAs are in the 40 to 50% least deprived areas in terms of mental health.	<b>Medium.</b> Evidence links access to green space with opportunities for physical activity, social interaction and a range of physical and mental health benefits. Impacts include temporary or permanent diversion of six footpaths and the Penrith to Greystoke cycle route, visual impacts on Wetheriggs Country Park and two PRow at Skirsgill Park and Brougham, exposure to noise in parts of Wetheriggs Country Park and PRow close to the scheme. The amenity value of these resources will be affected consistently or periodically throughout the five year construction period, considered to be a long-term effect in the context of green space. Alternative PRow and local parks are available.	<b>Moderate negative (significant)</b>
13.10.95	Loss of opportunity for access to green space, educational and therapeutic activities for vulnerable children at Happy Hooves Riding Centre. <b>Negative</b> health effect.	<b>High.</b> As well as catering for the general public, Happy Hooves Riding Centre is part of the Riding for the Disabled Programme. Its users include children and adults with a range of physical and learning disabilities and children who are not engaging effectively with mainstream education. There are no known alternative facilities in the local area.	<b>High.</b> The Riding Centre provides access to green space, physical activity, social interaction, educational and therapeutic activities, which benefit the health and wellbeing of its users. The Centre will be prevented from operating due to the loss of 52% of the site during construction and the noise and visual impacts on the remaining land. The magnitude of effect is high due to the loss of this facility.	<b>Major negative (significant)</b>

<b>M6 Junction 40 to Kemplay Bank – Construction effects</b>				
<b>ES Ref (para)</b>	<b>ES assessment of effect on health determinant and outcomes</b>	<b>Sensitivity assessment</b>	<b>Magnitude assessment</b>	<b>Significance</b>
13.10.96	Traffic congestion leading to longer journey times, affecting access to services and facilities. <b>Negative</b> health effect.	<b>Medium.</b> Two of the three directly affected LSOAs have above average levels of deprivation (30 to 40% most deprived) and above average proportions of people living with disabilities or long-term health problems. Rural communities to the south of Penrith have low levels of deprivation, but an above average proportion of older people who are more likely to rely on public services. Communities to the south of Kemplay Bank rely on services and facilities in Penrith, including local shops, Penrith Hospital, the Lakes Medical Practice, Penrith Leisure Centre and Ullswater Community College. Bus services intersect the scheme at Kemplay Bank Roundabout, providing links into Penrith from south. Bus services also run along the A66 linking Penrith with settlements to the east and west.	<b>Medium.</b> Evidence links access to health services to a range of mental and physical health outcomes. Increased congestion on the M6 Junction 40, Kemplay Bank Roundabout and A66. Delays will occur periodically throughout the five-year construction period, which is considered a long-term duration in the context of community severance. Traffic will be diverted onto local roads, with the potential to cause additional congestion. There may be increased journey times to community facilities from rural communities south of Penrith, and for local journeys around Pategill Road. The CTMP will aim to minimise knock-on effects on the local road network. Delays have not been modelled, so a reasonable worst-case assessment of medium magnitude impact on severance and accessibility has been made.	<b>Moderate negative (significant)</b>
13.10.97	Effects on emergency response times from Penrith Community Fire and Ambulance Station. <b>Neutral</b> health effect.	<b>High.</b> Users of these emergency services are assumed to be experiencing adverse circumstances such as fire or medical emergencies and therefore have a high sensitivity.	<b>Negligible.</b> Penrith Community Fire and Ambulance Station is located on Kemplay Bank Roundabout. The CTMP will set out measures, developed in consultation with the emergency services, to maintain adequate access for the emergency services throughout the construction phase.	<b>Minor negative (not significant)</b>

**Table 4: M6 Junction 40 to Kemplay Bank - Operational effects**

<b>M6 Junction 40 to Kemplay Bank – Operational effects</b>				
<b>ES Ref (para)</b>	<b>ES assessment of effect on health determinant and outcomes</b>	<b>Sensitivity assessment</b>	<b>Magnitude assessment</b>	<b>Significance</b>
13.10.98	Changes in level and distribution of traffic emissions (NO <sub>2</sub> , PM <sub>10</sub> and PM <sub>2.5</sub> ). <b>Neutral</b> health effect.	<b>Medium.</b> There are no AQMA within the M6 Junction 40 to Kemplay Bank scheme study area. Department for Environment Food and Rural Affairs (DEFRA) background pollutant concentrations and local authority air quality monitoring data has identified that NO <sub>2</sub> , PM <sub>10</sub> and PM <sub>2.5</sub> concentrations are well within the relevant air quality objectives, meaning that the ambient air quality in the study area is good. Scheme located in proximity to a primary school, a hospital and sports and recreational facilities. Users of these facilities are likely to be more sensitive to the effects of air pollution. Two out of three directly affected LSOAs have above average proportions of older people and people living with disabilities or long-term health problems, who are likely to be more sensitive to the effects of air pollution. The under 75s mortality rate from respiratory disease in the study area is below the national average.	<b>Low.</b> Evidence links air quality to respiratory health and mortality rates. The Project will affect local air quality through changes in traffic flow, speed and fleet composition. The Air Quality Assessment (Chapter 5: Air Quality) has identified small increases and decreases in NO <sub>x</sub> and PM <sub>10</sub> concentrations at some locations close to the affected road network within the study area. Predicted concentrations will exceed the air quality objective for NO <sub>2</sub> as a result of the Project at two residential receptors on Ullswater Road in Penrith. Based on the air quality assessment, it is considered that there will be no change in exposure of the population to air pollutants during operation.	<b>Minor negative (not significant)</b>
13.10.99	Changes in exposure to traffic noise. <b>Neutral</b> health effect.	<b>Medium.</b> Two of the three directly affected LSOAs have above average levels of deprivation (30 to 40% most deprived for health and disability) and above average proportions of people living with disabilities or long-term health problems, some of whom may be more sensitive to the effects of noise	<b>Low.</b> Evidence links pro-longed noise levels to worsening of mental wellbeing and quality of life. The noise and vibration assessment identifies significant adverse and beneficial effects on residential and non-residential receptors as a result of changes to traffic flows in the study area. Across the scheme, the changes in	<b>Minor negative (not significant)</b>



<b>M6 Junction 40 to Kemplay Bank – Operational effects</b>				
<b>ES Ref (para)</b>	<b>ES assessment of effect on health determinant and outcomes</b>	<b>Sensitivity assessment</b>	<b>Magnitude assessment</b>	<b>Significance</b>
		and vibration. All LSOAs are in the 40 to 50% least deprived areas in terms of mental health. There are four NIAs identified in the study area.	exposure to traffic noise will be low and are not expected to affect levels of annoyance, enjoyment of outdoor space, quality of sleep or perception of quality of the local environment at population scale.	
13.10.100 – 13.10.101	Visual effects of new road infrastructure. <b>Negative</b> health effect, reducing to <b>neutral</b> .	<b>Medium.</b> Two out of three directly affected LSOAs have above average proportions of older people and people living with disabilities or long-term health problems. All LSOAs are in the 40 to 50% least deprived areas in terms of mental health. Visual receptors affected by potential loss of amenity include residential receptors on Clifford Road, Penrith, users of the local ProWs and visitors of the Wetherigss Country Park and Happy Hooves Riding Centre.	<b>Medium.</b> Evidence links landscape and visual environment to mental wellbeing and life satisfaction. The landscape and visual assessment (LVIA) has identified significant adverse impacts on viewpoints in the vicinity of the scheme. These impacts will reduce to slight (non- significant) impacts over 15 years as planting becomes established. During the early stages of operation, visual effects will result in reduced enjoyment of outdoor space and reduced satisfaction with the local environment. The health effect will be reduced to neutral once vegetation becomes established and the community becomes used to the presence of the new infrastructure.	<b>Moderate negative (significant)</b>
13.10.102	Changes in local traffic flows, affecting journey times and accessibility. <b>Neutral</b> health effect.	<b>Medium.</b> Two out of the three LSOAs are within the 40% and 10% least deprived areas in England measured across all indices in the IMD. All LSOAs rank within the 40% and 50% least deprived areas in terms of mental health. Communities to the south of Kemplay Bank rely on services and facilities in Penrith, including local shops, Penrith Hospital, the Lakes Medical Practice, Penrith Leisure Centre and Ullswater Community College. Bus services intersect the scheme at	<b>Low.</b> Evidence suggests there is a link between ability to access community facilities/services and improved mental and physical health. The Transport Assessment describes that the changes in local traffic flows resulting from the Project. Local journey times on the A66, M6 Junction 40 and Kemplay Junction will improve. However, increased traffic flows into Penrith, for instance on the A592 Ullswater Road, are likely to lead to minor increases in congestion elsewhere on the local road network.	<b>Minor negative (not significant)</b>



<b>M6 Junction 40 to Kemplay Bank – Operational effects</b>				
<b>ES Ref (para)</b>	<b>ES assessment of effect on health determinant and outcomes</b>	<b>Sensitivity assessment</b>	<b>Magnitude assessment</b>	<b>Significance</b>
		Kemplay Bank Roundabout, providing links into Penrith from south. Bus services also run along the A66 linking Penrith with settlements to the east and west.		
13.10.103	Road safety improvements at M6 Junction 40. <b>Positive</b> health effect.	<b>Medium.</b> Scheme located in proximity to a primary school, a hospital and sports and recreational facilities. Users of these facilities more likely to be sensitive in relation to road safety. Two of the three LSOAs experience people with long-term disabilities and higher proportion of people aged 65 and over. People from these groups are more likely to be sensitive around road safety and could be more likely to suffer from impaired mobility and inability to safely cross roads.	<b>High.</b> The Road Safety assessment reported in the Transport Assessment predicts that, over the 60-year appraisal period, the Project will save 23 slight, 3 serious and 0 fatal casualties on the M6 Junction 40 to Kemplay Bank section of the A66 and associated junctions and links.	<b>Major positive (significant)</b>
13.10.104	Access and safety implications for WCH crossing Kemplay Bank Roundabout. <b>Neutral</b> health effect.	<b>Low.</b> A number of footpaths run within the Order Limits of the M6 Junction 40 to Kemplay Bank, providing access to services for communities such as direct access to Ullswater Community College and North Lakes School. In addition, some of the footpaths connect to regional cycle routes that allow for journeys serving wider needs. Two out of the three LSOAs are within the 40% and 10% least deprived areas in England measured across all indices in the IMD.	<b>Negligible.</b> Evidence suggests there is a link between ability to adopt active lifestyles and improved mental and physical health. Access for WCH across the M6 Junction 40 and Kemplay Bank roundabouts will be retained, as will the existing shared use cycle/footway runs along the north side of the A66.	<b>Negligible(not significant)</b>

**Table 5. Penrith to Temple Sowerby – Construction effects**

<b>Penrith to Temple Sowerby – Construction effects</b>				
<b>ES Ref (para)</b>	<b>ES assessment of effect on health determinant and outcomes</b>	<b>Sensitivity assessment</b>	<b>Magnitude assessment</b>	<b>Significance</b>
13.10.27	Local air emissions and dust risk from construction activities. <b>Neutral</b> health effect	<b>Low.</b> There are no AQMA within the Penrith to Temple Sowerby scheme study area. Defra background pollutant concentrations and local authority air quality monitoring data has identified that NO <sub>2</sub> , PM <sub>10</sub> and PM <sub>2.5</sub> concentrations are well within the relevant air quality objectives, meaning that the ambient air quality in the study area is good. This area includes an above average proportion of older people. Older people are more likely than others to have existing health conditions and therefore may be more vulnerable to some adverse health effects. The area has below average proportion of people living with disabilities and are within the 40% least deprived across England. The under 75s mortality rate from respiratory disease in Eden District (17 per 100,000) is below the national average (34.2 per 100,000).	<b>Low.</b> Evidence links air quality to respiratory health and mortality rates. Four-year construction programme is considered short-term duration in the context of air quality effects (health outcomes are based on studies of long-term exposure). The Air Quality assessment has not identified any significant effects on NO <sub>x</sub> and PM <sub>10</sub> concentrations resulting from construction activities. Dust mitigation set out in Chapter 5 of the ES is considered to remove any significant impacts.	<b>Minor negative (not significant)</b>
13.10.28	Combined visual, noise and vibration effects from construction activities. <b>Neutral</b> health effect.	<b>Medium.</b> Both LSOAs where the scheme is located have an above average proportion of over 65s when compared to the national average, some of whom may be more sensitive to the effects of noise and vibration. The study area falls within the 40% least deprived areas in England across all indices of IMD and within 10% least deprived areas for health and disability. The two LSOAs where the scheme is located are within the	<b>Low.</b> Evidence links noise and visual amenity to mental wellbeing and quality of life. Residents of rural properties close to the draft Order Limits are likely to be impacted temporarily by construction noise. This will combine with close range views of construction activities from rural properties. There are no environmental effects on public open spaces or other sensitive community receptors. Individual and combined noise and visual	<b>Minor negative (not significant)</b>

