Transport for the North (TfN)

SOUTHERN PENNINES - STRATEGIC DEVELOPMENT CORRIDOR

Environmental Appraisal Report

70034373_EAR

MARCH 2019

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PUBLIC

PROJECT NO. 70034373

OUR REF. NO. 70034373_EAR

DATE: MARCH 2019

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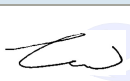
QUALITY CONTROL

Issue/revision	First issue	Revision 1	Revision 2	Revision 3
Remarks	First Draft for Comment	Second Draft for Comment	Final for Issue	Final for Issue
Date	October 2018	February 2019	March 2019	March 2019
Prepared by	Tom Gold / Richard McCulloch	Tom Gold	Tom Gold	Tom Gold
Signature				 Digitally signed by Gold, Tom DN: cn=Gold, Tom, ou=Leeds (3 White Rose Office Park), email=Tom.Gold@wsp.com Date: 2019.03.13 08:16:24 Z
Checked by	Kevin Stubbs	Kevin Stubbs	Kevin Stubbs	Kevin Stubbs
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Project number	70034373	70034373	70034373	70034373
Report number	70034373_EAR	70034373_EAR	70034373_EAR	70034373_EAR
File reference	V1	V2	V3	V4

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1. INTRODUCTION

1.1. BACKGROUND

1.1.1. This Environmental Assessment Report (EAR) has been produced for the Southern Pennines Strategic Development Corridor (SDC). It contains an environmental appraisal of schemes included within the Strategic Programme Outline Case (SPOC), and should be read in conjunction with the SPOC document.

1.1.2. The purpose of the SDCs is to provide a Strategic Outline Programme (SOP) of schemes to 2050 for inclusion at a "Pan Northern" level within Transport for the North's (TfN's) Strategic Transport Plan (STP) Investment Programme. The TfN STP was published in February 2019, and is summarised alongside its supporting evidence base within Figure 1-1 below.

1.1.3. Transport for the North (TfN) has a vision to significantly improve frequency, capacity, reliability, speed and resilience of Northern transport systems; the aim of such improvements is to create a globally competitive region which can sustain substantial economic growth for future decades. As such, TfN has procured five SDCs. In parallel to this SDC, there are four other concurrent studies; the Central Pennines SDC, Connecting the Energy Coasts SDC, West & Wales SDC and Yorkshire to Scotland SDC.

Figure 1-1 - The Strategic Transport Plan and its Evidence Base

TfN's work programmes

1.1.4. The aim of this study is to develop a robust Strategic Programme Outline Case (SPOC) for the Southern Pennines SDC. The SPOC will follow an interpretation of the approach in HM Treasury Green Book to develop a business case for the Strategic Outline Programme (SOP).

1.1.5. The SDC objectives are shown below in **Table 1-1**:

Table 1-1 - Study Objectives

1	To identify transport specific objectives, which support the delivery of TfN's STP objectives
2	Identify a long-list of options that could meet the transport objectives, and undertake an assessment of the potential VfM, benefits and impacts of the different options using the WebTAG appraisal process. This will include an initial assessment of the interventions against the study specific objectives.
3	Short-list and sequence the options to be carried forward.
4	Prepare inputs to the programme level business case for the better option(s) for further consideration in the development of road and rail investment plans.

1.2. PURPOSE OF REPORT

1.2.1. The purpose of the Environmental Appraisal Report is to inform decision makers and stakeholders of the potential environmental implications of the SOP proposed for the Southern Pennines SDC, and how environmental considerations have been taken into account.

1.2.2. The approach to transport appraisal outlined in the Department for Transport (DfT)'s WebTAG appraisal process ensures that the environment is considered throughout the development of transport interventions. This report outlines the WebTAG based methodology undertaken and its outcomes.

1.2.3. In order to satisfy the requirements of the STP, further environmental appraisal has been undertaken. One of the STP's four pan-Northern transport objectives is 'promoting and enhancing the built, historic and natural environment'. For this objective, the STP states that *'Through collaboration with TfN's Partners, stakeholders and communities, transport interventions across the strategic transport system must protect and enhance the natural, historic and built environment, making sure that the North's transport system is as sustainable as possible. This includes the need to provide sustainable travel choices for the movement of people and goods, reduce air pollutant and carbon emissions from transport, and make best use of existing transport infrastructure before investing in new capacity. It also ensures that new infrastructure is designed to minimise the negative impacts on the natural, historic and built environment, including biodiversity, and results in net environmental gains where possible. Promoting access to the natural and green environment will also promote physical and mental health.'*

1.2.4. The STP's environmental objective has been influenced by an Integrated Sustainability Appraisal (ISA). This has ensured that environmental considerations, and sustainability more widely, are embedded throughout the STP in order to ensure TfN's Investment Programme develops and delivers sustainable future strategic transport interventions that assist and where possible enhance the environment of the North. ISA is an iterative assessment process informing the Strategic Transport Plan as it develops, intended to ensure that potential significant effects arising from the Plan are identified, assessed, and mitigated. This report provides an assessment of the SOP against the ISA objectives, thereby ensuring that the objectives of the ISA continue to inform the development of the STP at the programme level. A policy appraisal has also been undertaken in order to support the requirement that the STP interventions align with local environmental objectives and are in accordance with national policy.

1.2.5. This report sets out an approach to appraisal that is proportional to a SPOC, and that reflects the needs of the WebTAG process and STP objectives. The report will outline how the environment has been considered in the development of the SOP, and will provide an indication of any limitations of the appraisal process.

1.3. STRUCTURE OF REPORT

1.3.1. The outline structure for this report and appraisal methodology was discussed and agreed with the SDC Technical Assurance Group (TAG) in May 2018.

1.3.2. This report is structured as follows:

- Chapter 2: Project Definition
- Chapter 3: Outline of Approach to the Environment
- Chapter 4: Strategic Outline Programme (SOP)
- Chapter 5: Environmental Impact Appraisal
- Chapter 6: Policy Appraisal
- Chapter 7: Integrated Sustainability Appraisal (ISA) Objectives Appraisal
- Chapter 8: Summary

2. PROJECT DEFINITION

2.1. STUDY CONTEXT

2.1.1. The people of the North are at the heart of the TfN STP. An effective, efficient Northern transport network is a fundamental part of everyday life – connecting people to jobs, health, education and leisure opportunities, connecting businesses to each other and allowing the efficient movement of goods and services. A transport system that is fit-for-purpose with strong north-south and east-west connections will be the backbone of a strong economy for the North and for the UK.

2.1.2. The STP has a horizon year of 2050 to align with the Northern Powerhouse Independent Economic Review (NPIER) and to enable the development of a long term transport investment programme for the North. This will mean that TfN and its Partners can work with Government to secure funding to deliver the right schemes in the right place at the right time, providing certainty for local transport authorities to plan complementary investment and also for the private sector to plan commercial investments. The pipeline of investment will give confidence to businesses across the North to invest and grow, give the supply chain, including Small and Medium Enterprises (SMEs), confidence to plan interventions, build up their skills base, and collaborate across industries.

2.1.3. The Northern Powerhouse Independent Economic Review (NPIER) was launched at the end of June 2016. It was commissioned by TfN on behalf of Northern partners and clearly set out the importance of taking an ambitious approach to economic growth showing how high-quality transport infrastructure is vital for boosting exports and unlocking business investment across the north.

2.1.4. The NPIER demonstrated how transformational economic growth by 2050 could generate:

- 15% increased gross value added (GVA) - £100bn compared with business as usual, and
- 850,000 additional jobs, based around four prime and three enabling capabilities for the North's economy, all underpinning the North's quality of life.

2.1.5. In response to this, in February 2019 TfN published the STP which sets out a multi-modal, long term plan, setting out an evidence-led, compelling case for strategic transport investment across the North. The STP and Investment Programme identify the improvements needed to ensure economic centres are better connected, leading to growth in productivity and jobs. Evidence from the NPIER was used as the backbone to inform the STP.

2.1.6. Building on existing and proposed projects, the Strategic Development Corridors (SDCs) represent strategic geographical and economic areas with the strongest potential towards transformational growth in the North. Combining evidence from the 2017 Integrated Rail and Major Roads Reports, the STP identifies seven corridors (see Figure 2-1) where evidence indicates delivery of transformational growth is dependent on bringing forward major road and rail investment.

2.1.7. These corridors complement Northern Powerhouse Rail (NPR), Integrated and Smart Travel and three Strategic Road studies, which form part of the reference case for this study. This study specifically seeks to explore the Southern Pennines Strategic Development Corridor (SDC).

2.1.8. This study involves the development of a SPOC for the Southern Pennines SDC. This follows an interpretation of the approach in HM Treasury Green Book to develop business cases for programmes, as set out in **Figure 2-2** below.

Figure 2-1 - TfN Strategic Development Corridors

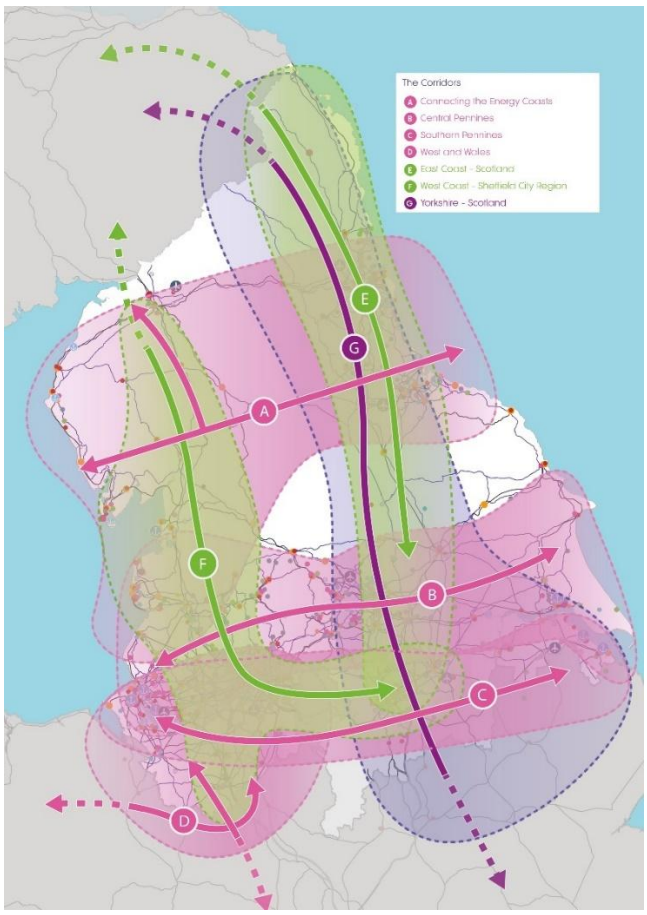


Figure 2-2 - Programme Level Business Case Development of the Strategic Development Corridors

2.1.9. Individual corridor interventions (or where appropriate grouped interventions) would follow the full DfT WebTAG approach starting with the SOBC and leading to more detailed consideration of individual intervention or groups of interventions – these considerations are out of scope in this study.

2.1.10. The SPOC will show whether the programme of interventions within the SDC:

- Are supported by a robust case for change that fits with wider public policy objectives – the 'strategic case';
- Demonstrate value for money – the 'economic case'; and
- Are commercially viable – the 'commercial case'

2.2. RELATION TO TRANS-PENNINE TUNNEL PROJECT

2.2.1. The Trans-Pennine Tunnel Strategic Study examined options for providing significantly improved road connectivity between Greater Manchester and Sheffield City Region, and the wider Southern Pennines corridor. This programme of work has shown that although a long tunnel under the Peak District National Park would be technically feasible, the cost would be prohibitive and offer poor value for money. TfN is working with Highways England, Department for Transport and local TfN partners on identifying a shorter tunnel option as well as looking at wider connectivity across the Southern Pennines SDC.

2.2.2. To date, this work has found that the most promising option is a partially tunnelled route on the line of the existing A628, with a supporting package of wider road connectivity enhancements, including on the M60, M67 and M1. This work will build on Highways England's existing Trans-Pennine Upgrade programme, including improvements to the A57 at Mottram.

2.2.3. At the time of writing (February 2019) the strategic case for the Trans-Pennine Tunnel scheme is currently under development at PCF Stage 0. It is understood the Strategic Outline Business Case (SOBC) will be submitted to the Department for Transport in 2019, upon which a decision will be made as to whether the scheme is included in the second Road Investment Strategy (RIS) from 2020.

2.2.4. While the Trans-Pennine Tunnel scheme forms a significant intervention within the Southern Pennines SDC, the scheme as outlined above is subject to its own appraisal process and does not fall within the aims of the SDC study. As such, the Trans-Pennine Tunnel and associated wider transport connectivity interventions have not been included as part of the SOP and is instead treated as a Reference Case scheme for the purpose of appraisal undertaken within this study. Further information regarding the approach to Reference Case schemes and environmental appraisal of the Trans-Pennine Tunnel is provided in **Section 3.5**.

2.3. SOUTHERN PENNINES CORRIDOR

2.3.1. **Geographic Coverage**: Derbyshire, Lancashire, Lincolnshire, Nottinghamshire, Liverpool, Greater Manchester, Sheffield / South Yorkshire, Leeds / West Yorkshire, Hull and Humber, East Riding of Yorkshire.