<b>Penrith to Temple Sowerby – Construction effects</b>				
<b>ES Ref (para)</b>	<b>ES assessment of effect on health determinant and outcomes</b>	<b>Sensitivity assessment</b>	<b>Magnitude assessment</b>	<b>Significance</b>
		40% and 20% least deprived in terms of mental health. The levels of people with disabilities and long-term health problems are below national averages.	effects may result in a temporary reduction in the perceived quality of the living environment for the affected residents given the four-year construction period. Due to the low population density in the study area, the extent of exposure to these changes will be low.	
13.10.29	HGV movements affecting local amenity. <b>Neutral</b> health effect.	<b>Medium.</b> Both LSOAs are within the 10% least deprived in terms of health and disability. Both LSOAs have an above average proportion of over 65s when compared to the national average, who may be more sensitive to the effects of HGV traffic due to issues such as impaired mobility. The proportion of children is close to the national average. The study area has a low population density and there are no sensitive receptors close to the scheme.	<b>Negligible.</b> Evidence shows the link between increased HGVs on the roads and perceptions of safety and increased noise levels and visual severance. The CTMP will ensure that HGVs are prevented from using small rural roads and will be routed along suitable major roads, such as the existing A66, through the Penrith to Temple Sowerby area. This is confirmed within Annex B13 of the Environmental Management Plan (EMP). Due to the low population density along the A66 in this area, the health effect from HGV traffic is assessed as negligible.	<b>Negligible (not significant)</b>
13.10.31	Effects on access to green space and physical activity from diversion of PRow and cycle route. <b>Neutral</b> health effect	<b>Medium.</b> The study area is rural and sparsely populated. There is an above average proportion of people over 65. The two affected LSOAs have below average levels of deprivation (40% least deprived) and below national average proportions of people living with disabilities or long-term health problems. Both LSOAs are in the 20% to 40% least deprived areas in terms of mental health.	<b>Low.</b> Evidence suggests there is a link between the ability to access to green space and improved mental and physical health. Two footpaths and National Cycle Network (NCN) route 71 will be diverted during the construction phase of four years. The LVIA has also identified significant adverse visual impacts on two rural PRow in this area. The diversion of NCN 71 is not considered to reduce the value of this resource for health, since the route will remain open throughout construction and the additional distance and amenity impacts will be slight in the context the	<b>Minor negative (not significant)</b>

<b>Penrith to Temple Sowerby – Construction effects</b>				
<b>ES Ref (para)</b>	<b>ES assessment of effect on health determinant and outcomes</b>	<b>Sensitivity assessment</b>	<b>Magnitude assessment</b>	<b>Significance</b>
			overall route. Impacts on PRoW are considered to have a small effect on overall access to green space and opportunities for physical activity due to the rural context and the availability of alternative recreational routes.	
13.10.32	Changes in local traffic flows, affecting journey times and accessibility. <b>Negative</b> health effect.	<b>High.</b> The study area is rural and sparsely populated. The rural community is dependent on travel to centres such as Penrith and Temple Sowerby to access services and community facilities. There is an above average proportion of people over 65. Older people are more likely to have impaired mobility and to use services such as public transport to access services such as health and social care, making them more vulnerable to effects following from congestion, journey times and accessibility.	<b>Medium.</b> Evidence suggests there is a link between ability to access community facilities/services and improved mental and physical health. The four-year construction period will lead to increased journey times on the A66 due to traffic management measures such as reduced speed limits and temporary closures of lanes and slip roads. Measures implemented through the CTMP will aim to minimise knock-on effects on the local road network. The Transport Assessment predicts that significant volumes of traffic will be diverted through Temple Sowerby, causing congestion in the village. Traffic will be monitored and action, such as traffic calming measures, will be taken to reduce traffic through the village. For the community of Temple Sowerby and surrounding rural areas, journey times are likely to be impacted both on and off the A66. Impacts on access to services such as Temple Sowerby Medical Practice, and facilities in larger centres such as Penrith, will be reduced through mitigation measures set out in the CTMP. For the majority of those affected, increased journey times may cause	<b>Moderate negative (significant)</b>

Penrith to Temple Sowerby – Construction effects				
ES Ref (para)	ES assessment of effect on health determinant and outcomes	Sensitivity assessment	Magnitude assessment	Significance
			annoyance, until the change becomes established; however, a small proportion of people may be discouraged from travelling to access services and facilities .	

Table 6. Penrith to Temple Sowerby – Operational effects

Penrith to Temple Sowerby – Operational effects				
ES Ref (para)	ES assessment of effect on health determinant and outcomes	Sensitivity assessment	Magnitude assessment	Significance
13.10.33	Changes in level and distribution of traffic emissions (NO <sub>2</sub> , PM <sub>10</sub> and PM <sub>2.5</sub> ). <b>Neutral</b> health effect.	<b>Low.</b> There are no AQMAs in the study area. NO <sub>2</sub> , PM <sub>10</sub> and PM <sub>2.5</sub> concentrations are well within the relevant air quality objectives, meaning that the ambient air quality is good. The study area is rural and sparsely populated. There is an above average proportion of people over 65. Older people are more likely to be vulnerable to health effects from traffic emissions effects. The two affected LSOAs have below average levels of deprivation (40% least deprived) and below proportions of people living with disabilities or long-term health problems. Both LSOAs are in the 20% to 40% least deprived areas in terms of mental health.	<b>Low.</b> Evidence links air quality to respiratory health and mortality rates. The Project will affect local air quality through changes to road alignment traffic flow, speed and fleet composition. The Air Quality Assessment has identified small increases and decreases in NO <sub>x</sub> and PM <sub>10</sub> concentrations at receptors close to the affected road network within the study area. However, as the air quality across the study area is good and the number of sensitive receptors experiencing changes in air quality is low, no significant air quality impacts have been identified for the Penrith to Temple Sowerby area.	<b>Minor negative (not significant)</b>

<b>Penrith to Temple Sowerby – Operational effects</b>				
<b>ES Ref (para)</b>	<b>ES assessment of effect on health determinant and outcomes</b>	<b>Sensitivity assessment</b>	<b>Magnitude assessment</b>	<b>Significance</b>
1310.34 - 13.10.35	Changes in exposure to traffic noise. <b>Neutral</b> health effect.	<b>Medium.</b> The study area is rural and sparsely populated. The two affected LSOAs have below average levels of deprivation (40% least deprived) and below proportions of people living with disabilities or long-term health problems. There is an above average proportion of people over 65, who are more likely to experience the effects from changes in traffic noise. Both LSOAs are in the 20% to 40% least deprived areas in terms of mental health. There no NIAs identified in the study area.	<b>Low.</b> Evidence links pro-longed noise levels to worsening of mental wellbeing and quality of life. The noise and vibration assessment identifies significant adverse and beneficial effects on residential and non-residential receptors as a result of changes to traffic flows in the study area. Across the scheme, the change in exposure to traffic noise is low and is not expected to lead to changes in levels of annoyance, enjoyment of outdoor space, quality of sleep or perception of quality of the local environment at population scale.	<b>Minor negative (not significant)</b>
13.10.36	Visual effects of new road infrastructure. <b>Neutral</b> health effect	<b>Medium.</b> The study area is rural and sparsely populated. Both LSOAs are in the 20% to 40% least deprived areas in terms of mental health. Visual receptors within the study area that are likely to be affected by visual effects of new road infrastructure include the local PRoW and national cycle network users.	<b>Low.</b> Evidence links landscape and visual environment to improved health and wellbeing, improved levels of obesity and higher rates of physical activity in young and older people. The LVIA has identified significant adverse impacts on viewpoints from rural areas in the vicinity of the scheme. The visual impacts of the scheme in this area will affect unpopulated rural locations and individual rural properties.	<b>Minor negative (not significant)</b>
13.10.37	Changes in local traffic flows, affecting journey times and accessibility. <b>Positive</b> health effect.	<b>High.</b> The study area is rural and sparsely populated. The rural community is dependent on travel to centres such as Penrith and Temple Sowerby to access services and community facilities. There is an above average proportion of people over 65 who are likely to be more sensitive to changes in journey times and accessibility when accessing services of in the west of Penrith,	<b>Medium.</b> Evidence suggests there is a link between ability to access community facilities/services and improved mental and physical health. Traffic congestion along the A66 will be reduced as a result of the Project, leading to shorter, more reliable journey times. This will lead to improved connectivity for the rural communities in the study area to facilities, shops and services in Penrith and elsewhere. Better	<b>Moderate positive (significant)</b>

Penrith to Temple Sowerby – Operational effects				
ES Ref (para)	ES assessment of effect on health determinant and outcomes	Sensitivity assessment	Magnitude assessment	Significance
		Eamont Bridge and Temple Sowerby in the east. The two affected LSOAs have below average levels of deprivation (40% least deprived).	connectivity can benefit mental and physical health through increased access to a wide range of resources including employment, educational facilities, health and social care, sport, leisure and cultural facilities as well as basic needs such as food shopping, and increased opportunities for social interaction. The improved connectivity resulting from the Project is likely to result in a small increase in the number of people accessing these resources.	
13.10.38	Reduced driver stress due to junction safety improvements. <b>Positive</b> health effect.	<b>Medium.</b> The study area is rural and sparsely populated. There is an above average proportion of people over 65. Older people are more likely to have impaired mobility and may be more sensitive to road safety improvements. Profile of Center Parcs tourist facility staff and visitors not available.	<b>Medium.</b> The existing at-grade junction at Centre Parcs will be replaced by a grade-separated junction, removing the need to cross oncoming traffic when turning right. The resulting reduction in driver stress on this stretch of the A66 is considered a positive wellbeing effect for road users.	<b>Moderate positive (significant)</b>
13.10.39	Road safety improvements <b>Positive</b> health effect.	<b>Medium.</b> The study area is rural and sparsely populated. There is an above average proportion of people over 65. Older people are more likely to have impaired mobility and may be more sensitive to road safety improvements.	<b>High.</b> The Road Safety assessment reported in the Transport Assessment predicts that, over the 60-year appraisal period, the Project will save 9 slight, 13 serious and 2 fatal casualties on the Penrith to Temple Sowerby section of the A66 and associated junctions and links. This is due to the removal of the single carriageway, junction improvements and diversion of traffic from the surrounding rural road network.	<b>Major positive (significant)</b>



<b>Penrith to Temple Sowerby – Operational effects</b>				
<b>ES Ref (para)</b>	<b>ES assessment of effect on health determinant and outcomes</b>	<b>Sensitivity assessment</b>	<b>Magnitude assessment</b>	<b>Significance</b>
13.10.40	Improved opportunities for physical activity and access to green space following provision of shared cycle/footway to north side of A66 between Penrith and Temple Sowerby. <b>Positive</b> health effect.	<b>Medium.</b> The study area is rural and sparsely populated. The two affected LSOAs have below average levels of deprivation (40% least deprived).	<b>Medium.</b> Evidence suggests there is a link between ability to access infrastructure enabling active lifestyles and improved mental and physical health. A parallel shared cycleway/footway will be provided on the north side of the A66 between Penrith and Temple Sowerby. Two existing rural routes (Byway 311013 and Footpath 311004), which currently terminate at the A66, will be connected via the new route and grade-separated junction, creating enhanced opportunities for walking and cycling. By providing a safe crossing of the A66 and a 6-mile segregated route between Penrith and Temple Sowerby, the scheme will encourage active travel, physical activity and access to the countryside, which are linked to positive mental and physical health outcomes.	<b>Moderate positive (significant)</b>



**Table 7. Temple Sowerby to Appleby – Construction effects**

<b>Temple Sowerby to Appleby – Construction effects</b>				
<b>ES Ref (para)</b>	<b>ES assessment of effect on health determinant and outcomes</b>	<b>Sensitivity assessment</b>	<b>Magnitude assessment</b>	<b>Significance</b>
13.10.82	Local air emissions and dust risk from construction activities. <b>Neutral</b> health effect	<p><b>Medium.</b> There are no AQMA within the Temple Sowerby to Appleby scheme area. Defra background pollutant concentrations and local authority air quality monitoring data has identified that NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations are well within the relevant air quality objectives, meaning that the ambient air quality in the study area is good.</p> <p>The area includes an above average proportion of people over 65. Older people are more likely than others to have existing health conditions and therefore may be more vulnerable to some adverse air quality effects. The presence of Kirkby Thore Primary School means that a large number of children are present in the study area, close to the Order Limits. Children are particularly vulnerable as air quality effects can have lasting impacts on longer term respiratory health. One of the LSOAs has a below average proportion of under 16s compared to national averages, and both LSOAs have above national average proportion of over 65s. Both LSOAs have a below average percentage of people living with disabilities or long-term health problems that limit day to day activities. Both LSOAs are ranked within 10% least deprived areas for health and disability (40% least deprived across all indices).</p>	<p><b>Low.</b> Evidence links air quality to respiratory health and mortality rates. Three-year construction programme is considered short-term duration in the context of air quality effects (health outcomes are based on studies of long-term exposure). Requirements for dust mitigation set out in Air Quality assessment are considered to remove any significant impacts on sensitive receptors such as Kirkby Thore Primary School and the residential areas of Dunfell View and Sanderson's Croft. The Air Quality assessment has not identified any significant effects on NO<sub>x</sub> and PM<sub>10</sub> concentrations resulting from construction activities.</p>	<b>Minor negative (not significant)</b>

<b>Temple Sowerby to Appleby – Construction effects</b>				
<b>ES Ref (para)</b>	<b>ES assessment of effect on health determinant and outcomes</b>	<b>Sensitivity assessment</b>	<b>Magnitude assessment</b>	<b>Significance</b>
13.10.83	Combined visual, noise and vibration effects from construction activities. <b>Negative</b> health effect.	<b>Medium.</b> This area includes an above average proportion of people over 65. Older people are more likely than others to have existing health conditions and therefore may be more vulnerable to some adverse noise and vibration effects. Both LSOAs are ranked within 10% least deprived areas for health and disability (40% least deprived across all indices). There is one NIA within the study area.	<b>High.</b> Evidence links noise and visual amenity to mental wellbeing and quality of life. The school and residential areas on the northern and western edges of Kirkby Thore are in proximity to construction activities and therefore are likely to be impacted by construction noise. Construction noise effects will combine with significant visual effects reported in LVIA in residential areas on the western and northern edges of Kirkby Thore, including Low Moor Park and Sandersons Croft, and at Kirkby Thore Primary School. Lighting during occasional night-time working will result in additional glare and localised light spill. These combined effects are likely to result in a temporary increase in levels of annoyance, reduced enjoyment of the public realm and open space, and a reduction in the perceived quality of the living environment for the affected communities given the three-year construction period.	<b>Moderate negative (significant)</b>
13.10.84	HGV movements affecting local amenity. <b>Uncertain</b> health effect.	<b>Medium.</b> Both LSOAs have an above average proportion of over 65s when compared to the national average, who may be more sensitive to the effects of HGV traffic due to issues such as impaired mobility. The proportion of children is close to the national average. The community has access to local services and facilities in Temple Sowerby, Kirkby Thore and Appleby.	<b>Medium.</b> Evidence shows the link between increased HGVs on the roads and perceptions of safety and increased noise levels and visual severance. To construct the Project, large quantities of materials will be transported to construction compounds. The CTMP will ensure that HGVs are prevented from using small rural roads and will be routed along suitable major roads, such as the existing A66, through the Temple Sowerby to Appleby area. This is	<b>Moderate negative (significant)</b>

<b>Temple Sowerby to Appleby – Construction effects</b>				
<b>ES Ref (para)</b>	<b>ES assessment of effect on health determinant and outcomes</b>	<b>Sensitivity assessment</b>	<b>Magnitude assessment</b>	<b>Significance</b>
			confirmed within Annex B13 of the Environmental Management Plan (EMP). The A66 passes close to Kirkby Thore and Crackenthorpe and the presence of additional HGVs in these locations is likely to reduce the perceived quality of the local environment because of concerns about air emissions, noise and visual amenity and safety. The impacts will depend on the number of HGV movements and the implementation of measures included in the CTMP. Therefore, a reasonable worst-case assessment has been made.	
13.10.86	Effects on access to green space and physical activity from diversion of PRoW and cycle route. <b>Negative</b> health effect	<b>Medium.</b> One of the LSOAs has a below average proportion of under 16s compared to national averages, and both LSOAs have above national average proportion of over 65s. Older people are more likely to have impaired mobility and are likely to use green spaces regularly, making them more vulnerable to impacts on severance and accessibility. Both LSOAs have a below average percentage of people living with disabilities or long-term health problems that limit day to day activities. Both LSOAs are ranked within 10% least deprived areas for health and disability (40% least deprived across all indices).	<b>Medium.</b> Evidence suggests there is a link between the ability to access to green space, community facilities/services and improved mental and physical health. Impacts on access to publicly accessible green space and PRoW during construction will include the temporary or permanent diversion of 13 footpaths, six bridleways and the Eden Valley Cycle Route over the three-year construction period. The LVIA has identified significant adverse visual impacts on seven PRoW and the Eden Valley Cycle Route. PRoW close to construction activities are also likely to be impacted by noise. The affected PRoW are in proximity to settlements in the study area, in particular at Kirkby Thore and Crackenthorpe. The direct and indirect impacts on PRoW are likely to reduce people's enjoyment of these routes and may	<b>Moderate negative (significant)</b>

Temple Sowerby to Appleby – Construction effects				
ES Ref (para)	ES assessment of effect on health determinant and outcomes	Sensitivity assessment	Magnitude assessment	Significance
			deter some from using them for physical activity and access to the countryside, reducing the mental and physical health benefits linked to these activities.	
13.10.87	Temporary loss of sports pitch due to diversion of utility. <b>Negative</b> health effect	<b>High.</b> The Kirkby Thore Primary School sport pitch is being used all year round. The only potential alternative is the Appleby Sports Centre. However, this is not considered to be at a suitable distance for primary school children to access freely.	<b>Medium.</b> The sports pitch provides access to green space, physical activity, social interaction, which benefit the health and wellbeing of its users. Evidence provides the link between access to open green spaces and sports facilities to increased active lifestyles and improvement of general physical and mental wellbeing. The sports pitch will be temporarily required to facilitate the diversion of a utility and will be returned to its existing use upon completion of the works. The temporary land take equates to approximately 0.15ha which is approximately 35% of the outdoor space available to the school. This will temporarily reduce area available for children to take part in sport and outdoor exercise. The remaining field will remain in use.	<b>Moderate negative (significant)</b>
13.10.88	Changes in local traffic flows, affecting journey times and accessibility. <b>Neutral</b> health effect.	<b>Medium.</b> There is an above average proportion of people over 65. Older people are more likely to have impaired mobility and to use services such as public transport to access services such as health and social care, making them more vulnerable to effects following from congestion, journey times and accessibility. The community has access to local services and facilities in Temple Sowerby, Kirkby Thore and Appleby.	<b>Low.</b> Evidence suggests there is a link between ability to access community facilities/services and improved mental and physical health. The majority of the new dual carriageway will be built offline, with traffic management measures such as temporary speed limits and lane closures required around the tie-in points between existing and new carriageway, resulting in short periods of disruption. The Transport Assessment	<b>Minor negative (not significant)</b>

Temple Sowerby to Appleby – Construction effects				
ES Ref (para)	ES assessment of effect on health determinant and outcomes	Sensitivity assessment	Magnitude assessment	Significance
			has not identified any significant increases in traffic flows on the local road network in the Temple Sowerby to Appleby area. Communities in this area will experience congestion elsewhere on the A66 when accessing services and facilities in Penrith, but journey times to Appleby-in-Westmoreland will not be affected.	

Table 8. Temple Sowerby to Appleby – Operational effects

Temple Sowerby to Appleby – Operational effects				
ES Ref (para)	ES assessment of effect on health determinant and outcomes	Sensitivity assessment	Magnitude assessment	Significance
13.10.89	Changes in level and distribution of traffic emissions (NO <sub>2</sub> , PM <sub>10</sub> and PM <sub>2.5</sub> ). <b>Neutral</b> health effect.	<b>Medium.</b> There are no AQMA within the Temple Sowerby to Appleby scheme area. Defra background pollutant concentrations and local authority air quality monitoring data has identified that NO <sub>2</sub> , PM <sub>10</sub> and PM <sub>2.5</sub> concentrations are well within the relevant air quality objectives, meaning that the ambient air quality in the study area is good.  The area includes an above average proportion of people over 65. Older people are more likely than others to have existing health conditions and therefore may be more vulnerable to some adverse air quality effects. The presence of Kirkby Thore Primary School means that a large	<b>Low.</b> Evidence links air quality to respiratory health and mortality rates. The Air Quality Assessment has identified small increases and decreases in NO <sub>x</sub> and PM <sub>10</sub> concentrations at receptors close to the affected road network within the study area. However, as the air quality across the study area is good and the number of sensitive receptors experiencing changes in air quality is low, health effects are not significant.	<b>Minor negative (not significant)</b>

Temple Sowerby to Appleby – Operational effects				
ES Ref (para)	ES assessment of effect on health determinant and outcomes	Sensitivity assessment	Magnitude assessment	Significance
		number of children are present in the study area. Children are particularly vulnerable as air quality effects can have lasting impacts on longer term respiratory health. One of the LSOAs has a below average proportion of under 16s compared to national averages, and both LSOAs have above national average proportion of over 65s. Both LSOAs have a below average percentage of people living with disabilities or long-term health problems that limit day to day activities. Both LSOAs are ranked within 10% least deprived areas for health and disability (40% least deprived across all indices).		
13.10.90	Combined adverse visual and noise effects in Kirkby Thore. <b>Negative</b> health effect.	<b>Medium.</b> The two affected LSOAs have below average levels of deprivation (40% least deprived) and below proportions of people living with disabilities or long-term health problems. There is an above average proportion of people over 65. Both LSOAs are in the 20% to 40% least deprived areas in terms of mental health. There no NIAs identified in the study area. The area includes a primary school.	<b>Medium.</b> Evidence links noise and visual amenity to mental wellbeing and quality of life. The noise assessment has identified significant effects on residential and non-residential receptors. In Sanderson Croft, on the north side of Kirkby Thore, there will be adverse noise effects at 57 properties. There will also be significant adverse visual effects on residential and non-residential properties, which will reduce as planting becomes established. There will also be adverse visual impacts on the west side of the village at Low Moor Park, Priest Lane, Kirkby Thore Primary School. Combined noise and visual effects will result in reduced enjoyment of outdoor space and satisfaction with the local environment.	<b>Moderate negative (significant)</b>

<b>Temple Sowerby to Appleby – Operational effects</b>				
<b>ES Ref (para)</b>	<b>ES assessment of effect on health determinant and outcomes</b>	<b>Sensitivity assessment</b>	<b>Magnitude assessment</b>	<b>Significance</b>
13.10.91	Changes in traffic noise levels in central, southern and easter areas of Kirkby Thore. <b>Positive</b> health effect.	<b>Medium.</b> The two affected LSOAs have below average levels of deprivation (40% least deprived) and below proportions of people living with disabilities or long-term health problems. There is an above average proportion of people over 65. Both LSOAs are in the 20% to 40% least deprived areas in terms of mental health. There no NIAs identified in the study area. Kirkby Thore School is located within the affected area.	<b>High.</b> Evidence links noise and visual amenity to mental wellbeing and quality of life. Significant beneficial noise effects are predicted at 223 dwellings in central, southern and eastern Kirkby Thore (including Low Moor Park), nine non-residential receptors including Kirkby Thore Primary School, a playground, village hall, shops and places of worship, and 11 PRow. The community in the central, southern and eastern areas of Kirkby Thore will experience reduced levels of annoyance and sleep disturbance and increased enjoyment of outside space due to reductions in traffic noise.	<b>Moderate positive (significant)</b>
13.10.95 – 13.10.96, 13.10.98	Changes in local traffic flows, affecting journey times and accessibility. <b>Positive</b> health effect.	<b>Medium.</b> There is an above average proportion of people over 65. Older people are more likely to have impaired mobility and to use services such as public transport to access services such as health and social care, making them more vulnerable to effects following from congestion, journey times and accessibility. The two affected LSOAs have below average levels of deprivation (40% least deprived) and below average proportions of people living with disabilities or long-term health problems. The community has access to local services and facilities in Temple Sowerby, Kirkby Thore and Appleby.	<b>Medium.</b> Evidence suggests there is a link between ability to access community facilities/services and improved mental and physical health. Traffic congestion along the dualled A66 will be reduced, leading to shorter, more reliable journey times and improved connectivity for rural communities to facilities, shops and services in Penrith and Appleby-in-Westmorland. Better connectivity can benefit mental and physical health through increased access to a wide range of resources including employment, educational facilities, health and social care, sport, leisure and cultural facilities, basic needs such as food shopping, and opportunities for social interaction	<b>Moderate positive (significant)</b>