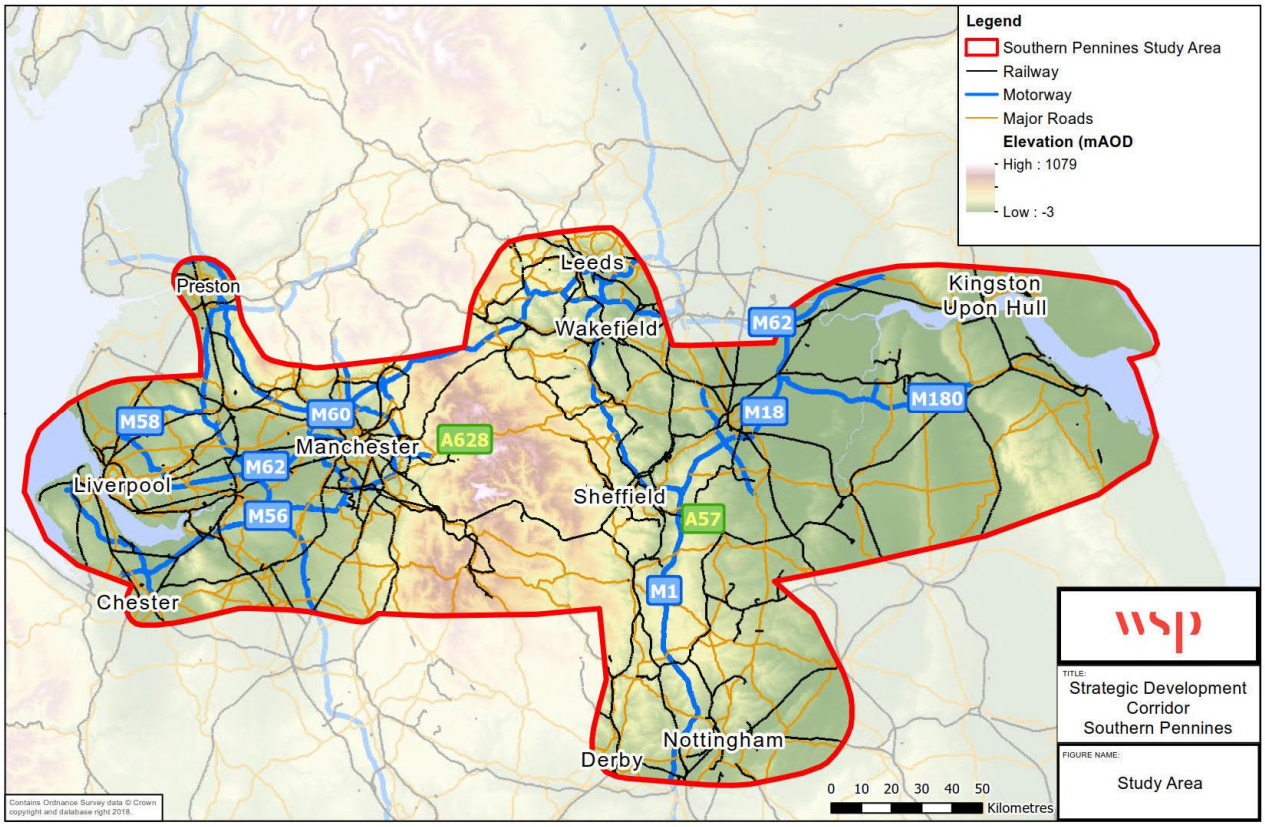
2.3.2. As illustrated in **Figure 2-3**, the Southern Pennines SDC is an east-west corridor which broadly extends from the west coast of England between Lancashire and Wirral through to the east coast of England between the River Humber and North Lincolnshire. The corridor facilitates east-west

movements across the Peak District National Park between Liverpool City Region, Greater Manchester and Lancashire in the north-west of England, and West Yorkshire, East Riding and Hull in the north-east. As such the corridor connects two of the North's main ports (Liverpool and Hull) and numerous cities including Liverpool, Manchester, Preston, Leeds, Bradford, Sheffield, Nottingham, Derby and Hull.

2.3.3. The Southern Pennines corridor has some of the North's key economic and population centres, with a diverse mix of strategic movements. Within the SDC the M6, M1 and A1 provide key strategic road links north to south, while the M62, A628 and A57 provide key east to west connections. The rail network in the SDC comprises a complex series of routes connecting population centres, rural communities, freight and logistics centres and international gateways.

2.3.4. As shown in **Figure 2-3**, the SDC has a highly variable topography. The Pennines are the dominant feature of topography in the SDC, running centrally through the SDC. Highest elevations fall within the Peak District National Park, while the Pennine fringe areas have a variable topography falling to lower elevations that characterise the majority of the SDC outside the Pennines and its fringes. Urban development is predominantly located at lower elevations.

Figure 2-3 - Southern Pennines Strategic Development Corridor



2.4. ENVIRONMENTAL ASSETS

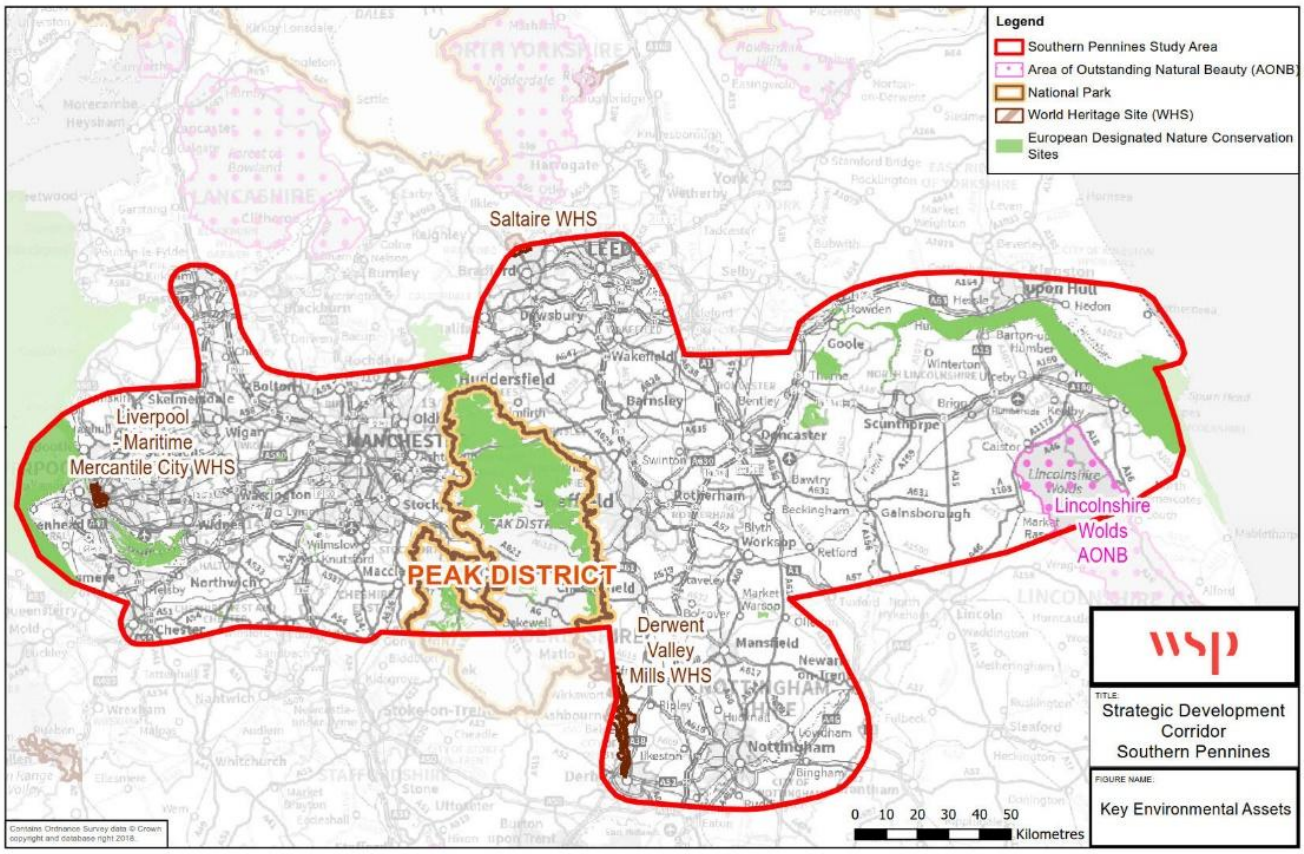
2.4.1. The Southern Pennines SDC contains a number of important environmental assets which are highly valued at a local to international scale. An overview of key designations is provided below and an Environmental Constraints Map provided as **Figure A-1**. Detail relating to the environmental baseline of the SDC can be found in **Appendix A**.

2.4.2. Within the SDC is the Peak District National Park. This landscape covers 8% of the SDC area and is protected for its natural beauty, wildlife and cultural heritage; and the opportunities for enjoyment and education which these offer. The SDC also contains the Lincolnshire Wolds Area of Outstanding Natural Beauty (AONB), a statutory designation given to landscapes highly valued for their visual amenity. Spurn Heritage Coast also lies within the SDC; this stretch of coast has been designated to conserve the best stretches of coast in England.

2.4.3. Features of historic importance are located throughout the Southern Pennines SDC; and include those protected by international, national and local designations. Of these, the most highly valued are World Heritage Sites, of which the SDC contains three: Saltaire, Derwent Valley Mills and Liverpool Maritime Mercantile City. A wide range of other historic and cultural heritage features are located throughout the corridor, spanning the full range of human settlement from prehistoric to the present. These include Registered Battlefields, Scheduled Monuments, Registered Parks and Gardens and Listed Buildings.

2.4.4. Throughout the SDC there are a number of sites designated at the International (European) or National (United Kingdom) level for nature conservation purposes. Protected at the International level are Special Areas of Conservation (SAC), Special Protection Areas (SPA) and Wetlands of International Importance (Ramsar) sites. 15 SACs, 9 SPAs and 8 Ramsar sites are located within the SDC. Many areas contain multiple designations such as the South Pennine Moors which are designated SCA and SPA, and the Dee Estuary and the Humber Estuary which are both designated SCA, SPA and Ramsar. Of national biodiversity designations, there are also 298 Sites of Special Scientific Interest (SSSI) and 9 National Nature Reserves (NNR).

Figure 2-4 - Key Environmental Assets



3. OUTLINE OF APPROACH TO THE ENVIRONMENT

3.1. ENVIRONMENTAL APPRAISAL AT THE PLAN, PROGRAMME AND INTERVENTION LEVEL

OVERVIEW

3.1.1. As outlined in **Section 1** and **2** of this report, this study forms a part of TfN's long term plan for strategic transport investment across the North. In accordance with DfT's WebTAG appraisal process and the core objectives of the STP, the environment has, and will continue to be taken into account throughout the process illustrated in **Figure 2-2**

STRATEGIC TRANSPORT PLAN (OUT OF SCOPE)

3.1.2. An Integrated Sustainability Appraisal (ISA) of the Strategic Transport Plan (STP) has been prepared. The ISA fulfils the requirements for Sustainability Appraisal / Strategic Environmental Assessment (SA/SEA), Health Impact Assessment (HIRA), Equality Impact Assessment (EqIA) and Community Safety Assessment (CSA). While the ISA includes assessment of issues relating to Habitat Regulations Assessment (HRA), a HRA Stage 1 Screening Report was published separately from the ISA Report.

3.1.3. The ISA reports the likely sustainability effects of implementing the STP and reports on the process of developing the STP from a sustainability perspective, which the concurrent process of the ISA has supported. In doing so, the ISA supports the STP's objective of 'promoting and enhancing the built, historic and natural environment' and the identified role of the STP to ensure a sustainable investment programme.

3.1.4. As part of the ISA's assessment of the then draft STP, an assessment of the seven SDCs against the ISA objectives was undertaken. It is acknowledged in the ISA that the investment programme was still in development and that at the time that the ISA appraisal was undertaken precise details of potential interventions were not known. Appraisal was therefore undertaken based upon a set of assumptions regarding the likely types of intervention for each SDC. From the high-level appraisal undertaken, some significant adverse effects were identified. In response, the ISA recommends mitigation in regard to each ISA objective.

STRATEGIC DEVELOPMENT CORRIDOR (IN SCOPE)

3.1.5. The STP defined seven SDCs, for which this study has been commissioned to progress the STP's vision at the programme level for the Southern Pennines SDC, through the identification of interventions that align with the strategic fit outlined in the STP, and progression of the programme to Strategic Programme Outline Case (SPOC).

3.1.6. As outlined in the STP a two-stage sustainability approach will be carried out in developing and delivering TfN's investment programme. Stage 1 assessments comprise preparation of an Environmental Appraisal Report as part of the SPOC for SDCs. The approach taken to environmental appraisal of the SOP for the Southern Pennines SDC is outlined in **Sections 3.2** to **3.9** of this report. The outcome of environmental appraisal undertaken for this study is outlined in **Chapters 5, 6** and **7** of this report.

CORRIDOR INTERVENTIONS (OUT OF SCOPE)

3.1.7. Interventions proposed through this study will be taken forward through other separate commissions to Strategic Outline Business Case (SOBC) in line with DfT's Transport Business Case approach. Stage 2 assessments will ensure that in the development and design of the interventions, further detailed sustainability assessments are undertaken to inform final funding decisions and approvals. This will include a more detailed WebTAG compliant appraisal, and an enhanced TfN appraisal. Environmental Appraisal Reports will be prepared, and further sustainability analysis of each proposed intervention will be undertaken as part of the development of the business cases, with TfN working with Partners and stakeholders. The environmental and social impact of selected interventions will be minimised through the selection and design process and assured through the WebTAG appraisal and the planning process, which involves statutory environmental assessment and may also involve Habitat Regulations Assessment for certain interventions. The selection and design process will also consider options which might enhance the environment.

3.2. ENVIRONMENTAL INPUTS TO DEVELOPMENT OF THE STRATEGIC OUTLINE PROGRAMME (SOP)

3.2.1. To ensure the SOP aligns with the STP's objective to promote and enhance the built, historic and natural environment, the environment has been considered throughout the development of the SOP.

Appraisal Specification Report (ASR)

3.2.2. The approach to be taken for environmental assessment was outlined in the ASR. This provided an overview of the aims of the appraisal, the approach to be taken including the data sources to be used, and provided an outline of the environmental outputs to be delivered through the study.

Current and Future Situation Report

3.2.3. This report set out the current and future situation of the study area associated with the Southern Pennines SDC. This began the development of an evidence base and contextualised the study area with regard to economy, transport and the environment.

3.2.4. An environmental baseline was established within this report. This covered environmental and social topics as listed in the Transport Appraisal Guidance (TAG) Unit A3 'Environmental Impact Appraisal' and the Design Manual for Road and Bridges (DMRB). An environmental constraints map was also provided which presented key high level environmental constraints within the SDC study area.