<b>Temple Sowerby to Appleby – Operational effects</b>				
<b>ES Ref (para)</b>	<b>ES assessment of effect on health determinant and outcomes</b>	<b>Sensitivity assessment</b>	<b>Magnitude assessment</b>	<b>Significance</b>
13.10.97	Road safety improvements <b>Positive</b> health effect.	<b>Medium.</b> The study area is rural and sparsely populated. There is an above average proportion of people over 65. Older people are more likely to have impaired mobility and be more sensitive to road safety improvements.	<b>High.</b> The Road Safety assessment predicts that, over the 60-year appraisal period, the Project will save 184 slight, 39 serious and 4 fatal casualties on the Temple Sowerby to Appleby section of the A66 and associated junctions and links. This is due to the removal of the single carriageway, junction improvements and diversion of traffic from the surrounding rural road network. The speed limit on the de-trunked A66 will be reduced from 40 to 30mph. These changes will improve conditions for pedestrians and cyclists, increasing community connectivity within the village.	<b>Major positive (significant)</b>
13.10.99-13.10.100	Reduced opportunities for physical activity and access to green space due to impacts on existing PRow. <b>Negative</b> health effect.	<b>Medium.</b> The study area is rural and sparsely populated. The two affected LSOAs have below average levels of deprivation (40% least deprived).	<b>Medium.</b> Evidence suggests there is a link between ability to access infrastructure enabling active lifestyles and improved mental and physical health. To the north of Kirkby Thore, three rural PRow (Bridleway 336018 and Footpaths 336017 and 336013) will be crossed by the scheme. These will be diverted across the dual carriageway via the grade-separated junction, with diversion distances ranging from negligible to 500m. To the north of Crackenthorpe, the new dual carriageway will run alongside Bridleway 341001 (and old Roman Road) for approximately 2 miles and will cross three rural PRow currently linked to the bridleway. The amenity of these routes will be impacted by traffic noise from the new dual	<b>Moderate negative (significant)</b>



Temple Sowerby to Appleby – Operational effects				
ES Ref (para)	ES assessment of effect on health determinant and outcomes	Sensitivity assessment	Magnitude assessment	Significance
			carriageway. These PRoW are close to communities on the north side of the village and there are no alternative routes in the immediate area. It is considered that these impacts are likely to deter some residents from using the PRoW for physical activity and access to the countryside, reducing the mental and physical health benefits linked to these activities.	
13.10.101	Improved opportunities for physical activity and access to green space due to provision of a new shared cycle/footway. <b>Positive</b> health effect.	<b>Medium.</b> The study area is rural and sparsely populated. The two affected LSOAs have below average levels of deprivation (40% least deprived).	<b>Medium.</b> Evidence suggests there is a link between ability to access infrastructure enabling active lifestyles and improved mental and physical health.  A new shared cycle/footway will be provided alongside the de-trunked A66 from Kirkby Thore to the western extent of Appleby. The new 5-mile segregated route will encourage active travel, physical activity and access to the countryside.	<b>Moderate positive (significant)</b>

**Table 9. Appleby to Brough – Construction effects**

<b>Appleby to Brough – Construction effects</b>				
<b>ES Ref (para)</b>	<b>ES assessment of effect on health determinant and outcomes</b>	<b>Sensitivity assessment</b>	<b>Magnitude assessment</b>	<b>Significance</b>
13.10.146	Local air emissions and dust risk from construction activities. <b>Neutral</b> health effect	<b>Medium.</b> There are no AQMA within the Appleby to Brough study area. Defra background pollutant concentrations and local authority air quality monitoring data has identified that NO <sub>2</sub> , PM <sub>10</sub> and PM <sub>2.5</sub> concentrations are well within the relevant air quality objectives, meaning that the ambient air quality in the study area is good. Environmental effects caused by the construction of the scheme will occur in rural areas with low population density to the east of Appleby, and close to the villages of Warcop and Brough. This area includes an above average proportion of people over 65. Older people are more likely than others to have existing health conditions and therefore may be more vulnerable to some adverse health effects. The two LSOAs where the study area falls are within the 40% most deprived areas in terms of all indices of deprivation.	<b>Low.</b> Evidence links air quality to respiratory health and mortality rates. The 2.5-years construction programme is considered short-term duration in the context of air quality effects (health outcomes are based on studies of long-term exposure). The Air Quality Assessment has identified a large construction dust risk potential for high-sensitivity receptors within 100m of the draft Order Limits. Residents in a number of rural properties and farmsteads, Warcop village and Warcop Training Camp will therefore be at risk of adverse impacts on wellbeing from dust effects. However, requirements for dust mitigation set out in Chapter 5 are considered to remove any significant impacts. The Air Quality assessment has not identified any significant effects on NO <sub>x</sub> and PM <sub>10</sub> concentrations resulting from construction activities.	<b>Minor negative (not significant)</b>
13.10.147	Combined visual, noise and vibration effects from construction activities. <b>Neutral</b> health effect.	<b>Medium.</b> The study area includes an above average proportion of people over 65. Older people are more likely than others to have existing health conditions and therefore may be more vulnerable to some adverse noise and vibration effects. The two LSOAs forming the study area fall within the 10% and 30%	<b>Low.</b> Evidence links noise and visual amenity to mental wellbeing and quality of life. Residents on the eastern edge of Warcop and in rural properties close to the draft Order Limits are likely to be impacted temporarily by construction noise. This will combine with views of construction activities from rural areas	<b>Minor negative (not significant)</b>

<b>Appleby to Brough – Construction effects</b>				
<b>ES Ref (para)</b>	<b>ES assessment of effect on health determinant and outcomes</b>	<b>Sensitivity assessment</b>	<b>Magnitude assessment</b>	<b>Significance</b>
		least deprived areas in term of health and disability. There is one NIA within the study area.	as described in Landscape and Visual Impact Assessment. There are no adverse noise or visual effects on public open spaces or other sensitive community receptors. Individual and combined noise and visual effects may result in a temporary reduction in the perceived quality of the living environment for residents of rural properties. Due to the low population density in the study area, the extent of exposure to these changes will be low	
13.10.148	HGV movements affecting local amenity. <b>Neutral</b> health effect.	<b>Medium.</b> The study area includes an above average proportion of people over 65 who may be more sensitive to the effects of HGV traffic due to issues such as impaired mobility.	<b>Negligible.</b> Evidence shows the link between increase of HGVs on road and perceptions of safety, amenity and severance. The CTMP will ensure that HGVs will be routed along suitable major roads, such as the existing A66, and will be prevented from passing through minor roads in the villages of Warcop and Brough. Therefore, no likely health effects are identified.	<b>Negligible(not significant)</b>
13.10.150	Effects on access to green space and physical activity from diversion of PRow and cycle route. <b>Neutral</b> health effect	<b>Medium.</b> The study area is rural and contains a number of villages, including Warcop, which is close to the Order Limits. There is an above average proportion of people over 65, who are more likely to have impaired mobility and to use green spaces regularly, making them more vulnerable to impacts on severance and accessibility. The study area falls within 40% most deprived areas in England.	<b>Low.</b> Evidence links noise and visual amenity to mental wellbeing and quality of life. Impacts on access to green space and PRow during construction will include the temporary or permanent diversion of 11 rural footpaths and six rural bridleways, and the loss of land from the south side of Ketland Common, which will be mitigated by increasing the boundary elsewhere. The LVIA has identified significant adverse visual impacts on five rural PRow, one of which crosses Ketland Common.	<b>Minor negative (not significant)</b>

<b>Appleby to Brough – Construction effects</b>				
<b>ES Ref (para)</b>	<b>ES assessment of effect on health determinant and outcomes</b>	<b>Sensitivity assessment</b>	<b>Magnitude assessment</b>	<b>Significance</b>
			Impacts on PRoW in this area are considered to have a small effect on overall access to green space and opportunities for physical activity due to the rural context and the availability of alternative recreational routes	
13.10.151	Changes in local traffic flows, affecting journey times and accessibility. <b>Neutral</b> health effect.	<b>High.</b> The rural community is dependent on travel to centres such as Appleby and Brough to access services and community facilities. The study area has a higher than average proportion of people over 65. Older people are more likely to have impaired mobility and to use services such as public transport to access services such as health and social care, making them more vulnerable to effects following from congestion, journey times and accessibility. The study area has below average people living with disabilities or long-term health problems that limit day to day activities.	<b>Low.</b> Evidence suggests there is a link between ability to access community facilities/services and improved mental and physical health. The construction of the dual carriageway will include offline and online elements and online works will lead to periodic increases in journey times on the A66 due to traffic management measures such as reduced speed limits and the temporary closure of lanes and slip roads. These delays will affect access to the villages of Appleby-in-Westmoreland and Brough. Based on information presented in the Transport Assessment, it is not considered that the journey time delays would hinder access to services and facilities for rural communities in the study area.	<b>Minor negative (significant)</b>

**Table 10. Appleby to Brough – Operational effects**

<b>Appleby to Brough – Operational effects</b>				
<b>ES Ref (para)</b>	<b>ES assessment of effect on health determinant and outcomes</b>	<b>Sensitivity assessment</b>	<b>Magnitude assessment</b>	<b>Significance</b>
13.10.152	Changes in level and distribution of traffic emissions (NO <sub>2</sub> , PM <sub>10</sub> and PM <sub>2.5</sub> ). <b>Neutral</b> health effect.	<b>Medium.</b> There are no AQMA within the Appleby to Brough study area. Defra background pollutant concentrations and local authority air quality monitoring data has identified that NO <sub>2</sub> , PM <sub>10</sub> and PM <sub>2.5</sub> concentrations are well within the relevant air quality objectives, meaning that the ambient air quality in the study area is good. The study area includes an above average proportion of people over 65. Older people are more likely than others to have existing health conditions and therefore may be more vulnerable to some adverse health effects. The two LSOAs where the study area falls are within the 40% most deprived areas in terms of all indices of deprivation.	<b>Low.</b> Evidence links air quality to respiratory health and mortality rates. The Project will affect local air quality through changes to road alignment traffic flow, speed and fleet composition. The Air Quality Assessment has identified small increases and decreases in NO <sub>x</sub> and PM <sub>10</sub> concentrations at receptors close to the affected road network within the study area. However, as the air quality across the study area is good and the number of sensitive receptors experiencing changes in air quality is low, no significant air quality impacts have been identified.	<b>Minor negative (not significant)</b>
13.10.153-13.10.154	Combined visual, noise and vibration effects traffic noise. <b>Neutral</b> health effect.	<b>Medium.</b> The two affected LSOAs have slightly above average levels of deprivation (40% most deprived). There is an above average proportion of people over 65.	<b>Low.</b> Evidence links noise and visual amenity to mental wellbeing and quality of life. The Noise and Vibration assessment and the Landscape and Visual identify significant adverse and beneficial effects on residential and non-residential receptors. The Project will increase the traffic flow on the existing dual carriageway resulting in a significant adverse effect on noise on 16 residential properties on Lady Anne Drive on the southern edge of Brough. This may reduce enjoyment of outdoor space and perceptions of the quality of the local environment for these residents.	<b>Minor negative (not significant)</b>

Appleby to Brough – Operational effects				
ES Ref (para)	ES assessment of effect on health determinant and outcomes	Sensitivity assessment	Magnitude assessment	Significance
			<p>However, the number of properties affected is low.</p> <p>There will also be significant adverse noise effects at 17 rural dwellings throughout the study area. Residents in these properties may experience negative changes in levels of annoyance, sleep disturbance and enjoyment of outdoor space. Due to the low level of exposure, these noise effects are not considered to give rise to changes in population health and wellbeing.</p>	
13.10.155	<p>Changes in local traffic flows, affecting journey times and accessibility.</p> <p><b>Positive</b> health effect.</p>	<p><b>High.</b> The rural community is dependent on travel to centres such as Appleby and Brough to access services and community facilities. There is an above average proportion of people over 65. Older people are more likely to have impaired mobility and to use services such as public transport to access services such as health and social care, making them more vulnerable to effects following from congestion, journey times and accessibility. The two affected LSOAs have above average levels of deprivation (40% most deprived) and below average proportions of people living with disabilities or long-term health problems.</p>	<p><b>Medium.</b> Evidence suggests there is a link between ability to access community facilities/services and improved mental and physical health. Traffic congestion along the A66 will be reduced as a result of the Project, leading to shorter, more reliable journey times. This will lead to improved connectivity for the rural communities in the study area to facilities, shops and services in Appleby-in-Westmorland and elsewhere. Better connectivity can benefit mental and physical health through increased access to a wide range of resources including employment, educational facilities, health and social care, sport, leisure and cultural facilities, basic needs such as food shopping, and opportunities for social interaction. The improved connectivity resulting from the Project is likely to result in a small increase in</p>	<p><b>Moderate positive (significant)</b></p>