3.2.5. Existing environmental challenges and opportunities were outlined in the report. Future environmental challenges were also considered, in the areas of climate change, resources, technology and value change.

Sifting of Options and Option Assessment Report

3.2.6. It was identified that the SDC represents a complex series of sub-corridors. The assets, movements and issues within these sub-corridors was outlined to inform the identification of interventions. Environmental constraints within each sub-corridor were identified and used to inform option generation.

3.2.7. The long-list of interventions identified were subject to an appraisal against 12 performance measures linked to the four STP objectives. This included criteria associated with the STP objective of 'promoting and enhancing the built, historic and natural environment'. This was used to inform the

interventions progressed for further consideration for inclusion as core or complementary SOP interventions.

3.2.8. The Option Assessment Report (OAR)[1] reported the option assessment process by which SOP interventions were identified, including appraisal against environmental criteria.

Option Refinement

3.2.9. The environmental appraisal process reported in **Sections 5, 6** and **7** of this report was undertaken on the interventions included in the draft SOP, as outlined in the OAR. This draft SOP was also appropriately coded into the regional highway and rail models for more detailed appraisal, refinement and package optimisation.

3.2.10. It was the intention to base the optioneering process on a transformational travel market, derived from the Northern Transport Demand Model (NTDM) including NPIER forecasts, but this has not been possible owing to technical difficulties encountered during this stage of work.

3.2.11. Due to the reliance on a National Trip End Model (NTEM) core demand scenario only it has been necessary to categorise SOP interventions for each SDC in the following manner:

- interventions that have a strong strategic case and are supported by the NTEM model outputs;
- interventions that have a strong strategic case but are not adequately represented by the NTEM Core travel market scenario, and require further development and analysis. These interventions are not modelled within traffic model outputs used to inform noise, air quality and greenhouse gas appraisal.

3.2.12. The option refinement process also removed a number of potential interventions where the transport need was met by better performing alternative interventions or the intervention is not expected to make any meaningful contribution to the desired Pan-Northern transport outcomes. This option refinement process also gave consideration to environmental risks highlighted through the environmental appraisal.

3.3. ENVIRONMENTAL APPRAISAL OF THE STRATEGIC OUTLINE PROGRAMME (SOP)

ENVIRONMENTAL IMPACT APPRAISAL

3.3.1. Environmental topics as outlined in the WebTAG appraisal guidance have been subject to an environmental impact appraisal. However, considering the high-level nature of the programme of interventions proposed through this study and associated uncertainty, not all topics have been subject to WebTAG compliant appraisal.

3.3.2. Environmental topics to be presented in an Appraisal Summary Table (AST) as part of the WebTAG appraisal for the SPOC comprise the following:

- Noise;

[1] Transport for the North (2018) KP6 Option Appraisal Report – Southern Pennines Strategic Development Corridor

- Air Quality; and
- Greenhouse Gases

3.3.3. Environmental capital topics, as follows, will be presented in the AST but have instead been subject to a risk based appraisal:

- Landscape;
- Townscape;
- Historic Environment;
- Biodiversity; and
- Water Environment.

3.3.4. It is considered that at this stage, insufficient information relating to the characteristics of the SOP interventions is available to appraise the nature and magnitude of impacts relating to these topics. These topics are however subject to a risk based appraisal, as reported in this document to inform decision-makers. At later stages of the transport appraisal process these topics will be considered fully in accordance with WebTAG guidance.

3.3.5. Further detail relating to the approach taken to environmental impact appraisal can be found below.

Inputs to Strategic Programme Outline Case (SPOC)

3.3.6. The scope and methodology undertaken for environmental appraisal undertaken as an input to the SPOC is outlined in the Appraisal Specification Summary Table (ASST) included as **Table 3-1** below.

Table 3-1 - Appraisal Specification Summary Table (ASST) – Environmental Topics

Sub-Impacts	Level of Uncertainty	Proposed Proportionate Appraisal Methodology	Reference to Evidence and Rationale in Support of Proposed Methodology	Type of Assessment Output (Quantitative/ Qualitative/ Monetary/ Distributional)
Noise	Medium	Qualitative review of potential effects, informed by traffic modelling	TAG A3	Qualitative
Air Quality	Medium	Qualitative review of potential effects, informed by traffic modelling	TAG A3	Qualitative
Greenhouse gases	Medium	Qualitative review of potential effects, informed by traffic modelling / TUBA outputs	TAG A3	Qualitative / Quantitative

Landscape	High	Chapter 3 of EAR	Chapter 3 of EAR	Risk based appraisal (see Section 5.2 of EAR).
Townscape	High	Chapter 3 of EAR	Chapter 3 of EAR	Risk based appraisal (see Section 5.2 of EAR).
Historic Environment	High	Chapter 3 of EAR	Chapter 3 of EAR	Risk based appraisal (see Section 5.2 of EAR).
Biodiversity	High	Chapter 3 of EAR	Chapter 3 of EAR	Risk based appraisal (see Section 5.2 of EAR).
Water Environment	High	Chapter 3 of EAR	Chapter 3 of EAR	Risk based appraisal (see Section 5.2 of EAR).

3.3.7. Noise, Air Quality and Greenhouse Gases have been appraised qualitatively in accordance with WebTAG Unit A3 and the appraisal results presented in an AST that forms the appraisal element of the SPOC. These topics have been scoped in as it is considered that a sufficient understanding of the traffic related consequences of the SOP interventions is available to determine effects relating to these topics.

3.3.8. The appraisal is based upon a high-level understanding of the nature of proposed interventions included within the SOP as outlined in **Chapter 4**, and a high-level understanding of the spatial issues and constraints associated with these topics, in the context of anticipated future trends as outlined in **Section 3.7** and **Appendix B.** This qualitative appraisal has also been informed by outputs from traffic modelling that relate to traffic flows and changes.

Appraisal of Environmental Capital

3.3.9. Environmental capital topics will be presented in the AST, but have instead been appraised using a risk / opportunity based approach. This approach is considered appropriate to the early stage nature of this study; and the fact that interventions are currently at a concept level, with a high level of uncertainty relating to how the location and design of these interventions will develop. Therefore, it is considered there is too great an uncertainty of the environmental impacts of these interventions at this stage to provide a more precise appraisal of these topics. A concept level understanding of the interventions, with assumptions made as appropriate, however allows for an appraisal of the risk of potential effects based on the likely scheme location and assumed characteristics. The results of this appraisal are presented in **Chapter 5** of this report.

3.3.10. The appraisal is based upon a high level / concept understanding of the nature of proposed interventions included within the SOP as outlined in **Chapter 4**.A risk based approach has been adopted to provide guidance on whether the baseline information suggests there are likely to be any environmental impacts that will need consideration, given the likely intervention characteristics and potential locations based on available scheme descriptions and aims set out in the OAR. Impacts are also considered in the context of the anticipated future trends outlined in **Section 3.7** and **Appendix B.**

3.3.11. The appraisal and risk ratings applied to each topic considers reasonably foreseeable mitigation that would be applied through the development process of the SOP interventions. However, where the potential effects of the intervention would be challenging to mitigate, the Precautionary Principle has been applied and the appraisal scored on a ‘worst-case’ basis. Furthermore, while the appraisal

highlights potential beneficial effects, these are not used to balance the scoring of adverse effects unless the positive effect is a genuine compensatory effect (e.g. adverse assessments on groundwater supply at one location would probably need to be offset by beneficial assessments on groundwater supply at another location)[2]. As such, given the number and variety of interventions listed in **Chapter 4**, the scoring will be driven by the likely worst-case adverse effects.

POLICY APPRAISAL

3.3.12. A policy appraisal has been undertaken in order to identify any conflicts that the SOP may have in regards to environmental policy relating to the environmental topics as listed in WebTAG Unit A3. This has been appraised using a risk based approach. The results of this appraisal are presented in **Chapter 6** of this report.

3.3.13. The appraisal review is based upon a high-level understanding of the nature of proposed interventions included within the SOP as outlined in **Chapter 4**. These interventions have been appraised against the environmental policy outlined in **Chapter 6**. Policy at the national and regional level only has been reviewed. Information collated for the environmental impact appraisal has been utilised to inform an understanding of potential policy conflicts.

3.3.14. A risk based approach has been adopted to provide guidance on whether the environmental impact appraisal suggests there are likely to be any policy conflicts that will need consideration, in the context of the anticipated future trends outlined in **Section 3.7** and **Appendix B**.

INTEGRATED SUSTAINABILITY APPRAISAL (ISA) OBJECTIVES APPRAISAL

3.3.15. An appraisal of the SOP against the ISA objectives has been undertaken to ensure that the objectives of the ISA continue to inform the development of the STP at the programme level. The ISA objectives are presented in **Table 3-2** below.

Table 3-2 - Integrated Sustainability Appraisal Objectives

Objective No.	Objective	SOP Appraisal Undertaken
1	Reduce greenhouse gas emissions from transport overall, with particular emphasis on road transport	✓
2	Protect and enhance biodiversity, geodiversity and the green infrastructure network	✓
3	Conserve and enhance the international sites (HRA specific objective)	✓
4	Protect and enhance air quality	✓

[2] DfT (2015), TAG Unit A3 – Environmental Impact Appraisal

Objective No.	Objective	SOP Appraisal Undertaken
5	Increase resilience of the transport network to extreme weather events and a changing climate	✕
6	Protect and enhance the inland and coastal water environment	✓
7	Protect and conserve soil and remediate / avoid land contamination	✕
8	Support the conservation and enhancement of the quality and distinctiveness of historic assets, industrial and cultural heritage and their settings	✓
9	Protect and enhance the character and quality of landscapes and townscapes	✓
10	Promote the prudent use of natural resources, minimise the production of waste and support re-use and recycling	✕
11	Enhance lower carbon, affordable transport choice	✓
12	Enhance long term economic prosperity and promote economic transformation	✕
13	Coordinate land use and strategic transport planning across the region	✕
14	Promote greater equality of opportunity for all citizens, with the desired outcome of achieving a fairer society (EqIA specific objective)	✕
15	Improve health and well-being for all citizens and reduce inequalities in health (HIA specific objective)	✕
16	Promote community safety and reduce crime and fear of crime for all citizens (CSA specific objective)	✕

3.3.16. The appraisal of the SOP against the ISA objectives is presented in **Chapter 7**. Only ISA objectives relating to the environmental topics as listed in WebTAG Unit A3 have been appraised, as indicated in **Table 3-2**. ISA objectives deriving from the social and economic aspects of the ISA, including HIA, EqIA and CSA, have not been appraised; reference is instead made to the ISA assessment of the SDC against these objectives. Where the proposed SOP interventions align with the assumptions made in the ISA, the appraisal scores and associated commentary have been included in the appraisal in **Chapter 7**. For an appraisal of distributional impacts of the SOP on communities, the high-level commentary included within the SPOC should be referred to.

3.3.17. A risk based approach has been adopted to provide guidance on whether the environmental impact appraisal suggests there are potential conflicts with the ISA objectives that will need consideration, in the context of the anticipated future trends outlined in **Section 3.7** and **Appendix B**. This appraisal utilises the decision-making questions provided in the ISA, which are included in **Appendix D**.

3.4. ASSESSMENT SCENARIO

3.4.1. The study has appraised the SOP against a core scenario that represents the most unbiased and realistic set of assumptions that form the central DfT National Trip End Model (NTEM) case in line

with WebTAG guidance. This Business as Usual scenario is the ongoing investment in and maintenance of the current existing network, in the absence of the STP. This assumes the future will be like the past, reflecting both historical experience and substantial levels of previous policy intervention and investment, as well as expected UK trends. It is to be noted that this is distinct from a 'Do-Nothing' Scenario.

3.5. REFERENCE CASE

3.5.1. The STP programme of investment will ultimately be delivered as a set of discrete interventions that can be grouped and packaged in a manner that is capable of facilitating transformational growth. The SDCs and their constituent sub-corridors form a subset of this STP programme. Accordingly, it has been necessary to develop a Reference Case that takes account of current road and rail commitments and other transformational work programmes.

3.5.2. Building on a 2015 baseline, and incorporating recently completed schemes and schemes under construction, the Reference Case comprises:

2020-2027

- Schemes already confirmed by Highways England, Network Rail and DfT as committed;
- Schemes identified and categorised as being at least 'reasonably foreseeable'. The WebTAG definition of reasonably foreseeable has been extended for the SDCs to include any intervention that is at Strategic Outline Business Case stage or equivalent, including interventions without an identified funding route; and
- Schemes expected to be included in Highways England's Road Investment Strategy and Network Rail's Enhancements Delivery Plan

Post 2027

- Schemes included in other work programmes identified by the Strategic Transport Plan as necessary to achieve the North's economic growth aspirations
- A full list of the Reference Case interventions can be found in the Option Assessment Report (OAR).

3.5.3. For the environmental appraisals, the Reference Case schemes have been considered as part of the baseline. This includes (but is not limited to) the following major projects:

- A66 Dualling;
- Manchester North West Quadrant;
- Trans-Pennine Tunnel Wider Transport Connectivity;
- HS2;
- The Halton Curve;
- Northern Powerhouse Rail.

3.5.4. The influence of the Reference Case schemes on the environmental baseline has not been considered in this study. In accordance with legislation, these Reference Case interventions will be subject to appropriate environmental assessment. It is anticipated that through this process any significant environmental effects will be minimised through the application of mitigation. Insufficient information is available at this time to assess and consider any residual environmental effects that may result from these Reference Case schemes.

3.5.5. Given the significance of the Trans-Pennine Tunnel scheme within the Southern Pennines SDC, further detail regarding the consideration of environmental impacts of this scheme is provided below.

Environmental Appraisal of the Trans-Pennine Tunnel

3.5.6. As outlined in **Section 2.2**, past and current studies at PCF Stage 0 have examined options for a Trans-Pennine Tunnel and wider transport connectivity. Environmental appraisal has comprised an integral element of these studies.

3.5.7. The current Trans-Pennine Tunnel study includes preparation of WebTAG compliant environmental appraisal appropriate to Stage 0 studies. Given the environmental sensitivities of the scheme, the need for exceptional design to minimise adverse effects and provide enhancements has been acknowledged. As such, the current Stage 0 study goes beyond usual Stage 0 requirements through the use of a Design Panel and workshops to develop principles of exemplar design that would ensure successful design outcomes. Should it progress further, the scheme will undergo further optioneering and environmental appraisal, and later Environmental Impact Assessment (EIA) as part of an application for a Development Consent Order (DCO).

3.5.8. As a Reference Case scheme, the environmental impacts of the Trans-Pennine Tunnel scheme or its influence on the baseline environment will not be considered as part of this study; these will instead be considered, in greater detail, through the Trans-Pennine Tunnel study outlined above. Insufficient scheme detail is available at this stage to provide a meaningful appraisal of potential cumulative impacts between the Trans-Pennine Tunnel and SOP schemes. Cumulative impacts will be considered at a later stage.

3.6. BASELINE DATA COLLECTION

3.6.1. An environmental baseline has been collated that is proportionate to the level of information required at the programme level.

3.6.2. The following spatial environmental datasets have been utilised to establish an environmental baseline used in the identification of environmental impacts of the SOP interventions.

Table 3-3 - Data Sources for Baseline Environmental Assessment

Environmental Topic	Datasets Considered	Datasets Not Considered
Noise	§ Noise Important Areas § Strategic Noise Mapping (Defra)	
Air Quality	§ Air Quality Management Areas (AQMA) § EU Limit Values (Defra National Pollution Climate Mapping)	
Greenhouse Gases	§ Local Authority CO2 Emissions (National Atmospheric Emissions Inventory)	
Landscape	§ National Parks (and Proposed) § Areas of Outstanding Natural Beauty (AONB) § Heritage Coasts	§ Local landscape character assessments § Non-statutory landscape designations

	§ Country Parks § Green Belt § National Character Areas (and profile documents)	
Townscape	§ Ordnance Survey mapping	
Historic Environment	§ World Heritage Sites § Registered Battlefields § Scheduled Monuments § Registered Parks and Gardens § Listed Buildings	§ Conservation Areas (national dataset not available) § Historic Environment Record § Non-statutory historic designations
Biodiversity	§ Special Areas of Conservation (and proposed) § Special Protection Areas (and proposed) § Wetlands of International Importance (Ramsar) (and proposed) § Sites of Special Scientific Interest (SSSI) § National Nature Reserve § RSPB Reserves § Ancient Woodland § Local Nature Reserves § Important Bird Areas § BAP Priority Habitats	§ Non-statutory wildlife designations (e.g. Local Wildlife Sites) § Protected species data
Water Environment	§ Flood Zones 2 and 3 § Main Rivers § Ordinary Watercourses § Groundwater Source Protection Zones	§ Water Framework Directive (WFD) classification

3.7. BASELINE ENVIRONMENTAL CHANGE

3.7.1. The SOP interventions are anticipated to be delivered between 2035 and 2050. As such, the environmental appraisal has been undertaken on a baseline of 2035 to 2050. Anticipated trends have the potential to change the characteristics and value of environmental resources.

3.7.2. The environmental baseline upon which the impact appraisal has been undertaken has been informed by anticipated trends as outlined in the **Current and Future Situation Technical Note** and **Impacts of Future Technology Report** as well as **Appendix D.1 of the Integrated Sustainability Appraisal**.

3.7.3. Where anticipated trends have the potential to alter the characteristics of the environmental baseline, the Precautionary Principle has been applied in the appraisal of SOP interventions; when uncertain, environmental resources have been assumed as the highest applicable value and any impacts appraised in relation to this value.

3.8. ENVIRONMENTAL POLICY REVIEW

3.8.1. A review of national and regional policy has been undertaken in order to outline the environmental policy against which the SOP will be appraised. A summary of the environmental policy reviewed is presented in **Appendix C**.

3.8.2. It is acknowledged that environmental policy will likely undergo changes by the time at which the SOP interventions seek development consent. However, the appraisal has been undertaken on current policy as outlined in **Appendix C**. It is considered that changes in policy cannot be predicted with sufficient accuracy.

3.9. LIMITATIONS

3.9.1. The appraisal undertaken has inherent limitations that must be acknowledged in presenting the outcomes to inform decision-making. These are summarised as follows:

- SOP interventions are at a concept stage and have been appraised on current understanding of the likely characteristics. The appraisal scores may change once further scheme design is undertaken;
- Changes in the environmental baseline are based on an understanding of anticipated trends;
- Implications of the Reference Case schemes for the environmental baseline have not been considered. It is assumed that any environmental impacts will be minimised through the application of mitigation;
- Policy appraisal has been undertaken based on a review of current environmental policy. Changes in environmental policy have not been considered.
- Analysis is limited to being informed by the current modelling tools available.

4. STRATEGIC OUTLINE PROGRAMME (SOP)

4.1.1. An outline of the SOP interventions is illustrated in **Figures 4-1** and **4-2** and listed in **Table 4-1** and **Table 4-2**.

4.1.2. Interventions in **Table 4-1** and **Table 4-2** are categorised according to whether they have been appraised within the economic dimension (including transport modelling), for the reasons outlined in **Section 3.2.**

4.1.3. Environmental appraisal, as presented within **Chapters 5, 6 and 7**, has been undertaken on the individual SOP interventions as included within the draft SOP presented in the OAR. As described in **Section 3.2**, some further optioneering and scheme refinement has been undertaken since. The appraisal in **Chapters 5, 6 and 7** therefore includes some interventions that have since been excluded as a result of further optioneering. For example, the A556 extension scheme has now been excluded from the SOP as a result of environmental risks highlighted through this appraisal.

Figure 4-1 – Southern Pennines SDC - Road Reference Case & SOP

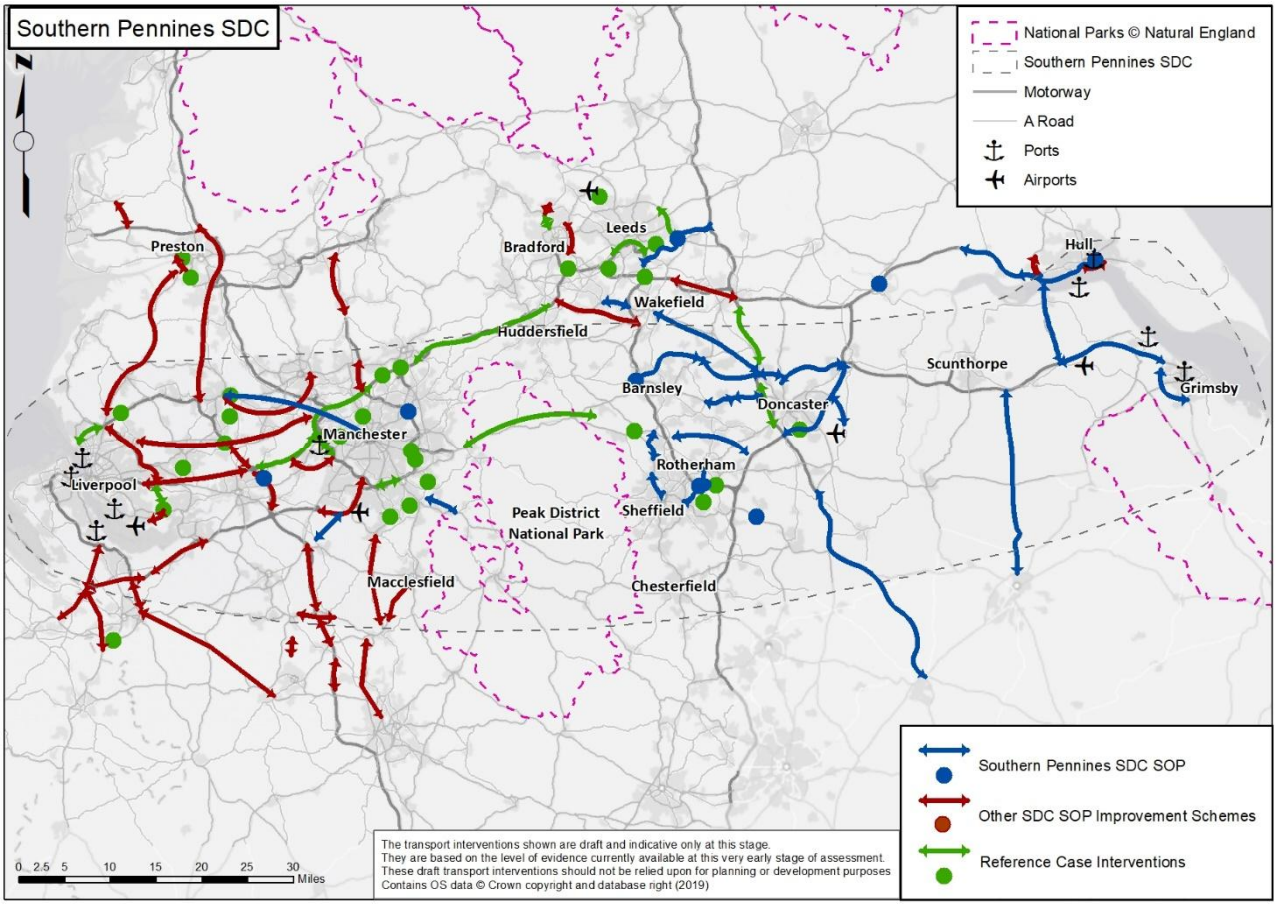


Table 4-1 – Southern Pennines SDC – SOP Road Interventions

Road Interventions Appraised within the Economic Dimension
· A6 High Lane-Disley Bypass · M60 J21 Mainline Capacity Improvements · A1 widening between J34 and Winthorpe/A46 junction · A15 route upgrade from J4 on M180 to A46 Lincoln Bypass · Grimsby Western Relief Road · A15 junction upgrades between A63 and M180 · South Anston bypass · M1 junction 37a · M1 to HS2 link in South Yorkshire · A1 to HS2 link in South Yorkshire · A61 dualling between A616 and Grenoside, Sheffield · M1-M18 Link with additional capacity on the M18 between new link and A1(M) · M18 widening between the M180 and A1(M) · M18 J4 Connection to Doncaster Sheffield Airport · A635 improvements · Marr/Hickleton Bypass · A1-A19 Link · A19-M18 Link · Wakefield to A1(M) via A638 Crofton · M1 J43 to Hook Moor · M1 J46 Improvements
Road Interventions Not Appraised within the Economic Dimension at this stage
· Manchester Airport - improved vehicle access from south and west · Birchwood (Woolston) Park & Ride for trains services and P&R bus service to/from Warrington · Bus Rapid Transit Schemes connecting Wigan Borough and Salford City · A180 upgrade · A63/A1033 junction improvements · New Junctions on M62 between Selby and Goole · A63 technology Improvements · M1 New Junction between junction 33-34 · Sheffield/Rotherham Innovation corridor · A61 Penistone Road and Shalesmoor · Dewsbury to M1 J40 Improvements

Figure 4-2 – Southern Pennines SDC - SOP Rail Interventions

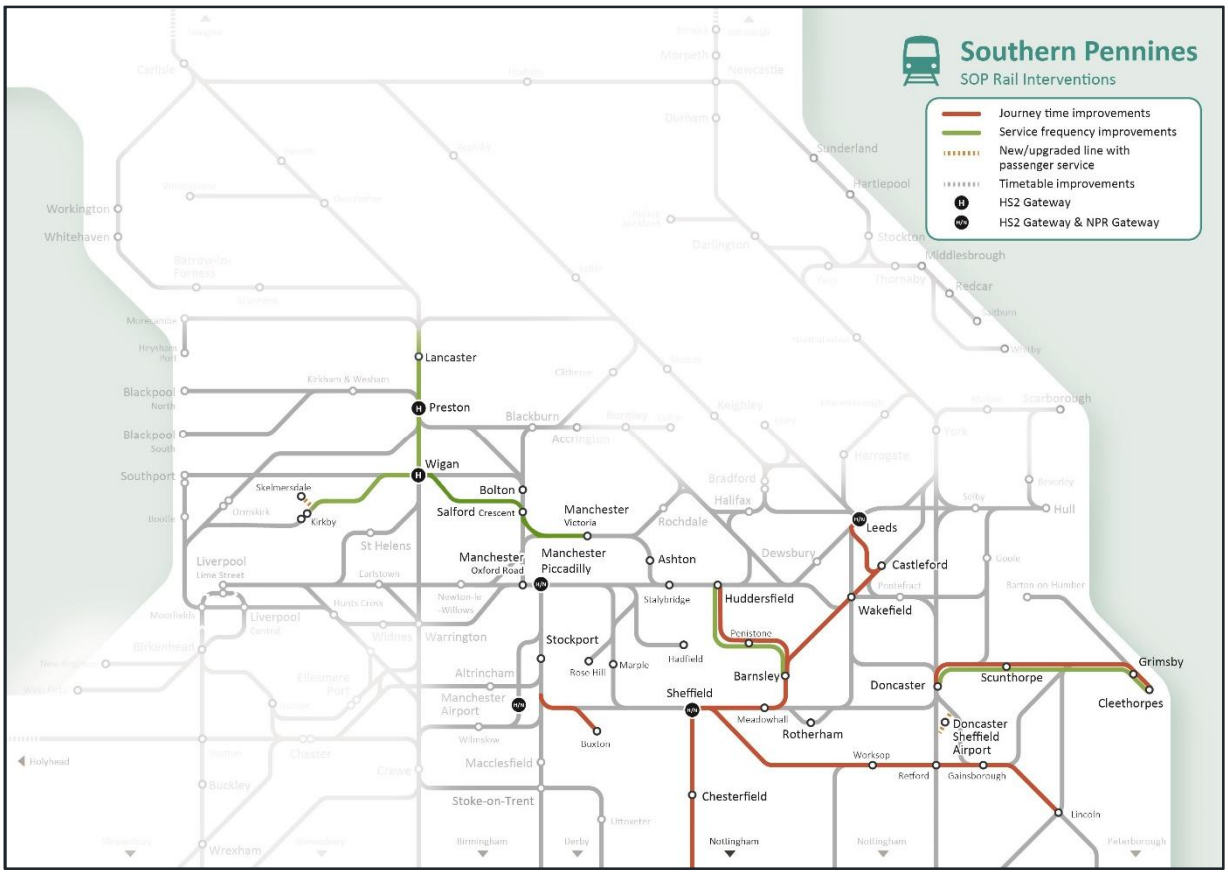


Table 4-2 – Southern Pennines SDC – SOP Rail Interventions

Rail Interventions Appraised within the Economic Dimension
· Crewe – Stoke - Derby (journey time improvements) · Extension of North Staffordshire services to Nottingham and Manchester Airport · Manchester – Skelmersdale (via Wigan) service frequency enhancement · New stations at Droylsden/Littlemoss (Eastern Gateway) and Stoke park and ride · Buxton Line (journey time improvements)
Rail Interventions Not Appraised within the Economic Dimension at this stage
· Increased service calls at Hartford and other WCML stations · Mid-Cheshire Line (journey time and capacity improvements) · Northwich to Sandbach reopening and new stations · Knutsford to Manchester Airport (Western Link connection) · Extension of Leeds – Chester service to Llandudno Junction · New station at Broughton · Direct connectivity between Preston/Bolton and Sheffield · Rail connection and station for Doncaster Sheffield Airport · New station between Barnetby and Habrough · South Transpennine Line – journey time and capacity improvements between Doncaster and Cleethorpes · Sheffield to Lincoln (journey time improvements and service frequency enhancements) · Penistone Line (journey time improvements and service frequency enhancements) · Hallam Line (journey time improvements) · Barnsley – Doncaster direct services · Sheffield – Nottingham (journey time improvements)