<b>Appleby to Brough – Operational effects</b>				
<b>ES Ref (para)</b>	<b>ES assessment of effect on health determinant and outcomes</b>	<b>Sensitivity assessment</b>	<b>Magnitude assessment</b>	<b>Significance</b>
			the number of people accessing these resources.	
13.10.156 -13.10.157	Improved junction layout reducing driver stress. <b>Positive</b> health effect.	<b>Medium.</b> The study area is rural and sparsely populated. There is an above average proportion of people over 65. Older people are more likely to have impaired mobility and be more sensitive to road safety improvements.	<b>High.</b> Three at-grade junctions at Sandford, Warcop and Brough will be replaced by grade-separated junctions, which will improve safety by removing the need to cross oncoming traffic when turning right. In addition, two existing field accesses and two minor side roads will be diverted to use the grade-separated junctions. The resulting reduction in driver stress on this stretch of the A66 is considered to have a positive wellbeing effect for road users.	<b>Moderate positive (significant)</b>
13.10.156 -13.10.157	Road safety improvements. <b>Positive</b> health effect.	<b>Medium.</b> The study area is rural and sparsely populated. There is an above average proportion of people over 65. Older people are more likely to have impaired mobility and be more sensitive to road safety improvements.	<b>High.</b> The Road Safety assessment predicts that, over the 60-year appraisal period, the Project will save 129 slight, 36 serious and 5 fatal casualties on the Appleby to Brough section of the A66 and associated junctions and links. This is due to the removal of the single carriageway, junction improvements and diversion of traffic from the surrounding rural road network.	<b>Major positive (significant)</b>
13.10.158	Improved opportunities for physical activity and access to green space due to provision of a new shared cycle/footway. <b>Positive</b> health effect.	<b>Medium.</b> The study area is rural and sparsely populated. The two affected LSOAs have slightly above average levels of deprivation (40% most deprived). There is an above average proportion of people over 65.	<b>Medium.</b> Evidence suggests there is a link between ability to access infrastructure enabling active lifestyles and improved mental and physical health. A shared cycleway/footway is proposed to run alongside the dual carriageway from east of Appleby to Brough. The route will connect into 10 existing	<b>Moderate positive (significant)</b>



<b>Appleby to Brough – Operational effects</b>				
<b>ES Ref (para)</b>	<b>ES assessment of effect on health determinant and outcomes</b>	<b>Sensitivity assessment</b>	<b>Magnitude assessment</b>	<b>Significance</b>
			<p>PRoW which currently terminate at the A66. Proposed safe crossing points at grade-separated junctions and shared underpasses will improve pedestrian access and remove the severance caused by the existing A66. The new 5-mile segregated route and improved north-south connectivity on the rural PRoW network will encourage active travel, physical activity and access to the countryside, which are linked to positive mental and physical health outcomes.</p>	

**Table 11. Bowes Bypass – Construction effects**

<b>Bowes Bypass – Construction effects</b>				
<b>ES Ref (para)</b>	<b>ES assessment of effect on health determinant and outcomes</b>	<b>Sensitivity assessment</b>	<b>Magnitude assessment</b>	<b>Significance</b>
13.10.192	Local air emissions and dust risk from construction activities. <b>Neutral</b> health effect	<p><b>Low.</b> There are no AQMA within the Bowes Bypass study area. Defra background pollutant concentrations and local authority air quality monitoring data has identified that NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations are well within the relevant air quality objectives, meaning that the ambient air quality in the study area is good.</p> <p>Environmental effects caused by the construction of the scheme will occur in proximity to the village of Bowes. This area includes an above average proportion of people over 65. Older people are more likely than others to have existing health conditions and therefore may be more vulnerable to some adverse health effects. The presence of Bowes Hutchinson Primary School means that a large number of children are present in the study area, close to the Order Limits. Children are particularly vulnerable as effects can have lasting impacts on longer term health. The LSOA where the study area is located is ranked within the 50% most deprived areas. The under 75s mortality rate from respiratory disease in County Durham (42.4 per 100,000) compares poorly against the national average (33.6 per 100,000).</p>	<p><b>Low.</b> Evidence links air quality to respiratory health and mortality rates. The two years construction programme is considered short-term duration in the context of air quality effects (health outcomes are based on studies of long-term exposure). The Air Quality Assessment has identified a large construction dust risk potential for high-sensitivity receptors within 100m of the draft Order Limits. Residents on The Street and Bowes Hutchinson Primary School will therefore be at risk of adverse impacts on wellbeing from dust effects. Requirements for dust mitigation set out in Air Quality assessment are considered to remove any significant impacts. The Air Quality assessment has not identified any significant effects on NO<sub>x</sub> and PM<sub>10</sub> concentrations resulting from construction activities.</p>	<b>Minor negative (not significant)</b>

<b>Bowes Bypass – Construction effects</b>				
<b>ES Ref (para)</b>	<b>ES assessment of effect on health determinant and outcomes</b>	<b>Sensitivity assessment</b>	<b>Magnitude assessment</b>	<b>Significance</b>
13.10.193	Combined visual, noise and vibration effects from construction activities. <b>Negative</b> health effect.	<b>Medium.</b> This area includes an above average proportion of people over 65. Older people are more likely than others to have existing health conditions and therefore may be more vulnerable to some adverse noise and vibration effects. The presence of Bowes Hutchinson Primary School means that a large number of children are present in the study area, close to the Order Limits. Children are particularly vulnerable as effects can have lasting impacts on longer term health. The LSOA where the study area is located is ranked within the 50% most deprived areas. There is no NIA within the study area	<b>Medium.</b> Evidence links noise and visual amenity to mental wellbeing and quality of life. Bowes Hutchinson Primary School, residential properties on the north side of The Street and properties on Clint Lane to the north of the A66 are located close to construction activities and therefore likely to be impacted temporarily by construction noise. Construction noise effects will combine with significant visual impacts identified in Landscape and Visual Effect assessment, on Clint Lane and The Street. Lighting during occasional night-time working will result in additional glare and localised light spill. These combined effects are likely to result in a temporary increase in levels of annoyance, reduced enjoyment of the public realm and open space, and a reduction in the perceived quality of the local environment for a small proportion of people in the Bowes area.	<b>Minor negative (not significant)</b>
13.10.194	HGV movements affecting local amenity. <b>Neutral</b> health effect.	<b>Medium.</b> The study area includes an above average proportion of people over 65 who may be more sensitive to the effects of HGV traffic due to issues such as impaired mobility. The LSOA where the study area is located is ranked within the 50% most deprived areas.	<b>Negligible.</b> Evidence shows the link between increase of HGVs on road and perceptions of safety and increased noise levels and visual severance. The CTMP will ensure that HGVs are routed along suitable major roads, such as the existing A66, and will be prevented from passing along minor roads such as those in the village of Bowes.	<b>Negligible (not significant)</b>

<b>Bowes Bypass – Construction effects</b>				
<b>ES Ref (para)</b>	<b>ES assessment of effect on health determinant and outcomes</b>	<b>Sensitivity assessment</b>	<b>Magnitude assessment</b>	<b>Significance</b>
13.10.196-13.10.197	Effects on access to green space and physical activity from diversion of PRow and cycle route. <b>Neutral</b> health effect	<b>Medium.</b> There is an above average proportion of people over 65, who are more likely to have impaired mobility and to use green spaces regularly, making them more vulnerable to impacts on severance and accessibility. The study area falls within 40% most deprived areas in England and 30% most deprived in terms of mental health.	<b>Low.</b> Evidence links access to green space with opportunities for physical activity, social interaction and a range of physical and mental health benefits. Impacts on public green space and PRow during construction will include the permanent diversion four public footpaths and National Cycle Network Route 40 / Pennine Way Bowes Loop, where these routes cross the A66. The LVIA has identified significant adverse visual impacts on the Pennine Way Bowes Loop and five rural PRow to the south of Bowes. Impacts on PRow in this area are considered to have a small effect on overall access to green space and opportunities for physical activity due to the rural context and the availability of alternative recreational routes. The diversion of NCN 40 and Bowes Loop is not considered to reduce the value of these resources for health, since these cycling and walking routes will remain open throughout construction and the additional distance and amenity impacts will be slight in the context the overall routes.	<b>Minor negative (not significant)</b>
13.10.198	Changes in local traffic flows, affecting journey times and accessibility. <b>Uncertain</b> health effect.	<b>Medium.</b> There is an above average proportion of people over 65. Older people are more likely to have impaired mobility and to use services such as public transport to access services such as health and social care, making them more vulnerable to effects following from congestion, journey times and	<b>Medium.</b> Evidence suggests there is a link between ability to access community facilities/services and improved mental and physical health. The construction phase will lead to longer journey times on the A66 due to traffic management measures such as reduced speed limits and temporary closures	<b>Moderate negative (significant)</b>

<b>Bowes Bypass – Construction effects</b>				
<b>ES Ref (para)</b>	<b>ES assessment of effect on health determinant and outcomes</b>	<b>Sensitivity assessment</b>	<b>Magnitude assessment</b>	<b>Significance</b>
		<p>accessibility. The study area has below average people living with disabilities or long-term health problems that limit day to day activities. The study area falls within 50% most deprived areas in England and 30% most deprived in terms of mental health.</p>	<p>of lanes and slip roads. The Transport Assessment predicts that, due to increased travel times on the A66, traffic will be diverted onto the A67 and the A688 to undertake east west movements. This will increase traffic flows through Barnard Castle and Gainford, to the north of the A66. These roads will be monitored and action, such as traffic calming measures, will be taken as necessary to discourage traffic from using these routes. Depending on the effectiveness of mitigation measures set out in the CTMP, journey time increases on the A66, A67 and A688 have the potential to impact on access to services and facilities for rural communities. Therefore, a reasonable worst case assumption has been made.</p>	

**Table 12. Bowes Bypass – Operational effects**

<b>Bowes Bypass – Operational effects</b>				
<b>ES Ref (para)</b>	<b>ES assessment of effect on health determinant and outcomes</b>	<b>Sensitivity assessment</b>	<b>Magnitude assessment</b>	<b>Significance</b>
13.10.199	Changes in level and distribution of traffic emissions (NO <sub>2</sub> , PM <sub>10</sub> and PM <sub>2.5</sub> ). <b>Neutral</b> health effect.	<b>Low.</b> There are no AQMA within the Bowes Bypass study area. Defra background pollutant concentrations and local authority air quality monitoring data has identified that NO <sub>2</sub> , PM <sub>10</sub> and PM <sub>2.5</sub> concentrations are well within the relevant air quality objectives, meaning that the ambient air quality in the study area is good. The study area includes an above average proportion of people over 65. Older people are more likely than others to have existing health conditions and therefore may be more vulnerable to some adverse health effects. The two LSOAs where the study area falls are within the 40% most deprived areas in terms of all indices of deprivation.	<b>Low.</b> Evidence links air quality to respiratory health and mortality rates. The Air Quality Assessment has identified small increases and decreases in NO <sub>x</sub> and PM <sub>10</sub> concentrations at receptors close to the affected road network within the study area. However, as the air quality across the study area is good and the number of sensitive receptors experiencing changes in air quality is low, no significant air quality impacts have been identified.	<b>Minor negative (not significant)</b>
13.10.200	Combined visual, noise and vibration effects traffic noise. <b>Neutral</b> health effect.	<b>High.</b> This area includes an above average proportion of people over 65. Older people are more likely than others to have existing health conditions and therefore may be more vulnerable to some adverse noise and vibration effects. The presence of Bowes Hutchinson Primary School means that a large number of children are present in the study area, close to the Order Limits. Children are particularly vulnerable as effects can have lasting impacts on longer term health. The LSOA where the study area is located is ranked within the 50% most deprived areas. There is no NIA within the study area	<b>Low.</b> Evidence links noise and visual amenity to mental wellbeing and quality of life. Changes in traffic flows on the Bowes Bypass will result in a significant adverse effect on one residential property, one business premises and a P <sub>RoW</sub> in Bowes. In the short term, there will be a moderate adverse visual impact on residents and community facilities located near the Bowes roundabout on the eastern side of the village. This will reduce to a non-significant impact at year 15 once vegetation is established and the community becomes used to the presence of new infrastructure.	<b>Minor negative (not significant)</b>