5. ENVIRONMENTAL IMPACT APPRAISAL

5.1. INPUTS TO STRATEGIC PROGRAMME OUTLINE CASE (SPOC)

5.1.1. **Table 5-1** below presents a summary of the WebTAG compliant appraisal of the impacts of the SOP on noise, air quality and greenhouses. Further description of the impacts is presented in the subsequent sections.

Table 5-1 - Summary of WebTAG Appraisal Summary Table (AST) Scores

Topic	Score
Noise	Moderate Adverse
Air Quality	Moderate Adverse
Greenhouse Gases	Moderate Adverse

NOISE

5.1.2. The SOP includes a variety of transport interventions with the potential to alter noise levels experienced by sensitive receptors. Exposure to noise from road and rail traffic can lead to significant adverse effects on human health and quality of life, as well as adverse effects to other environmental receptors (i.e. landscapes, habitats, species and cultural heritage).

5.1.3. New (offline) infrastructure included in the SOP will expose new receptors to strategic levels of road or rail noise. Offline SOP interventions include an M1-M18 link, A19-M18 link, A1/M1-HS2 link, A1-A19 link, Grimsby Western Relief Road, and bypasses at High Lane-Disley, South Anston and Marr / Hickleton. These interventions have the potential for significant effects on the adjacent noise environment at these locations, with potential adverse effects on receptors such as (but not limited to) residential properties and ecological receptors. The tranquillity of adjacent landscapes will also be affected. New schemes will incorporate mitigation to reduce these effects, such as low-noise surfacing and noise barriers, although residual effects will likely remain at some locations. New road schemes will however have beneficial effects where traffic is removed from existing routes. Notably, modelling suggests a High Lane-Disley Bypass would alleviate traffic on the A6 between New Mills and Stockport, much of which is designated as Noise Important Areas (NIAs). Localised reductions in road traffic noise are also anticipated within Grimsby, Sheffield, Doncaster and Barnsley as a result of new road schemes.

5.1.4. Online improvements to existing infrastructure have the potential to change noise levels at adjacent sensitive receptors. The SOP includes schemes that will enhance the capacity and performance of the existing road and rail network, such as dualling of the A61(between the A616 and Grenoside), widening of the A1 (J34 to Winthorpe) and M18 (M180 to A1(M)), and various junction improvements along the M1. Where road traffic flows or train service frequencies increase as a result of these improvements, adjacent receptors will likely experience increases in noise levels. Traffic modelling suggests the SOP will lead to large increases in road traffic flows on sections of the Strategic Road Network, notably the A1, A15, A180, A616, A628, M1, M18, M180 and M62. While traffic flows on

existing routes may increase as a result of the SOP, infrastructure improvements and mitigation resulting from these interventions have the potential to reduce noise effects. The development and approval process of interventions will be subject to modern standards and policy, for which current policy is summarised in **Appendix C**. This presents an opportunity to introduce infrastructure that more effectively manages road or rail noise, including at a large number of NIAs situated on roads and railways that would be subject to improvements through the SOP.

5.1.5. Rail schemes included within the SOP will also support a modal-shift from road to rail that has the potential for a beneficial effect in reducing road traffic noise. Improvements to journey time, reliability and capacity on railways including the construction of new stations at Droylsden / Littlemoss, Doncaster Sheffield Airport and Humberside Airport will make rail a more attractive choice as a mode of transport. Any such modal-shift can have a positive influence on road noise. This modal-shift will be supported by Transport for the North's Integrated and Smart Travel programme which promotes measures such as smart ticketing, payment and information technologies to make travel by rail, bus and light rail simple, attractive and convenient.

5.1.6. Further to the effects outlined in preceding paragraphs, it is anticipated that by the time of operation of the SOP schemes changes in technology will alter the magnitude of change experienced by receptors as a result of the SOP. The increasing use of low-noise surfacing and mitigation of noise effects in new and upgraded transport infrastructure has the potential to reduce the magnitude of effect of SOP interventions. The increasing adoption of electric propulsion will reduce mechanical noise generated by road and rail SOP schemes, although tyre / wheel noise will remain. It is anticipated that future policy, building upon the current policy outlined in **Appendix C** will support a transition to electric-propulsion and continue to require that new development supports aspirations to reduce the number of people impacted by noise.

5.1.7. Overall, a Moderate Adverse impact is anticipated due to the inclusion of significant road schemes within the SOP for which there is the potential for adverse effects on receptors located along new and existing road corridors. At this stage however, only a high-level appraisal has been possible; subsequent stages of the scheme development and planning process will involve more detailed appraisal and later Environmental Impact Assessment (EIA) of the noise effects of interventions.

AIR QUALITY

5.1.8. Transport interventions included within the SOP have the potential to influence air quality concentrations experienced by sensitive receptors. Exposure to air pollutant concentrations in exceedance of national Air Quality Standards (AQSs) can have adverse effects on human health. Other receptors sensitive to air pollutant concentrations include habitats and species.

5.1.9. New (offline) infrastructure included in the SOP have the potential to expose new receptors to harmful levels of pollutant concentrations, notably nitrogen dioxide (NO_2). Offline SOP interventions include an M1-M18 link, A19-M18 link, A1/M1-HS2 link, A1-A19 link, Grimsby Western Relief Road, and bypasses at High Lane-Disley, South Anston and Marr / Hickleton. These interventions have the potential for significant effects on the air pollutant concentrations at these locations, with potential adverse effects on receptors such as (but not limited to) residential properties and ecological receptors. New road schemes will however have beneficial effects where traffic is removed from existing routes. Localised reductions in air pollutant concentrations are anticipated within Grimsby, Sheffield, Doncaster and Barnsley as a result of new road schemes. This includes potential improvements within Air Quality Management Areas (AQMAs).

5.1.10. Online improvements to existing infrastructure have the potential to change air pollutant concentrations at adjacent sensitive receptors. The SOP includes schemes that will enhance the capacity and performance of the existing road and rail network, such as dualling of the A61(A616 to Grenoside), widening of the A1 (J34 to Winthorpe) and M18 (M180 to A1(M)), and various junction improvements along the M1. Where road traffic flows or train service frequencies (if not electrified) increase as a result of these improvements, adjacent receptors will likely experience increases in pollutant concentrations. Traffic modelling suggests the SOP will lead to large increases in road traffic flows on sections of the Strategic Road Network, notably the A1, A15, A180, A616, A628, M1, M18, M180 and M62. This includes increases along sections of the Strategic Road Network within Greater Manchester, Barnsley, Wakefield and Sheffield Citywide AQMAs. Road improvements may also lead to increased average speeds, with combustion engines operating at lower efficiencies at higher speeds. However, the SOP road interventions are also anticipated to ease congestion. A reduction in stop-start movements allows combustion-engine driven cars to operate at greater levels of efficiency, thereby having a positive effect on air pollutant concentrations in congested locations.

5.1.11. Rail schemes included within the SOP will also support a modal-shift from road to rail that has the potential for a beneficial effect in reducing air pollutant concentrations. Improvements to journey time, reliability and capacity on railways including the construction of new stations at Droylsden / Littlemoss, Doncaster Sheffield Airport and Humberside Airport will make rail a more attractive choice as a mode of transport. Any such modal-shift can have a positive influence on areas negatively affected by roadside air pollutant concentrations. This modal-shift will be supported by Transport for the North's Integrated and Smart Travel programme which promotes measures such as smart ticketing, payment and information technologies to make travel by rail, bus and light rail more attractive.

5.1.12. Further to the effects outlined in preceding paragraphs, it is anticipated that by the time of operation of the SOP schemes changes in technology will reduce the magnitude of negative air quality effects. The increasing adoption over time of electric propulsion in road and rail transport will significantly reduce the impact of the SOP interventions on air pollutant concentrations. Under the policy outlined in **Appendix C**, notably the 'Clean Growth Strategy' and 'Road to Zero', as well as policy measures proposed through TfNs Strategic Transport Plan, it is anticipated that the composition of the road fleet utilising the SOP interventions will increasingly comprise ultra-low and zero emission vehicles. The anticipated decrease in the number of petrol and diesel driven cars as a result of ultra-low and zero emission vehicle uptake will have a positive effect on air pollutant concentrations. SOP interventions also present an opportunity to support the uptake of ultra-low and zero emission technologies, for example by incorporating electric charging and refuelling networks.

5.1.13. Overall, a Moderate Adverse impact is anticipated due to the inclusion of significant road schemes within the SOP for which there is the potential for adverse effects on receptors located along new and existing road corridors. However, it is anticipated this impact will reduce to Slight Adverse with continued uptake of ultra-low and zero emission vehicles until the Governments date for banning new petrol and diesel cars in 2040; and reduction of these types of vehicle within the fleet beyond. At this stage however, only a high-level appraisal has been possible; subsequent stages of the scheme development and planning process will involve more detailed appraisal and later Environmental Impact Assessment (EIA) of the air quality effects of interventions.

GREENHOUSE GASES

5.1.14. The SOP has the potential to influence greenhouse gas emissions of transportation, which accounts for approximately a quarter of the UK's carbon dioxide (CO_2) emissions. CO_2 is the primary greenhouse gas of concern to a changing climate.

5.1.15. Road transport constitutes the majority source of UK transport emissions. At present, the majority of the road fleet is fuelled by petrol and diesel and as such produce CO_2 emissions. The SOP includes road interventions that, through the introduction of new road schemes and improvements to the capacity, performance and reliability of existing road infrastructure, are expected to increase traffic volumes and distances travelled and therefore have a negative effect on greenhouse gas emissions. However, the SOP road interventions are also anticipated to ease congestion. A reduction in stop-start movements allows combustion-engine driven cars to operate at greater levels of efficiency, thereby having a positive effect on greenhouse-gas emissions.

5.1.16. It is anticipated that by the time the SOP interventions are operational, changes in technology will reduce the magnitude of operational greenhouse gas emissions. The increasing adoption over time of electric propulsion in road and rail transport will significantly reduce the impact of the SOP interventions on greenhouse gas emissions. Under the policy outlined in **Appendix C**, notably the 'Clean Growth Strategy' and 'Road to Zero', as well as policy measures proposed through TfNs Strategic Transport Plan, it is anticipated that the composition of the road fleet utilising the SOP interventions will increasingly comprise ultra-low and zero emission vehicles. The anticipated decrease in the number of petrol and diesel driven cars as a result of ultra-low and zero emission vehicle uptake will have a positive effect on greenhouse gas emissions. SOP interventions also present an opportunity to support the uptake of ultra-low and zero emission technologies, for example by incorporating electric charging and refuelling networks.

5.1.17. Rail schemes included within the SOP will support a modal-shift from road to rail that has the potential for a beneficial effect in reducing road related greenhouse gas emissions. Improvements to journey time, reliability and capacity on railways including the construction of new stations at Droylsden / Littlemoss, Doncaster Sheffield Airport and Humberside Airport will make rail a more attractive choice as a mode of transport. This modal-shift will be supported by Transport for the North's Integrated and Smart Travel programme which promotes measures such as smart ticketing, payment and information technologies to make travel by rail, bus and light rail more attractive.

5.1.18. The SOP comprises infrastructure schemes that will involve extensive construction and refurbishment of road and rail infrastructure, for which large quantities of construction materials including concrete are required. This therefore involves 'embodied carbon'; CO_2 would be emitted within the process of manufacturing the large quantities of concrete required for the SOP interventions, as well as during the maintenance and future demolition / disposal of materials used in these interventions. However, as stated in the Strategic Transport Plan and with a view to supporting the policy outlined in **Appendix C**, Transport for the North will explore opportunities to undertake sustainable procurement and be resource efficient, including promoting the circular economy.

5.1.19. Overall, a Moderate Adverse impact is anticipated due to the anticipated greenhouse emissions from increased traffic volumes as a result of road interventions, and embodied carbon. Despite WebTAG assumptions for changing fleet composition of fuel types and increasing fuel efficiency, modelling suggests that, based on a 60-year period, increased vehicle flows as a result of the SOP

will result in approximately an additional 7.2 million tonnes of CO_2 emissions. At this stage however, only a high-level appraisal using current assumptions has been possible; subsequent stages of the scheme development and planning process will involve more detailed appraisal and later Environmental Impact Assessment (EIA) of effects on greenhouse gases.