<b>Bowes Bypass – Operational effects</b>				
<b>ES Ref (para)</b>	<b>ES assessment of effect on health determinant and outcomes</b>	<b>Sensitivity assessment</b>	<b>Magnitude assessment</b>	<b>Significance</b>
13.10.201	Changes in local traffic flows, affecting journey times and accessibility. <b>Positive</b> health effect.	<b>Medium.</b> There is an above average proportion of people over 65. Older people are more likely to have impaired mobility and to use services such as public transport to access services such as health and social care, making them more vulnerable to effects following from congestion, journey times and accessibility. The study area has below average people living with disabilities or long-term health problems that limit day to day activities. The study area falls within 50% most deprived areas in England and 30% most deprived in terms of mental health.	<b>Medium.</b> Evidence suggests there is a link between ability to access community facilities/services and improved mental and physical health. Traffic congestion along the A66 and A67 will be reduced as a result of the Project, leading to shorter, more reliable journey times. This will lead to improved connectivity between Bowes and Barnard Castle, and easier access for rural communities to facilities, shops and services in both settlements. Better connectivity can benefit mental and physical health through increased access to a wide range of resources including employment, educational facilities, health and social care, sport, leisure and cultural facilities, basic needs such as food shopping, and opportunities for social interaction. The improved connectivity resulting from the Project is likely to result in a small increase in the number of people accessing these resources.	<b>Moderate positive (significant)</b>
13.10.202-13.10.203	Road safety improvements <b>Positive</b> health effect.	<b>Medium.</b> The study area is rural and sparsely populated. There is an above average proportion of people over 65. Older people are more likely to have impaired mobility and be more sensitive to road safety improvements. The presence of Bowes Hutchinson Primary School means that a large number of children are present in the study area, close to the Order Limits. Children are	<b>High.</b> An upgraded, fully grade-separated junction will replace the existing partially grade-separated junction. This will improve safety by removing the need to cross oncoming traffic when turning right onto the A66 from The Street to the east of Bowes. Additionally, three farm accesses in this area will be diverted onto the new grade-separated junction. The resulting reduction in driver	<b>Moderate positive (significant)</b>



<b>Bowes Bypass – Operational effects</b>				
<b>ES Ref (para)</b>	<b>ES assessment of effect on health determinant and outcomes</b>	<b>Sensitivity assessment</b>	<b>Magnitude assessment</b>	<b>Significance</b>
		particularly vulnerable when it comes to road safety.	stress on this stretch of the A66 is considered a positive wellbeing effect for road users. The Road Safety assessment reported in the Transport Assessment predicts that, over the 60-year appraisal period, the Project will result in an increase of 17 slight casualties and save 3 serious and 0 fatal casualties on the Bowes Bypass section of the A66 and associated junctions and links. This is due to the junction improvements, increased traffic flow on the existing dualled sections of the A66, and changes to traffic flows on the surrounding road network.	
13.10.204	Improved access and safety for walkers, cyclists and horse riders on local PRow. <b>Neutral</b> health effect.	<b>Medium.</b> The presence of Bowes Hutchinson Primary School means that a large number of children are present in the study area, close to the Order Limits. Children are particularly vulnerable when it comes to accessing opportunities for active lifestyle and green space. The study area falls within 50% most deprived areas in England and 30% most deprived in terms of mental health.	<b>Low.</b> Evidence suggests there is a link between ability to access infrastructure enabling active lifestyles and improved mental and physical health. To the northeast of Bowes, a new accommodation underpass will reconnect Footpath 6, which is currently severed by the existing A66. This will provide better links for the east of Bowes to rural PRow on the north side of the A66. Further east, the gap in the central reservation will be closed to prevent WCH from crossing the dual carriageway and PRow on the south side of the A66 will be diverted westwards to the accommodation underpass. These changes will result in better provision for WCH to the east of Bowes.	<b>Minor positive (not significant)</b>

**Table 13. Cross Lane to Rokeby – Construction effects**

<b>Cross Lanes to Rokeby – Construction effects</b>				
<b>ES Ref (para)</b>	<b>ES assessment of effect on health determinant and outcomes</b>	<b>Sensitivity assessment</b>	<b>Magnitude assessment</b>	<b>Significance</b>
13.10.236	Local air emissions and dust risk from construction activities. <b>Neutral</b> health effect	<b>Low.</b> There are no AQMA within the Cross Lanes to Rokeby scheme study area. Defra background pollutant concentrations and local authority air quality monitoring data has identified that NO <sub>2</sub> , PM <sub>10</sub> and PM <sub>2.5</sub> concentrations are well within the relevant air quality objectives, meaning that the ambient air quality in the study area is good. Environmental effects caused by the construction of the scheme will occur in rural areas with low population density. No vulnerable groups have been identified as having above average prevalence within the Cross Lanes to Rokeby area.	<b>Low.</b> Evidence links air quality to respiratory health and mortality rates. The two years construction programme is considered short-term duration in the context of air quality effects (health outcomes are based on studies of long-term exposure). The Air Quality has identified a large construction dust risk potential for high-sensitivity receptors within 100m of the draft Order Limits. A small number of rural properties close to the scheme will therefore be at risk of adverse impacts on wellbeing from dust effects. Requirements for dust mitigation set out in Air Quality assessment are considered to remove any significant impacts. The Air Quality assessment has not identified any significant effects on NO <sub>x</sub> and PM <sub>10</sub> concentrations resulting from construction activities.	<b>Minor negative (not significant)</b>
13.10.237	Combined visual, noise and vibration effects from construction activities. <b>Neutral</b> health effect.	<b>Low.</b> Environmental effects caused by the construction of the scheme will occur in rural areas with low population density. No vulnerable groups have been identified as having above average prevalence within the Cross Lanes to Rokeby area	<b>Low.</b> Evidence links noise and visual amenity to mental wellbeing and quality of life. Residents of rural properties close to the draft Order Limits are likely to be impacted temporarily by construction noise. This will combine with views of construction activities described in Landscape and Visual Impact Assessment. There are no adverse effects on public open spaces or other sensitive community receptors. Individual and combined noise and visual effects may result in a	<b>Minor negative (not significant)</b>

<b>Cross Lanes to Rokeby – Construction effects</b>				
<b>ES Ref (para)</b>	<b>ES assessment of effect on health determinant and outcomes</b>	<b>Sensitivity assessment</b>	<b>Magnitude assessment</b>	<b>Significance</b>
			temporary reduction in the perceived quality of the living environment for the affected residents.	
13.10.238	HGV movements affecting local amenity. <b>Neutral</b> health effect.	<b>Low.</b> Environmental effects caused by the construction of the scheme will occur in rural areas with low population density. No vulnerable groups have been identified as having above average prevalence within the Cross Lanes to Rokeby area	<b>Negligible.</b> Evidence shows the link between increase of HGVs on road and perceptions of safety and increased noise levels and visual severance. The CTMP will ensure that HGVs are prevented from using small rural roads and will be routed along suitable major roads, such as the existing A66, through the Cross Lanes to Rokeby area. This is confirmed within Annex B13 of the Environmental Management Plan (EMP).	<b>Negligible (not significant)</b>
13.10.240	Effects on access to green space and physical activity from diversion of PRow and cycle route. <b>Neutral</b> health effect	<b>Low.</b> Environmental effects caused by the construction of the scheme will occur in rural areas with low population density. No vulnerable groups have been identified as having above average prevalence within the Cross Lanes to Rokeby area.	<b>Low.</b> Evidence suggests there is a link between ability to access green spaces and improved mental and physical health. Impacts on access to publicly accessible green space and PRow during construction will include the temporary or permanent diversion of seven footpaths. The LVIA has identified significant adverse visual impacts two rural PRow. Impacts on PRow are considered to have a small effect on overall access to green space and opportunities for physical activity due to the rural context and the availability of alternative recreational routes	<b>Minor negative (not significant)</b>

<b>Cross Lanes to Rokeby – Construction effects</b>				
<b>ES Ref (para)</b>	<b>ES assessment of effect on health determinant and outcomes</b>	<b>Sensitivity assessment</b>	<b>Magnitude assessment</b>	<b>Significance</b>
13.10.241	Changes in local traffic flows, affecting journey times and accessibility. <b>Neutral</b> health effect.	<b>Low.</b> Environmental effects caused by the construction of the scheme will occur in rural areas with low population density. No vulnerable groups have been identified as having above average prevalence within the Cross Lanes to Rokeby area	<b>Low.</b> Evidence suggests there is a link between ability to access community facilities/services and improved mental and physical health. The construction phase will lead to longer journey times on the A66 due to traffic management measures such as reduced speed limits and the temporary closure of lanes and slip roads. The Transport Assessment has not identified any significant increases in traffic flows on the local road network in the Cross Lanes to Rokeby area. The rural community to the south of the scheme relies on services and facilities in Barnard Castle and may experience some delays to this journey when crossing the A66.	<b>Minor negative (not significant)</b>

**Table 14. Cross Lane to Rokeby – Operational effects**

<b>Cross Lanes to Rokeby – Operational effects</b>				
<b>ES Ref (para)</b>	<b>ES assessment of effect on health determinant and outcomes</b>	<b>Sensitivity assessment</b>	<b>Magnitude assessment</b>	<b>Significance</b>
13.10.242	Changes in level and distribution of traffic emissions (NO <sub>2</sub> , PM <sub>10</sub> and PM <sub>2.5</sub> ). <b>Neutral</b> health effect.	<b>Low.</b> There are no AQMA in the study area. NO <sub>2</sub> , PM <sub>10</sub> and PM <sub>2.5</sub> concentrations are well within the relevant air quality objectives, meaning that the ambient air quality is good. Environmental effects caused by the operation of scheme will occur in rural areas with low population density. No vulnerable groups have been identified as having above average prevalence within the Cross Lanes to Rokeby area	<b>Low.</b> Evidence links air quality to respiratory health and mortality rates. The Air Quality Assessment has identified small increases and decreases in NO <sub>x</sub> and PM <sub>10</sub> concentrations at receptors close to the affected road network. However, as the air quality across the study area is good and the number of sensitive receptors experiencing changes in air quality is low, no significant air quality impacts have been identified	<b>Minor negative (not significant)</b>
13.10.243-13.10.245	Combined visual, noise and vibration effects traffic noise. <b>Neutral</b> health effect.	<b>Low.</b> Environmental effects caused by the operation of scheme will occur in rural areas with low population density. No vulnerable groups have been identified as having above average prevalence within the Cross Lanes to Rokeby area	<b>Medium.</b> Evidence links noise and visual amenity to mental wellbeing and quality of life. The Noise and Vibration assessment and the LVIA identify significant adverse and beneficial effects on residential and non-residential receptors. The increased traffic flow on the A66 will result in a significant adverse noise effects on nine rural residential properties, as well as Cross Lanes Farm. Residents of these properties may experience increased annoyance, possible sleep disturbance and reduced enjoyment of outdoor space. Since these are isolated rural properties, there will be no effects on public realm. Due to the low level of population exposure, these noise effects are not considered to give rise to changes in population health and wellbeing. There will be a significant adverse noise effect at Cross Lanes Organic Farm Shop. Visitors to these	<b>Minor negative (not significant)</b>

<b>Cross Lanes to Rokeby – Operational effects</b>				
<b>ES Ref (para)</b>	<b>ES assessment of effect on health determinant and outcomes</b>	<b>Sensitivity assessment</b>	<b>Magnitude assessment</b>	<b>Significance</b>
			sites may experience noticeable changes in amenity, but this is not considered likely to affect wellbeing.	
13.10.243	Combined visual, noise and vibration effects traffic noise. <b>Neutral</b> health effect.	<b>Low.</b> Environmental effects caused by the operation of scheme will occur in rural areas with low population density. No vulnerable groups have been identified as having above average prevalence within the Cross Lanes to Rokeby area	<b>Low.</b> Evidence links noise and visual amenity to mental wellbeing and quality of life. The increased traffic flow on the A66 will result in a significant adverse noise effects on nine rural residential properties, as well as Cross Lanes Farm. Residents of these properties may experience increased annoyance, possible sleep disturbance and reduced enjoyment of outdoor space. Due to the low population density, noise effects are not considered to give rise to changes in health and wellbeing at population level.	<b>Minor negative (not significant)</b>
13.10.243-13.10.245	Combined visual, noise and vibration effects traffic noise. <b>Neutral</b> health effect.	<b>Medium.</b> Environmental effects caused by the operation of scheme will occur in rural areas with low population density. No vulnerable groups have been identified as having above average prevalence within the Cross Lanes to Rokeby area. Areas of Barnard Castle close to the affected road network include residential areas, a village hall and other community facilities.	<b>High.</b> Evidence links noise and visual amenity to mental wellbeing and quality of life. There will be a significant beneficial noise effect at St Mary's Church and the Old School village hall at Rokeby, the usage of which is unknown but thought to be infrequent. The scheme will encourage traffic to use the A66 instead of travelling through Barnard Castle and therefore there will be a net decrease in traffic flow and noise emissions along within the town. This will result in significant beneficial noise effects on Newgate Road and A67, including 60 residential and 27 non-residential receptors, a village hall, hotels, restaurants, bars/pubs and commercial properties such as offices and shops.	<b>Moderate positive (significant)</b>

Cross Lanes to Rokeby – Operational effects				
ES Ref (para)	ES assessment of effect on health determinant and outcomes	Sensitivity assessment	Magnitude assessment	Significance
			This will improve wellbeing through increased enjoyment of outdoor space and a perceived improvement in the quality of the living environment.	
13.10.246-13.10.247	Changes in local traffic flows, affecting journey times and accessibility. <b>Neutral</b> health effect.	<b>Low.</b> Environmental effects caused by the operation of scheme will occur in rural areas with low population density. No vulnerable groups have been identified as having above average prevalence within the Cross Lanes to Rokeby area.	<b>Medium.</b> Evidence suggests there is a link between ability to access community facilities/services and improved mental and physical health. Traffic congestion along the A66 will be reduced as a result of the Project, leading to shorter, more reliable journey times. This will lead to improved connectivity for rural communities to facilities, shops and services in Barnard Castle and elsewhere. Better connectivity can benefit mental and physical health through increased access to a wide range of resources including employment, educational facilities, health and social care, sport, leisure and cultural facilities, basic needs such as food shopping, and opportunities for social interaction. To the north of the study area, on the south side of Barnard Castle, the Transport Assessment reports a 53% increase in traffic flow on The Sills due to the new grade separated junction at Cross Lanes, improving access to Barnard Castle from areas to the south of the A66 via the B6277 Moorhouse Lane. Other roads will see a reduction in traffic due to reduced flows on the A67, including Barnard Castle Bridge and Galgate within the town centre.	<b>Minor positive (not significant)</b>



<b>Cross Lanes to Rokeby – Operational effects</b>				
<b>ES Ref (para)</b>	<b>ES assessment of effect on health determinant and outcomes</b>	<b>Sensitivity assessment</b>	<b>Magnitude assessment</b>	<b>Significance</b>
			There will be a net improvement in traffic flows in Barnard Castle as a whole.	
13.10.248-13.10.249	Road safety improvements <b>Positive</b> health effect.	<b>Medium.</b> Environmental effects caused by the operation of scheme will occur in rural areas with low population density. No vulnerable groups have been identified as having above average prevalence within the Cross Lanes to Rokeby area	<b>High.</b> The new grade-separated junction at Cross Lanes will replace three at-grade junctions, which will improve safety by removing the need to cross oncoming traffic when turning right. In addition, four farm accesses will be diverted onto grade separated junctions. The resulting reduction in driver stress associated with congestion on this stretch of the A66 is considered a positive wellbeing effect for road users.  The Road Safety assessment reported in the Transport Assessment predicts that, over the 60-year appraisal period, the Project will result in an increase of 23 slight casualties and save 4 serious and 1 fatal casualty on the Cross Lanes to Rokeby section of the A66 and associated junctions and links. This is due to the junction improvements, increased traffic flow on the existing dualled sections of the A66, and changes to traffic flows on the surrounding road network.	<b>Major positive (significant)</b>
13.10.250	Improved opportunities for physical activity and access to green space due to provision of a new shared cycle/footway.	<b>Low.</b> Environmental effects caused by the operation of scheme will occur in rural areas with low population density. No vulnerable groups have been identified as having above average prevalence within the Cross Lanes to Rokeby area	<b>Medium.</b> Evidence suggests there is a link between ability to access infrastructure enabling active lifestyles and improved mental and physical health. A 2-mile shared cycleway/footway is proposed to run alongside the dual carriageway from Cross Lanes junction to Greta Bridge, where it will connect to an existing cycle route through the village. The grade-separated junction at Cross Lanes will connect existing footpaths to the north	<b>Minor positive (not significant)</b>

<b>Cross Lanes to Rokeby – Operational effects</b>				
<b>ES Ref (para)</b>	<b>ES assessment of effect on health determinant and outcomes</b>	<b>Sensitivity assessment</b>	<b>Magnitude assessment</b>	<b>Significance</b>
	<b>Positive</b> health effect.		and south of the A66 and provide a safe crossing point for cyclists travelling between Rutherford Lane and the B6277. At Rokeby, three existing footpaths on the north side of the A66 will be joined to the new shared cycleway/footway and connected to the PRow network south of the A66 via the new grade-separated junction. The new shared cycleway/footway will provide a safer option for cyclists travelling from Greta Bridge to Barnard Castle, who currently use a route including steps down to a poorly maintained path leading onto the A66 carriageway. These changes are considered to improve the provision for WCH to the southeast of Barnard Castle. This will encourage active travel, physical activity and access to the countryside, which are linked to positive mental and physical health outcomes.	

**Table 15. Stephen Bank to Carkin Moor – Construction effects**

<b>Stephen Bank to Carkin Moor – Construction effects</b>				
<b>ES Ref (para)</b>	<b>ES assessment of effect on health determinant and outcomes</b>	<b>Sensitivity assessment</b>	<b>Magnitude assessment</b>	<b>Significance</b>
13.10.282	Local air emissions and dust risk from construction activities. <b>Neutral</b> health effect	<b>Medium.</b> There are no AQMA within the Stephen Bank to Carkin Moor study area. Defra background pollutant concentrations and local authority air quality monitoring data has identified that NO <sub>2</sub> , PM <sub>10</sub> and PM <sub>2.5</sub> concentrations are well within the relevant air quality objectives, meaning that the ambient air quality in the study area is good. Environmental effects caused by the construction of the scheme will occur in rural areas with low population density, and close to the village of West Layton. This area includes an above average proportion of older people. Older people are more likely than others to have existing health conditions and therefore may be more vulnerable to some adverse health effects. Both LSOAs where the study area is located are within the 40% and 30% least deprived areas.	<b>Low.</b> Evidence links air quality to respiratory health and mortality rates. The two years construction programme is considered short-term duration in the context of air quality effects (health outcomes are based on studies of long-term exposure). The Air Quality Assessment) has identified a large construction dust risk potential for high-sensitivity receptors within 100m of the draft Order Limits. There are no sensitive receptors within 100m of the scheme. The Air Quality assessment has not identified any significant effects on NO <sub>x</sub> and PM <sub>10</sub> concentrations resulting from construction activities.	<b>Minor negative (not significant)</b>
13.10.283	Combined visual, noise and vibration effects from construction activities. <b>Neutral</b> health effect.	<b>Medium.</b> Environmental effects caused by the construction of the scheme will occur in rural areas with low population density, and close to the village of West Layton. This area includes an above average proportion of older people. Older people are more likely than others to have existing health conditions and therefore may be more vulnerable to some adverse health effects. Both LSOAs	<b>Low.</b> Evidence links noise and visual amenity to mental wellbeing and quality of life. Residents on the southern edge of West Layton and in rural properties along the existing A66 are likely to be impacted by construction noise. This will combine with views of construction activities from West Layton, properties along the A66 and to the south of the A66, including long-range views	<b>Minor negative (not significant)</b>

<b>Stephen Bank to Carkin Moor – Construction effects</b>				
<b>ES Ref (para)</b>	<b>ES assessment of effect on health determinant and outcomes</b>	<b>Sensitivity assessment</b>	<b>Magnitude assessment</b>	<b>Significance</b>
		where the study area is located are within the 40% and 30% least deprived areas. There is one NIA within the study area	from the village of Ravensworth. There are no adverse effects on public open spaces or other sensitive community receptors. Individual and combined noise and visual effects may result in a temporary reduction in the perceived quality of the living environment for the affected residents.	
13.10.284	HGV movements affecting local amenity. <b>Neutral</b> health effect.	<b>Medium.</b> The study area includes an above average proportion of people over 65 who may be more sensitive to the effects of HGV traffic due to issues such as impaired mobility. The LSOAs where the study area is located are ranked within the 40% and 30% least deprived areas.	<b>Negligible.</b> Evidence shows the link between increase of HGVs on road and perceptions of safety and increased noise levels and visual severance. The CTMP will ensure that HGVs are prevented from using small rural roads and will be routed along suitable major roads, such as the existing A66, through the Stephen Bank to Carkin Moor area. This is confirmed within Annex B13 of the Environmental Management Plan (EMP).	<b>Negligible (not significant)</b>
13.10.286	Effects on access to green space and physical activity from diversion of PRow and cycle route. <b>Neutral</b> health effect	<b>Medium.</b> The study area is rural and contains a number of villages, including West Layton, which is close to the Order Limits. There is an above average proportion of people over 65, who are more likely to use green spaces regularly making them more vulnerable to impacts on severance and accessibility.	<b>Low.</b> Evidence links access to green space with opportunities for physical activity, social interaction and a range of physical and mental health benefits. Impacts on access to publicly accessible green space and PRow during construction will include the temporary or permanent diversion of four footpaths and five bridleways. The LVIA has identified significant adverse visual impacts on seven rural PRow. The affected PRow are in proximity to the small settlements of West Layton, East Layton and Ravensworth.	<b>Minor negative (not significant)</b>

<b>Stephen Bank to Carkin Moor – Construction effects</b>				
<b>ES Ref (para)</b>	<b>ES assessment of effect on health determinant and outcomes</b>	<b>Sensitivity assessment</b>	<b>Magnitude assessment</b>	<b>Significance</b>
13.10.287	Changes in local traffic flows, affecting journey times and accessibility. <b>Neutral</b> health effect.	<b>High.</b> The rural community is dependent on travel to centres such as West Layton and Ravensworth to access services and community facilities. There is an above average proportion of people over 65. Older people are more likely to have impaired mobility and to use services such as public transport to access services such as health and social care, making them more vulnerable to effects following from congestion, journey times and accessibility. The study area has below average people living with disabilities or long-term health problems that limit day to day activities. The study area falls within 30% and 40% least deprived areas in England.	<b>Negligible.</b> Evidence suggests there is a link between ability to access community facilities/services and improved mental and physical health. The Transport Assessment has not identified any significant increases in traffic flows on the local road network in the Stephen Bank to Carkin Moor area.	<b>Negligible (not significant)</b>

**Table 16. Stephen Bank to Carkin Moor – Operational effects**

<b>Stephen Bank to Carkin Moor – Operational effects</b>				
<b>ES Ref (para)</b>	<b>ES assessment of effect on health determinant and outcomes</b>	<b>Sensitivity assessment</b>	<b>Magnitude assessment</b>	<b>Significance</b>
13.10.289	Changes in level and distribution of traffic emissions (NO <sub>2</sub> , PM <sub>10</sub> and PM <sub>2.5</sub> ). <b>Neutral</b> health effect.	<b>Medium.</b> There are no AQMA in the study area. NO <sub>2</sub> , PM <sub>10</sub> and PM <sub>2.5</sub> concentrations are well within the relevant air quality objectives, meaning that the ambient air quality is good. There is an above average proportion of people over 65. Older people are more likely than others to have existing health conditions and therefore may be more vulnerable to some adverse health effects. The study area has below average people living with disabilities or long-term health problems that limit day to day activities. The study area falls within 30% and 40% least deprived areas in England.	<b>Low.</b> Evidence links air quality to respiratory health and mortality rates. The Project will affect local air quality and levels of traffic noise through changes in traffic flow, speed and fleet composition. The Air Quality Assessment has identified small increases and decreases in NO <sub>x</sub> and PM <sub>10</sub> concentrations at receptors close to the affected road network within the study area. However, as the air quality across the study area is good and the number of sensitive receptors experiencing changes in air quality is low, no significant air quality impacts have been identified.	<b>Minor negative (not significant)</b>
13.10.290-13.10.291	Combined visual, noise and vibration effects traffic noise. <b>Negative</b> to <b>Neutral</b> health effect.	<b>Medium.</b> Environmental effects caused by the construction of the scheme will occur in rural areas with low population density, and close to the village of West Layton. This area includes an above average proportion of older people. Both LSOAs in the study area are within the 40% and 30% least deprived areas. There is one NIA within the study area	<b>Low.</b> Evidence links noise and visual amenity to mental wellbeing and quality of life. The presence of a new offline dual carriageway will result in a significant adverse effect on noise at eight residential properties in the West Layton, and noise and visual impacts on Collier Lane and West Lane within the village, which may lead to a perceived reduction in the quality of the local environment. These responses will lessen over time, as planting becomes established and the community becomes used to the presence of the new bypass. Across the Stephen Bank to Carkin Moor study area, there will be significant adverse noise	<b>Minor negative (not significant)</b>