5.2. APPRAISAL OF ENVIRONMENTAL CAPITAL

5.2.1. **Table 5-2** below presents a summary of the appraisal of environmental capital topics. Further description of the potential impacts is presented in the following sections.

5.2.2. This assessment uses risk ratings. The constraints driving these ratings and the potential environmental effects of the SOP are outlined in the sections below. Each environmental topic has been rated for its potential risk of effects according to the following general criteria:

- Likely to have significant adverse environmental effects;
- Potential to have significant adverse environmental effects; and
- Unlikely to have any significant adverse environmental effects.

5.2.3. The SOP has the potential for beneficial environmental effects as well as the risk of adverse effects. Potential beneficial effects have also been considered and are referenced in the appraisal presented below where possible. The appraisal scoring has however been undertaken using the methodology outlined in **Section 3.3**; scoring is therefore driven by risks of adverse implications, unless there are genuine compensatory beneficial effects.

Table 5-2 - Summary of Risk-Based Appraisal of Environmental Capital Topics

Topic	Risk Rating	Summary
Landscape	Likely to have significant adverse environmental effects	§ Potential adverse landscape impacts to the Peak District National Park through High Lane-Disley and Thurlstone Bypass schemes. Impacts may be challenging to mitigate; § Risk of landscape impacts to other high value landscapes, although these impacts will likely be negligible, or minimised following mitigation; § Adverse impacts on landscape character, notably from offline schemes. Likely mitigable impacts. § Risk of adverse landscape impacts due to reinstatement of Barrow Hill Line and four proposed new stations, although impacts limited due to historic route and likely mitigable; § Risk of potential landscape impacts to Thrybergh Country Park from M1-M18 link road.
Townscape	Potential to have significant adverse environmental effects	§ Potential adverse townscape impacts to settlements in vicinity of offline schemes, notably from Sheffield / Rotherham Innovation Corridor and A556 northwards extension; § Townscape improvements as a result of bypass and new link interventions.
Historic Environment	Likely to have significant adverse environmental effects	§ Risk of potential major adverse impacts on Dunham Massey Grade II* park and garden from A556 northwards extension; § Risk of potential major adverse impacts on Wentworth Woodhouse Grade II* park and garden from M1-M18 link road; § Potential direct impact to Roman Ridge Scheduled Monuments from A1-A19 and M1-M18 link roads;

Topic	Risk Rating	Summary
		§ Risk of direct impacts on the integrity of designated and non-designated assets, as well as impacts on characteristics of the setting of these assets.
Biodiversity	Likely to have significant adverse environmental effects	§ Potential adverse impacts to European designated sites within the SDC. In most cases impacts can likely be mitigated, however A556 northwards extension may be more challenging to mitigate; § Potential direct and indirect impacts on SSSIs, notably through M18 widening and South Anston Bypass; § A556 northwards extension has the potential to directly impact a non-designated wildlife asset developed as a local wildlife trust project; § Likely impacts on ancient woodland, locally designated sites, priority habitats and protected species; § Opportunities to work with partners to mitigate any impacts and engage with opportunities to enhance biodiversity.
Water Environment	Potential to have significant adverse environmental effects	§ Potential increased risk of pollution of surface watercourses, although impacts can likely be mitigated; § Interventions located within groundwater source protection zones present increased risk to these and other groundwater bodies. Impacts likely mitigable, however schemes located within the inner protection zone (zone I, highest risk) including the A1 widening and the A556 northwards extension may be more challenging to mitigate; § Following mitigation, no increases in flood risk are anticipated. Impacts of new link road from the A19-M18 and the M18 J4 connection to Doncaster Sheffield Airport may be challenging to mitigate.

LANDSCAPE

5.2.4. The SOP includes interventions that fall in proximity to National Parks and Areas of Outstanding Natural Beauty (AONB), which are landscapes of the highest national value. **Table 5-3** below provides a commentary of those designated landscapes which are considered to be affected by the SOP.

Table 5-3 - Designated Landscapes Affected by the SOP

Designated Landscape	Comments
Peak District National Park	Proposed offline High Lane-Disley, and Thurlstone Bypass schemes both fall within 2km of the Peak District National Park. As such, there is the potential for impacts on the visual amenity and tranquillity of this landscape from these schemes. The extent of the proposed schemes and the open nature / topography of the surrounding landscape may make local impacts challenging to mitigate, however due to the distance any impacts on the visual amenity of the National Park can likely be minimised with mitigation. SOP road schemes may however also lead to increased trans-Pennine traffic within the Peak District National Park, particularly on the A628 which as part of the Reference Case Trans-Pennine Tunnel scheme will be upgraded. Additional traffic risks visual, noise and air quality impacts within the National Park. It is however anticipated that the Trans-Pennine Tunnel scheme will through the option selection, design and consenting process mitigate impacts of strategic traffic volumes and consider options that might enhance the

Designated Landscape	Comments
	environment. In order to satisfy planning policy, the Trans-Pennine Tunnel scheme will need to contribute positively to the local environment by achieving net benefits to the wildlife and landscape qualities of the area and finding opportunities to promote access to the National Park. Any additional traffic generated by the SOP within the National Park will be within this context of the Reference Case. The SOP also includes rail improvements to the existing Buxton to Greater Manchester route adjacent to the National Park, however with mitigation it is anticipated any impacts will be negligible.
Lincolnshire Wolds AONB	Proposed Grimsby Western Relief Road is within 2.5km of Lincolnshire Wolds AONB. As such, there is the potential for impacts on the visual amenity, tranquillity and lighting environment of these landscapes. However, with mitigation it is anticipated any impacts can be minimised.

5.2.5. The only further nationally designated landscape within the SDC, other than those listed in **Table 5-3**, is Spurn Heritage Coast. No schemes fall within 10km of this landscape, and as such no impacts are anticipated.

5.2.6. SOP interventions have the potential to impact local landscape designations. The M1-M18 link road has a risk of crossing through Thrybergh Country Park, whilst Buxton – Greater Manchester rail line improvements, Marr/Hickleton Bypass, A635 improvements and the reinstatement of the Barrow Hill railway all fall within close proximity to Country Parks. As such, these schemes are at risk of degrading the visual amenity and tranquillity of these locally valued landscapes. Data relating to other local landscape designations is not available at this time.

5.2.7. Subject to the further design and mitigation of interventions, the SOP has the potential to degrade the character of landscapes within the SDC. Offline interventions pose the greater risk of degrading landscape character, where the interventions will typically alter the land-use, pattern and tranquillity of existing landscapes. The SOP includes several offline road interventions, such as new links between M1-M18, A1-M1, A19-M18 and A1-A19, Grimsby Western Relief Road and A556 northwards extension, and bypasses at Thurlstone, High Lane-Disley, South Anston and Marr / Hickleton. Such schemes risk adverse impacts to landscape character that may be challenging to mitigate. Online road and rail schemes, involving improvements to existing routes, may also risk adverse impacts on landscape character. This is notably the case with dualling schemes, of which the SOP includes several. Rail improvements, including the reinstatement of the Barrow Hill Line and four new stations on route, have a risk of adverse impacts to the surrounding landscape although impacts are likely mitigable and anticipated to be limited due to the nature of the scheme involving reinstatement of a historic route. In general, the impacts on landscape character of online improvements are anticipated to be less significant and more easily mitigated than offline schemes.

5.2.8. In-combination, impacts of SOP interventions may also adversely affect the characteristics of National Character Areas (NCAs). The SOP includes offline interventions in certain sensitive NCAs, such as Yorkshire Southern Pennine Fringe (NCA37), Manchester Pennine Fringe (NCA54) and South West Peak (NCA53). Interventions in isolation and cumulatively may degrade characteristics of these areas.

5.2.9. Despite risks of adverse impacts, there are also opportunities for the SOP to provide landscape enhancements. TfN will work with partners to ensure good design is embedded in the design process, in order that schemes are sensitive to local landscape character and visual amenity and explore opportunities for landscape enhancement. The SOP will also improve access to valued landscapes such as the Peak District National Park, thereby offering greater opportunities for communities to benefit from the recreational, cultural and ecological attributes of these landscapes.

TOWNSCAPE

5.2.10. The SOP includes interventions that fall within settlements and as such have the potential to impact physical and social characteristics of the urban environment that comprise townscapes.

5.2.11. Rail interventions within the SOP predominantly involve improvements to existing lines, and therefore, following appropriate mitigation, are considered at low risk of adversely affecting townscapes.

5.2.12. Certain SOP road interventions are anticipated to have direct and indirect impacts on townscapes along or in proximity to their route. The SOP road interventions includes improvements to existing routes. Where these fall within settlements, any improvements have the potential to degrade townscape characteristics. Notably, improvements from Wakefield to A1(M) via A638 Crofton risks townscape impacts to settlements along its route, such as Belle Vue, Wragby, Foulby and Brackenhill / Ackworth Moor Top. Any capacity upgrades in these settlements risks degrading townscape characteristics such as appearance, layout, human interaction and cultural heritage.

5.2.13. Of the offline interventions included within the SOP, the Sheffield / Rotherham Innovation Corridor and A556 northwards extension have the potential for adverse townscape impacts; these schemes risk locating new strategic road links within or adjacent to settlements, thereby degrading the townscape characteristics. In some cases it may be challenging to mitigate these impacts.

5.2.14. Where SOP interventions draw traffic away from existing settlements, it is anticipated that these interventions will have locally beneficial townscape impacts. New links between M1-M18, A1-M1, A19-M18 and A1-A19, Grimsby Western Relief Road, and bypasses at Thurlstone, High Lane-Disley, South Anston and Marr / Hickleton are all anticipated to reduce traffic flows in urban areas along existing routes, thereby improving townscape characteristics such as appearance and human interaction. SOP interventions present an opportunity to work with local authorities and communities to identify improvements to townscapes / quality of place.

HISTORIC ENVIRONMENT

5.2.15. The SOP interventions fall within proximity to a large number of designated heritage assets. No impacts are however anticipated on any of the three World Heritage Sites located within the SDC; Saltaire, Derwent Valley Mills and Liverpool Maritime Mercantile City.

5.2.16. The SOP has the potential to affect designated heritage assets of national value, comprising Scheduled Monuments, Registered Parks and Gardens and listed buildings. Several SOP schemes will likely fall in immediate proximity to these heritage assets, and therefore risk direct impacts on the form of heritage assets, as well as setting impacts. The proposed route of a link road between the M1-M18 may fall in close proximity to the boundary of Wentworth Woodhouse Grade II* park and garden, whilst the proposed route for the A556 northwards extension may fall within or in close proximity to the boundary of Dunham Massey Grade II* park and garden. Furthermore, the proposed M1-M18 and A1-A19 link roads will likely intersect or be in close proximity to Roman Ridge

Scheduled Monuments. As such, these schemes risk major adverse impacts on the features of these heritage assets.

5.2.17. Other schemes that will likely fall within or in close proximity to Registered Parks and Gardens include Marr / Hickleton Bypass at Hickleton Hall (Grade II), the reinstatement of the Barrow Hill line at Renishaw Hall (Grade II*) and improvements from Wakefield to A1(M) via A638 Crofton at Nostell Priory (Grade II*). Scheduled Monuments are located nearby to many of the SOP interventions, and fall directly adjacent to improvements from Wakefield to A1(M) via A638 Crofton. Furthermore, a large number of Grade I, II* and II listed buildings are located in proximity to the SOP interventions. Direct and setting impacts are considered likely to take place. However, it is anticipated that for the majority of these interventions direct impacts can be avoided, and any setting impacts minimised through mitigation.

5.2.18. Impacts of the SOP on non-designated heritage assets, unknown archaeological remains and historic landscape character are unknown at this time. However, considering the nature of the SOP interventions it is considered likely that the SOP will have adverse impacts.

5.2.19. TfN and delivery partners will work with Historic England, local authorities, communities and other key stakeholders to identify opportunities to both mitigate impacts of the schemes taken forward, and where possible facilitate improvements to the historic environment. The SOP presents opportunities for enhancements, such as through upgrading of existing infrastructure in a manner more sensitive to the historic environment. The SOP will also improve access to valued cultural heritage sites such as Saltaire and Liverpool Maritime Mercantile City World Heritage Sites and other designated heritage assets and landscapes, thereby offering greater opportunities for communities to appreciate these sites.

BIODIVERSITY

5.2.20. The SOP includes interventions that fall within or in close proximity to nature conservation sites protected at the international (European), national and local level. Several interventions have the potential to affect European designated wildlife sites, of which those presenting risk of direct impacts or impacts that would be challenging to mitigate are outlined below:

- Improvements to A63 / A1033 and A15 are in close proximity to Humber Estuary SAC / SPA / Ramsar site;
- M60 J21-J24 improvements cross the Rochdale Canal SAC;
- A556 northwards extension has various different SAC / Ramsar sites within 1km of proposed route;

5.2.21. These schemes risk impacts to the integrity and qualifying attributes of these sites. However, it is anticipated that for many of these schemes these impacts can be minimised to negligible significance with mitigation. However, it is anticipated that potential impacts associated with the A556 northwards extension could be challenging to mitigate. This scheme runs in close proximity to Manchester Mosses SAC, Rixton Clay Pits SAC and Rostherne Mere Ramsar. The A556 extension scheme would likely run for much of its length adjacent to the route of HS2 Phase 2b, and subject to the programme of the A556 scheme in relation to the HS2 programme, the A556 scheme may be seen in the context of a baseline environment changed as a result of HS2 and any associated mitigation or compensation, or impacts may be viewed cumulatively with those associated with HS2. In either situation, this scheme has the potential for adverse impacts on these European sites

through direct loss of adjoining habitat, disturbance impacts, pollution risks and changes to the water environment.