<b>Stephen Bank to Carkin Moor – Operational effects</b>				
<b>ES Ref (para)</b>	<b>ES assessment of effect on health determinant and outcomes</b>	<b>Sensitivity assessment</b>	<b>Magnitude assessment</b>	<b>Significance</b>
			effects at four rural dwellings and significant beneficial noise effects at eight rural dwellings. Due to the low level of exposure across the study area, noise and visual effects are not considered to give rise to changes in population health.	
13.10.293	Changes in local traffic flows, affecting journey times and accessibility. <b>Positive</b> health effect.	<b>High.</b> The rural community is dependent on travel to centres such as West Layton and Ravensworth to access services and community facilities. The study area has an above average proportion of people over 65, who are more likely to use services such as health and social care, making them more vulnerable to impacts on severance and accessibility. Both LSOAs where the study area is located are within the 40% and 30% least deprived areas.	<b>Medium.</b> Evidence suggests there is a link between ability to access community facilities/services and improved mental and physical health. Traffic congestion along the A66 will be reduced as a result of the Project, leading to shorter, more reliable journey times. This will lead to improved connectivity for residents of West Layton and the surrounding rural community to shops, services and facilities. Better connectivity can benefit mental and physical health through increased access to a wide range of resources including employment, educational facilities, health and social care, sport, leisure and cultural facilities, basic needs such as food shopping, and opportunities for social interaction. The improved connectivity resulting from the Project is likely to result in a small increase in the number of people accessing these resources. A new grade-separated junction will provide access to the dualled A66 at Moor Lane, to the east of West Layton. The resulting reduction in driver stress on this stretch of the A66 is considered a positive wellbeing effect for road users.	<b>Moderate positive (significant)</b>



<b>Stephen Bank to Carkin Moor – Operational effects</b>				
<b>ES Ref (para)</b>	<b>ES assessment of effect on health determinant and outcomes</b>	<b>Sensitivity assessment</b>	<b>Magnitude assessment</b>	<b>Significance</b>
13.10.294	Improved junction safety resulting in reduced driver stress. <b>Positive</b> health effect.	<b>Medium.</b> The study area has an above average proportion of people over 65. Older people are more likely to have impaired mobility and may be more sensitive to road safety improvements. Both LSOAs where the study area is located are within the 40% and 30% least deprived areas.	<b>Medium.</b> A new grade-separated junction will provide access to the dualled A66 at Moor Lane, to the east of West Layton. The resulting reduction in driver stress on this stretch of the A66 is considered a positive wellbeing effect for road users.	<b>Moderate positive (significant)</b>
13.10.295	Road safety improvements. <b>Positive</b> health effect.	<b>Medium.</b> The study area is rural and sparsely populated. There is an above average proportion of people over 65. Older people are more likely to have impaired mobility and be more sensitive to road safety improvements.	<b>High.</b> The Road Safety assessment reported in the Transport Assessment predicts that, over the 60-year appraisal period, the Project will save 87 slight, 28 serious and 4 fatal casualties on the Stephen Bank to Carkin Moor section of the A66 and associated junctions and links. This is due to the removal of the single carriageway, junction improvements and diversion of traffic from the surrounding rural road network.	<b>Major positive (significant)</b>
13.10.296	Improved opportunities for physical activity and access to green space due to provision of a new shared cycle/footway. <b>Positive</b> health effect.	<b>Medium.</b> The study area is rural and sparsely populated. There is an above average proportion of people over 65. Both LSOAs where the study area is located are within the 40% and 30% least deprived areas.	<b>Medium.</b> Evidence suggests there is a link between ability to access infrastructure enabling active lifestyles and improved mental and physical health. A shared path for horse-riders and pedestrians is proposed alongside the de-trunked A66, connecting into four existing footpaths and four bridleways, which currently either terminate at the A66 or cross it via road verges and at-grade crossings. Proposed safe crossing points at grade-separated junctions and shared underpasses will improve access for WCH and reduce the severance caused by the existing A66.	<b>Moderate positive (significant)</b>

Stephen Bank to Carkin Moor – Operational effects				
ES Ref (para)	ES assessment of effect on health determinant and outcomes	Sensitivity assessment	Magnitude assessment	Significance
			The new 2.5-mile segregated route and improved crossings will encourage walking and horse riding, promoting physical activity and access to the countryside, which are linked to positive mental and physical health outcomes.	

Table 17. A1 (M) Junction 53 Scotch Corner – Construction effects

A1(M) Junction 53 Scotch Corner – Construction effects				
ES Ref (para)	ES assessment of effect on health determinant and outcomes	Sensitivity assessment	Magnitude assessment	Significance
13.10.313	Local air emissions and dust risk from construction activities. <b>Neutral</b> health effect	<b>Medium.</b> There are no AQMA within the A1(M) Junction 53 Scotch Corner scheme study area. Defra background pollutant concentrations and local authority air quality monitoring data has identified that NO <sub>2</sub> , PM <sub>10</sub> and PM <sub>2.5</sub> concentrations are well within the relevant air quality objectives, meaning that the ambient air quality in the study area is good.  Environmental effects caused by the construction of the scheme will occur at the A1(M) Junction 53 Scotch Corner, on the western edge of Middleton Tyas. The study area includes an above average proportion of people over 65 and above average people living with disabilities or long-term health	<b>Low.</b> Evidence links air quality to respiratory health and mortality rates. The construction programme is for less than a year and is considered short-term duration in the context of air quality effects (health outcomes are based on studies of long-term exposure). The Air Quality Assessment has identified a large construction dust risk potential for high-sensitivity receptors within 100m of the Order Limits. Residents at the western end of Middleton Tyas Lane and users of the Active Life Leisure Club will therefore be at risk of adverse impacts on wellbeing from dust effects. Requirements for dust mitigation are considered to remove any significant impacts. The Air Quality assessment has not identified any significant effects on NO <sub>x</sub>	<b>Minor negative (not significant)</b>

<b>A1(M) Junction 53 Scotch Corner – Construction effects</b>				
<b>ES Ref (para)</b>	<b>ES assessment of effect on health determinant and outcomes</b>	<b>Sensitivity assessment</b>	<b>Magnitude assessment</b>	<b>Significance</b>
		problems that limit day to day activities compared to the national average. Older people and people with existing long-term disabilities and health problems may be more vulnerable to some adverse health effects. The LSOA where the study area is located is within the 20% least deprived nationally.	and PM10 concentrations resulting from construction activities.	
13.10.314	Combined visual, noise and vibration effects from construction activities. <b>Neutral</b> health effect.	<b>Medium.</b> Environmental effects caused by the construction of the scheme will occur at the A1(M) Junction 53 Scotch Corner, on the western edge of Middleton Tyas. This area includes an above average proportion of older people. Older people are more likely than others to have existing health conditions and therefore may be more vulnerable to some adverse health effects. The LSOA where the study area is located is within the 20% least deprived nationally. There are no NIAs identified in the study area	<b>Low.</b> Evidence links noise and visual amenity to mental wellbeing and quality of life. Construction activities will be undertaken at night to avoid impacts on traffic flows around the junction during the day. No visual impacts are reported in LVIA . Lighting of night-time construction activities will result in additional glare and localised light spill. Periodic construction noise during the night-time has the potential to impact on sleep disturbance. These impacts may be noticeable for residents at the western end of Middleton Tyas Lane.	<b>Minor negative (not significant)</b>
13.10.315	HGV movements affecting local amenity. <b>Neutral</b> health effect.	<b>Medium.</b> The study area includes an above average proportion of people over 65 who may be more sensitive to the effects of HGV traffic due to issues such as impaired mobility. The LSOA where the study area is located is ranked within the 20% least deprived areas.	<b>Negligible.</b> Evidence shows the link between increase of HGVs on road and perceptions of safety and increased noise levels and visual severance. The CTMP will ensure that HGVs are routed along the existing A66 and A1(M) and are prevented from using small rural roads. This is confirmed within Annex B13 of the Environmental Management Plan (EMP).	<b>Negligible (not significant)</b>

A1(M) Junction 53 Scotch Corner – Construction effects				
ES Ref (para)	ES assessment of effect on health determinant and outcomes	Sensitivity assessment	Magnitude assessment	Significance
13.10.317	Effects on access to green space and physical activity from diversion of PRow and cycle route. <b>Neutral</b> health effect	<b>Medium.</b> The study area has an above average proportion of people over 65 and people living with disabilities or long-term health problems that limit day to day activities compared to the national average, who are more likely to have impaired mobility and to use green spaces, making them more vulnerable to impacts on severance and accessibility. There are no visual receptors within the study area that are relevant for the health assessment	<b>Low.</b> Evidence links access to green space with opportunities for physical activity, social interaction and a range of physical and mental health benefits. The assessment has not identified any impacts to green space or PRow during construction. All works to A1(M) J53 would be completed overnight and would require lane closures and temporary closure of Middleton Tyas Lane. Traffic would operate normally during the day. Therefore, no impacts on severance and accessibility are identified.	<b>Minor negative (not significant)</b>

Table 18. A1 (M) Junction 53 Scotch Corner – Operational effects

A1(M) Junction 53 Scotch Corner – Operational effects				
ES Ref (para)	ES assessment of effect on health determinant and outcomes	Sensitivity assessment	Magnitude assessment	Significance
13.10.318	Combined visual, noise and vibration effects traffic noise. Negative to <b>Neutral</b> health effect.	<b>Medium.</b> The study area includes an above average proportion of older people and people living with disabilities or long-term health problems that limit day to day activities. These groups are more likely than others to have existing health conditions and therefore may be more vulnerable to some adverse health effects. The LSOA where the study area is located is within the 20% least deprived nationally.	<b>Negligible.</b> No significant operational visual or noise effects are identified in the Landscape and Visual Effects and Noise and Vibration assessments for the A1(M) Junction 53 Scotch Corner. No residential areas or sensitive receptors would be affected by changes in traffic flows.	<b>Negligible (not significant)</b>

<b>A1(M) Junction 53 Scotch Corner – Operational effects</b>				
<b>ES Ref (para)</b>	<b>ES assessment of effect on health determinant and outcomes</b>	<b>Sensitivity assessment</b>	<b>Magnitude assessment</b>	<b>Significance</b>
13.10.319-13.10.320	Changes in local traffic flows, affecting journey times and accessibility. <b>Neutral</b> health effect.	<b>High.</b> The study area has an above average proportion of people over 65 and people living with disabilities or long-term health problems that limit day to day activities, who are more likely to use services such as health and social care, making them more vulnerable to impacts on severance and accessibility.	<b>Low.</b> Evidence suggests there is a link between ability to access community facilities/services and improved mental and physical health. The Transport Assessment identifies changes in local traffic flows resulting from the Project. The improved A1(M) Junction 53 is predicted to perform within acceptable limits, with maximum queue lengths not forecast to extend beyond the length of the slip roads. The Project will attract more traffic to the strategic road network from the local road network, resulting in increased flows on the A1(M) and the A6055 Kneeton Lane, but journey times will not be affected.	<b>Minor negative (not significant)</b>
13.10.321	Increased traffic flow on junction 53 leading to increase in road traffic accidents. <b>Negative</b> health effect.	<b>Medium.</b> The study area has an above average proportion of people over 65 and people living with disabilities or long-term health problems that limit day to day activities, who are more likely to be vulnerable to road safety.	<b>High.</b> The Road Safety assessment reported in the Transport Assessment predicts that, over the 60-year appraisal period, the Project will result in an additional 25 slight and 2 serious casualties on the A1 (M) Junction 53 and associated links. This is due to increased traffic flows on the roundabout and A66.	<b>Moderate negative (significant)</b>
13.10.322	Access and safety effects on WCH. <b>Neutral</b> health effect.	<b>Medium.</b> The study area includes an above average proportion of older people and people living with disabilities or long-term health problems that limit day to day activities. These groups are more likely than others to have existing health conditions and therefore may be more vulnerable to some adverse health effects. The LSOA where the study area is located is within the 20% least deprived nationally.	<b>Negligible.</b> Access for WCH across the A1(M) Junction 53 via Toucan crossings will be retained.	<b>Negligible (not significant)</b>