5.2.22. Other road and rail interventions included within the SOP are located within proximity to European sites, and as such have the potential for indirect adverse impacts on these sites. Such impacts may be through loss of supporting functional habitat, air pollutant emissions or noise, visual and artificial lighting disturbance. Notably, the Thurlstone Bypass scheme would facilitate increased traffic flows on the A628 within the South Pennine Moors SAC / SPA / SSSI. The nature of such indirect impacts is unknown at this time, but present a risk of impacts to the qualifying attributes of these sites.

5.2.23. The SOP also has the potential for direct and indirect impacts on sites of nature conservation designated at the national level, comprising SSSIs, National Nature Reserves and RSPB Reserves. Several offline interventions are located adjacent or within SSSIs, and therefore present a risk to the integrity of these sites. This includes the proposed South Anston Bypass and A556 northwards extension. Many of the other road and rail SOP interventions involve improvements to existing roads or rail lines that cross or are in immediate proximity to SSSIs, however with mitigation it is anticipated that any impacts can be minimised.

5.2.24. Many of the SOP interventions will likely be located in close proximity to ancient woodland. As such, there is a risk that the SOP will result in the loss of or disturbance to this irreplaceable habitat. With appropriate route selection and mitigation however, it is considered any losses or impacts can be minimised.

5.2.25. Certain SOP interventions are located in proximity to Local Nature Reserves and as such have the potential to degrade the characteristics of these sites. The location of non-designated wildlife sites (e.g. Local Wildlife Sites) is not known at this time, but it is anticipated that the SOP will have direct and indirect impacts on such sites.

5.2.26. The A556 northwards extension falls within a wetland landscape that is undergoing a restoration project titled ‘the Carbon Landscape’. This project is funded by £3.2 million of lottery funding and aims to deliver significant landscape-scale restoration and improvements across South Lancashire, including improving habitat connectivity between wild areas in the Mosslands. While the A556 extensions scheme would likely follow the route of HS2 Phase 2b, this scheme has the potential for significant adverse impacts on the objectives of this project.

5.2.27. The SOP will likely result in the loss of priority habitats. Furthermore, the impact of the SOP on protected species is currently unknown, although considering the nature of the interventions it is anticipated that protected species will be affected. However, with appropriate avoidance, mitigation and compensation where necessary it is anticipated any impacts can be minimised.

5.2.28. Despite the potential of the SOP interventions for adverse impacts on biodiversity, there are also opportunities for the SOP to provide biodiversity enhancements. This includes opportunities to contribute mitigation or compensation solutions to strategic biodiversity priorities, including Biodiversity Action Plans and other local strategies and policies. Local measures may include planting of native species, developing wildflower meadows along existing and new linear infrastructure or the active control of invasive species. TfN will continue to work with Natural England, local authorities, environmental stakeholders and local communities to discuss and agree mitigation strategies and opportunities for biodiversity enhancement.

WATER ENVIRONMENT

5.2.29. SOP interventions fall within the catchments of numerous main rivers and ordinary watercourses. Both rail and road schemes have the potential to contribute to transport related pollution of these surface watercourses. As well as improvements to existing transport infrastructure, the SOP also includes offline interventions. Of these, the Sheffield / Rotherham Innovation Corridor and M1-M18 link road may both require new crossings of the River Don, the Grimsby Western Relief Road may require a new crossing of the River Freshney, the A1-M1 link road may require a new crossing of the River Dearne and the M18 J4 connection to Doncaster-Sheffield Airport may require a new crossing of the River Torne. These schemes would expose these watercourses to increased risk of transport related pollution. Improvements to existing transport infrastructure also presents a risk of increased pollution of surface-watercourses. With appropriate mitigation however, it is anticipated that the impact of these schemes on the chemical and ecological quality of surface watercourses will be negligible. The SOP may also present opportunities to improve the biological and chemical quality of watercourses through upgrading drainage systems of existing infrastructure or dealing with existing sources of watercourse pollution.

5.2.30. Groundwater bodies may also be affected by the SOP. Several interventions are located within groundwater source protection zones, including the A556 northwards extension, A1 widening between J34 and Winthorpe / A46 junction, M18 J4 connection to Doncaster Sheffield Airport and the Grimsby Western Relief Road which all fall within or in close proximity to the inner protection zone (zone I, highest risk). This and other SOP interventions present a risk to the chemical quality of these protected aquifers, and other non-protected aquifers within the SDC. With appropriate mitigation however, it is anticipated that the impact of these schemes on the chemical quality of groundwater will be negligible. There may also be opportunities to benefit drainage and groundwater quality, through the promotion of Sustainable Urban Drainage Systems (SUDS) in the design of SOP interventions.

5.2.31. The majority of SOP interventions fall within flood zones at certain locations along their route. The extent of these flood zones through which the interventions pass is generally limited, and it is considered that with suitable mitigation the interventions will not adversely affect floodplains or increase flood risk to sensitive receptors. The likely route of a new link road from the A19-M18 and the M18 J4 connection to Doncaster Sheffield Airport will however fall for much of their length within areas of flood zone 3; impacts of these schemes on the floodplain may be more challenging to mitigate.

6. POLICY APPRAISAL

6.1.1. A review of policy against which the SOP has been appraised is presented in **Appendix C**. The results of this appraisal are presented in **Table 6-1**.

6.1.2. This assessment uses risk ratings. The constraints driving these ratings and the potential implications for policy compliance are outlined in the sections below. Each environmental topic has been rated for its potential policy implications (either spatial constraints or need for further consideration) according to the following general criteria:

- Likely to have significant implications for the SOP;
- Potential to have significant implications for the SOP; and
- Unlikely to have any significant implications for the SOP.

Table 6-1 - Environmental Policy Appraisal

	Policy conflicts & environmental risks / opportunities - commentary	Risk Rating
Noise	The SOP has the potential at certain locations to increase noise levels beyond statutory limits and contrary to policy seeking to avoid or reduce the effects of noise on health and quality of life. The SOP interventions will need to be undertaken in accordance with a policy framework and statutory noise requirements, which given the anticipated opening year of the SOP interventions is so far in the future, may change. The interventions will be required to adhere to the relevant Noise Insulation Regulations at the time that planning permission is required. Consent determined by the relevant Environmental Health Departments under Section 61 of the Control of Pollution Act 1974 is likely to be required prior to, and during construction. With the implementation of appropriate mitigation measures it is likely that the impact of the interventions can be minimised. Furthermore, it is anticipated that the SOP will have some benefits where traffic is alleviated on existing routes. However, as the scheme will draw traffic through existing NIAs and with the construction of offline schemes increase the number of people affected by road noise, there is a risk that the scheme will not comply with national policy seeking to reduce the effects of noise.	Potential to have significant implications for the SOP
Air Quality	The SOP has the potential to increase air pollutant concentrations beyond the standards and objectives set out in national Air Quality Objectives and EU limit and target values, and contrary to policy seeking to reduce air pollution. This may also include within AQMAs. However, by the time SOP interventions are operational it is anticipated that the road fleet will comprise a significantly larger proportion of ultra and zero-emission vehicles, in line with the Clean Growth and Road to Zero Strategies. This is anticipated to reduce the risk that the SOP will lead to exceedances in air quality objectives and limits, although it is possible objectives and limits may tighten in the future. The SOP has the potential to support national air quality policies, providing an opportunity to invest in charging infrastructure and reduce existing air quality issues through the design process. However, as the scheme will increase traffic flows at some locations and therefore has the potential to worsen local air quality, and with the construction of offline schemes increase the number of people affected by road transport emissions, there is a risk	Potential to have significant implications for the SOP

	Policy conflicts & environmental risks / opportunities - commentary	Risk Rating
	that the scheme will not comply with policy seeking to reduce air pollutant concentrations.	
Greenhouse Gases	The SOP is anticipated to lead to an increase in greenhouse gas emissions from transportation; despite the inclusion of public transportation within the SOP, increased road traffic from road interventions is anticipated to lead to an overall increase in greenhouse gas emissions. This is contrary to the UK's international and national commitments to reducing greenhouse gas emissions. However, by the time SOP interventions are operational it is anticipated that the road fleet will comprise a significantly larger proportion of ultra and zero-emission vehicles, in line with the Clean Growth and Road to Zero Strategies. This is anticipated to reduce the greenhouse gas emissions that result from the SOP. However, given the likely increase in emissions there is a risk that SOP interventions will not comply with policy seeking to reduce greenhouse gas emissions.	Potential to have significant implications for the SOP
Landscape and Townscape	The SOP includes improvement schemes in close proximity to the Peak District National Park and Lincolnshire Wolds AONB that have the potential to change views from these designated areas. Such impacts risk conflicting with policy in the NPPF and NPSNN relating to National Parks and AONBs, however environmentally sensitive design and mitigation can likely be employed to ensure that these schemes comply with relevant policy and legislation. SOP interventions also risk adverse impacts on landscape character and conflicting with planning policy relating to the protection of valued landscapes. Notably, offline schemes within sensitive NCAs such as the Yorkshire Southern Pennine Fringe (NCA37) and Manchester Pennine Fringe (NCA54) could be difficult to mitigate for landscape character impacts and local visual amenity. TfN will continue to work with local authorities, environmental stakeholders and communities to discuss and agree mitigation strategies for all potential interventions.	Potential to have significant implications for the SOP
Historic Environment	SOP interventions are not anticipated to impact any World Heritage Sites located within the SDC, however several schemes risk causing the harm or loss of designated heritage assets of national value. Notably, the proposed route of a link road between the M1-M18 has the potential to fall within close proximity to the boundary of Wentworth Woodhouse Grade II* park and garden, whilst the proposed route for the A556 northwards extension has the potential to fall within or in close proximity to the boundary of Dunham Massey Grade II* park and garden. These schemes risk major adverse impacts on the features of these heritage assets. Any such impacts will be given appropriate weight in the planning consent process, in accordance with planning policy. While it is considered that mitigation can likely minimise impacts in most cases, the strategic case for the SOP interventions will need to be proven where there are any residual adverse impacts on heritage assets. TfN will continue to work with Historic England, local authorities and communities to discuss and agree mitigation strategies for all potential interventions.	Potential to have significant implications for the SOP

	Policy conflicts & environmental risks / opportunities - commentary	Risk Rating
Biodiversity	The SOP interventions will need to conserve and enhance biodiversity, adequately mitigate, and where necessary compensate to mitigate for the loss of habitats and demonstrate a net biodiversity gain. This would enable the interventions to comply with National and Highways England policy. Several schemes have the potential for adverse impacts on European designated sites and SSSIs, and will require design that carefully avoids, mitigates or compensates for any impacts in order to comply with the requirements of the Habitats Directive. While it is anticipated this is likely achievable in most cases, schemes such as the A556 northwards extension may be more challenging to mitigate to the point of being acceptable in policy and legislation terms. TfN will continue to work with Natural England, local authorities, environmental stakeholders and local communities to discuss and agree mitigation strategies for all potential interventions.	Likely to have significant implications for the SOP
Water Environment	National policy requires that surface water drainage and flood issues need to be fully understood, therefore appropriate assessments of the interventions will be required. The SOP includes offline schemes requiring river crossings, and offline schemes within flood zones that have the potential to alter floodplains or increase flood risk. These schemes will likely present greater challenges, but with appropriate consultation with the Environment Agency and Lead Local Flood Authority, and assuming an FRA is undertaken and design features are implemented in accordance with best practice, the proposals are likely to be compliant with national policy and unlikely to be at risk of increasing flood risk or affecting water quality. TfN will continue to work with the Environment Agency, local authorities and communities to discuss and agree mitigation strategies for all potential interventions.	Potential to have significant implications for the SOP

7. INTEGRATED SUSTAINABILITY APPRAISAL (ISA) OBJECTIVES APPRAISAL

7.1.1. An ISA Framework has been defined, consisting of a series of objectives, against which the sustainability performance of the STP has been assessed. These ISA Objectives are presented in **Table 3-2**. As stated in **Section 3.3** of this report, only ISA objectives relating to the environmental topics as listed in WebTAG Unit A3 have been appraised, although the potential impact of the SDC on other objectives has been acknowledged in line with the assessment undertaken within the ISA.

7.1.2. **Table 7-2** presents the appraisal of the SOP against the ISA objectives. A key to the assessments scales used in **Table 7-1** is indicated in **Table 7-1** below.

Table 7-1 - Assessment Scales

Assessment Scale	Assessment Category
+	Beneficial
0	Neutral
-	Adverse
?	Uncertain
+/-	Combination of beneficial and adverse

Table 7-2 - Appraisal of the SOP against ISA Objectives

No	Objective	Assessment	Commentary
1	Reduce greenhouse gas emissions from transport overall, with particular emphasis on road transport	-	The SOP is anticipated to increase greenhouse gas emissions from transport overall in the short and medium-term, as a result of an anticipated increase in road traffic. In the short and medium-term the road fleet is anticipated to still comprise a large proportion of petrol and diesel engines, although these forms of propulsion are expected to decrease over time with the uptake of low and zero-emission vehicles. In the long term, the government's proposed ban of the sale of conventional petrol or diesel vehicles by 2040 is anticipated to lead to a significant fall in greenhouse gas emissions from road transport. The SOP presents an opportunity to support this transition through investment in infrastructure that supports low and zero-emission vehicles such as charging infrastructure. The inclusion of passenger and freight rail interventions also encourages lower carbon modes. In the long-term the SOP therefore has the potential to have an overall beneficial effect on greenhouse gas emissions.
2	Protect and enhance biodiversity, geodiversity and the green infrastructure network	-	The SOP comprises infrastructure development that has the potential to adversely affect the integrity of local, national and international (European) designated sites, and the status and distribution of priority habitats and species. However, it is assumed that TfN's programme of interventions will be delivered in accordance with commitments to no net biodiversity loss. Furthermore, there is the potential to deliver any necessary biodiversity mitigation or compensation to contribute to strategic local and national biodiversity priorities, and protect and enhance biodiversity through green infrastructure. The SOP comprises many improvements to existing highways and rail infrastructure, of which the proposed works undertaken through the SOP may present opportunities to enhance the environmental performance of this infrastructure.
3	Conserve and enhance the international sites (HRA specific objective)	-	The SOP includes interventions that have the potential to affect European designated wildlife sites, some of which present risks of impacts that would be challenging to mitigate. This may include increasing levels of transport disturbance from existing infrastructure, and offline schemes that risk damaging the integrity of these sites. However, the necessity to undertake HRA and provide appropriate levels of mitigation or compensation will likely minimise any adverse impacts, and presents opportunities to enhance these sites. Until further scheme design and assessment is undertaken however, there remains a residual risk of adverse impacts.
4	Protect and enhance air quality	-	The SOP is anticipated to worsen air quality in some locations as a result of increased traffic flows and higher speeds on existing road infrastructure and by exposing new receptors to road traffic emissions from offline interventions. The investment in rail and other forms of public transport however has the potential to lead to improvements in air quality where road traffic reduces as a result of modal-shift. Where the SOP alleviates traffic on existing routes it is anticipated

No	Objective	Assessment	Commentary
			to enhance local air quality in these locations. In the short and medium term the continued uptake of low and zero-emission vehicles is anticipated to reduce the negative effects of traffic generated by the SOP. In the long term, the government's proposed ban of the sale of conventional petrol or diesel vehicles by 2040 will result in a significant fall in the air pollutant emissions of road transport. The SOP presents an opportunity to support this transition through investment in infrastructure that supports low and zero-emission vehicles such as charging infrastructure.
5	Increase resilience of the transport network to extreme weather events and a changing climate	?	Insufficient scheme design information is available at this time to assess the performance of the SOP against this objective. Please refer to the ISA for assessment of the STP. However, some SOP interventions are located within flood zones, although it is anticipated that appropriate compensatory measures will be undertaken where land take within floodplains is required. Furthermore, it is anticipated that the schemes will be delivered to increase resilience of the transport network and encourage design for successful adaption to predicted changes in weather conditions and frequency of extreme events.
6	Protect and enhance the inland and coastal water environment	-	Both offline and online SOP schemes risk exposing watercourses to increased risk of transport related pollution. While it is considered that these impacts can likely be mitigated, the SOP will present increased risk of adverse impacts to the inland water environment. There may however also be opportunities to enhance the water environment, although these cannot be identified at this stage.
7	Protect and conserve soil and remediate / avoid land contamination	-	The impact of the SOP on soils and contaminated land has not been considered in this environmental appraisal. Please refer to the ISA for assessment of the STP. However, with reference to the decision-making questions in **Appendix D,** the proposed SOP interventions are anticipated to align with the assumptions and assessment made in Table H-4 of the ISA; the SOP includes interventions located within greenfield land, some of which may be Best and Most Versatile. The SOP is anticipated to result in some loss of agricultural soils and involve impacts to agricultural holdings through severance. There is however the potential for the SOP to lead to the remediation of contaminated land.
8	Support the conservation and enhancement of the quality and	-	The SOP interventions fall within proximity to a large number of designated heritage assets. The SOP is therefore anticipated to have both direct and setting impacts on heritage assets of both national and local value. With appropriate consultation and mitigation many of the impacts can likely be avoided or minimised, but the SOP is anticipated to have some residual impacts on heritage assets. However, the SOP does improve access to certain

No	Objective	Assessment	Commentary
	distinctiveness of historic assets, industrial and cultural heritage and their settings		historic and culturally significant sites, including the Saltaire and Liverpool Maritime Mercantile City World Heritage Sites. There may also be opportunities to work with partners and stakeholders to improve the condition and management of heritage assets.
9	Protect and enhance the character and quality of landscapes and townscapes	-	The SOP includes interventions that fall in proximity to National Parks and Areas of Outstanding Natural Beauty (AONB), which are landscapes of the highest national value. SOP interventions also have the potential to impact local landscape designations and degrade the character of landscapes within the SDC. With mitigation it is anticipated that many of these impacts will be minimised, but considering the inclusion in the SOP of offline schemes within sensitive NCAs such as the Yorkshire Southern Pennine Fringe (NCA37) and Manchester Pennine Fringe (NCA54), some adverse impacts are considered likely. SOP interventions also fall within settlements and as such have the potential to impact physical and social characteristics of the urban environment that comprise townscapes. However, the SOP includes interventions such as bypasses and new links that are anticipated to draw traffic from existing settlements, thereby improving townscape characteristics such as appearance and human interaction.
10	Promote the prudent use of natural resources, minimise the production of waste and support re-use and recycling	+	Insufficient scheme design information is available at this time to assess the performance of the SOP against this objective. Please refer to the ISA for assessment of the STP. However, with reference to the decision-making questions in **Appendix D,** the proposed SOP interventions are anticipated to align with the assumptions and assessment made in Table H-4 of the ISA; as well as the new infrastructure, the SOP comprises upgrades to existing infrastructure that will offer an opportunity to enhance the resource efficiency of this infrastructure.
11	Enhance lower carbon, affordable transport choice	+/-	The SOP proposes rail and road interventions, as well as policy interventions such as low emission zones, enabling autonomous vehicles and enhancing digital connectivity. While many of these interventions will support the minimisation of dependence upon the private car and promote a shift to more sustainable forms of transport, the inclusion in the SOP of new highway construction and highway infrastructure enhancements will encourage car use.

No	Objective	Assessment	Commentary
12	Enhance long term economic prosperity and promote economic transformation	+	Economic performance of the SOP has not been considered in this environmental appraisal. Please refer to the ISA for assessment of the STP, and to the Economic Appraisal Report. However, with reference to the decision-making questions in **Appendix D,** the proposed SOP interventions are anticipated to align with the assumptions and assessment made in Table H-4 of the ISA; the SOP is anticipated to support transformational economic growth in line with the STP, thereby enhancing long term economic prosperity.
13	Coordinate land use and strategic transport planning across the region	+	Coordination of land use and strategic transport planning has not been considered in this environmental appraisal. Please refer to the ISA for assessment of the STP. However, with reference to the decision-making questions in **Appendix D,** the proposed SOP interventions are anticipated to align with the assumptions and assessment made in Table H-4 of the ISA; the SOP interventions are anticipated to support the development of compact, higher density mixed use development coordinated with transport infrastructure, and support housing and employment development in areas that are or will be served by rail transport.
14	Promote greater equality of opportunity for all citizens, with the desired outcome of achieving a fairer society (EqIA specific objective)	+	Equality impact assessment of the SOP has not been undertaken with this appraisal. Please refer to the ISA for assessment of the STP. However, with reference to the decision-making questions in **Appendix D,** the proposed SOP interventions are anticipated to align with the assumptions and assessment made in Table H-4 of the ISA; the SOP will enhance connectivity to a wide range of services and jobs, thereby benefiting those who may have previously had poor access.
15	Improve health and well-being for all citizens and reduce inequalities in health (HIA specific objective)	?	Health impact assessment of the SOP has not been undertaken with this appraisal. Please refer to the ISA for assessment of the STP. However, the SOP interventions are anticipated to result in increases in traffic and HGV content which may have negative impacts on some communities. The SOP is anticipated to increase connectivity to the SDC's natural assets such as the Peak District National Park, thereby promoting health and wellbeing.

No	Objective	Assessment	Commentary
16	Promote community safety and reduce crime and fear of crime for all citizens (CSA specific objective)	+	Community safety assessment of the SOP has not been undertaken with this appraisal. Please refer to the ISA for assessment of the STP. However, with reference to the decision-making questions in **Appendix D,** the proposed SOP interventions are anticipated to align with the assumptions and assessment made in Table H-4 of the ISA; the SOP interventions are anticipated to enhance safety and therefore reduce the number of accidents. It is unknown at this time whether the interventions will apply 'Secured by Design', contribute to improvements in public realm and encourage improvements in personal security on public transport and its facilities.

8. SUMMARY

8.1.1. This Environmental Appraisal Report provides an overview of the potential environmental implications of the Strategic Outline Programme (SOP) of the Southern Pennines Strategic Development Corridor (SDC), and how environmental considerations have been taken into account. This comprises an approach that is proportional to the programme level, and reflects the needs of the Transport Appraisal Process and TfN's Strategic Transport Plan (STP).

8.1.1. The transport network of the Southern Pennines SDC would undergo significant changes as a result of the SOP, with associated impacts on noise, air quality and greenhouse gases. This is anticipated to lead to both negative and positive local effects on noise and air quality, and overall increased greenhouse gas emissions from road transportation. However, the increasing uptake of low and zero-emission vehicles will lessen these negative effects with time. Investment in road and rail infrastructure also presents an opportunity to support the transition to low and zero-emission vehicles and through design and mitigation reduce existing noise and air quality issues where possible.

8.1.1. The SOP includes road and rail improvements and new infrastructure that are located within proximity to environmental designations and resources, and therefore local environmental impacts are anticipated. This includes potential adverse impacts on the landscape characteristics of the Peak District National Park, and the risk of direct impacts to several European designated wildlife sites and heritage assets of national value. The SOP has the potential for impacts on other designations of national and local value, and adverse impacts to environmental resources such as landscape character, ecological networks and the setting of cultural heritage assets.

8.1.2. With further environmental assessment and option development, and where necessary mitigation and compensation, it is anticipated that these environmental impacts can be minimised or avoided, and in some cases opportunities identified for environmental enhancements. Following this process the majority of the SOP interventions are likely to comply with relevant policy and contribute to the objective of the STP to 'promote and enhance the built, historic and natural environment', and further objectives established in the Integrated Sustainability Appraisal (ISA). However, as a result of their nature and location some interventions present a high risk of significant environmental impacts and therefore a risk of failing to comply with policy, legislation and STP objectives. These interventions have been identified in this report.

8.1.3. Interventions proposed through this study will be taken forward through other separate commissions to Strategic Outline Business Case (SOBC) in line with the Department for Transport's Transport Business Case approach. This will include more detailed consideration of individual interventions or groups of interventions, for which appropriate WebTAG compliant environmental appraisal will take place. Subsequently, any schemes will undergo further environmental assessment through the Highways England Project Control Framework (PCF) process, Network Rail Governance for Railway Investment Projects (GRIP) process or local authority or Nationally Significant Infrastructure planning consent processes. This is likely to include an Environmental Impact Assessment (EIA) for many of these schemes, a process that will lead to production of an Environmental Statement (ES) to be submitted with any application for development consent. The environmental impacts of these schemes will inform the consenting authority's decision.

GLOSSARY

Air Quality Management Area (AQMA)	Areas where a Local Authority expect air quality objectives are not likely to be achieved are required to be designated as an Air Quality Management Area.
Ancient Woodland	Ancient woodland is defined as an area that has been wooded continuously since at least 1600 AD.
Appraisal Specification Report (ASR)	A report documenting the methodology and scope of appraisal, including proposed approach to modelling and forecasting and methodology for assessing sub-impacts to be presented in the AST.
Appraisal Specification Summary Table (ASST)	A table used to set out proposed appraisal methodologies for each of the challenges or sub-impacts in the AST.
Appraisal Summary Table (AST)	A table summarising the outputs of a WebTAG compliant appraisal.
Area of Outstanding Natural Beauty (AONB)	An area of countryside designated for protection through legislation and planning policy for its high landscape value.
Community Safety Assessment (CSA)	An assessment undertaken to ensure that a scheme, strategy or policy does not have a detrimental impact on community safety (including crime and road safety) and where possible improves the existing situation.
Design Manual for Road and Bridges (DMRB)	Documents containing information about current standards, advice notes and other published documents relating to the design, assessment and operation of trunk roads, including motorways.
Environmental Appraisal Report (EAR)	For the purpose of this study, the EAR is a document reporting the appraisal of environmental effects of the Strategic Development Corridor.
Equality Impact Assessment (EqIA)	An assessment designed to ensure that a policy, project or scheme does not discriminate against any disadvantaged or vulnerable people.
Full Business Case (FBC)	A business case document that provides the final stage of the transport business case process, intended to provide the full justification and evidence base for decision making for consideration by an investment committee.
Governance for Railway Investment Projects (GRIP)	A management and control process developed by Network Rail for delivering projects on the operational railway.
Health Impact Assessment (HIA)	A combination of procedures, methods, and tools by which a policy, program, or project may be judged as to its potential effects on the health of a population, and the distribution of those effects within the population.

Integrated Sustainability Appraisal (ISA)	A process for assessing the social, economic and environmental impacts of a plan, with the aim to ensure that sustainable development is at the heart of the plan-making process. The ISA of the STP combines several assessments, including SA/SEA, HIA, EqIA, CSA and HRA.
Intervention	A potential (loosely defined) scheme which would deliver a benefit.
Listed Building	A building or structure recorded on a statutory list for its special architectural and historic interest.
Local Nature Reserve	A site of local importance for wildlife, geology, education or public enjoyment.
Main River	Main rivers are usually larger streams and rivers, and are defined as a watercourse shown as such on the Flood Map for Planning (Rivers and Sea).
National Character Area (NCA)	NCAs divide England into 159 distinct natural areas. Each is defined by a unique combination of landscape, biodiversity, geodiversity, history, and cultural and economic activity.
National Nature Reserve (NNR)	Nature conservation designation of national importance, established to protect sensitive features and to provide 'outdoor laboratories' for research.
National Park	Areas of relatively undeveloped and scenic landscape that are designated under the National Parks and Access to the Countryside Act.
National Planning Policy Framework (NPPF)	A document that sets out government's planning policies for England and how these are expected to be applied.
National Policy Statement for National Networks (NPSNN)	A document that sets out the need for, and Government's policies to deliver, development of nationally significant infrastructure projects (NSIPs) on the national road and rail networks in England.
National Trip End Model (NTEM)	DfT's transport model used to forecast the growth in trip origin-destinations (or productions-attractions) up to 2051.
Noise Important Area (NIA)	Areas where the 1% of the population that are affected by the highest noise levels from major roads are located according to the results of the strategic noise mapping.
Northern Powerhouse Independent Economic Review (NPIER)	Report commissioned by the TfN partners collaborating with the wider Northern Powerhouse partnership, to understand the scale, nature and causes of the North's gaps, distinctive 'capabilities' and future growth prospects for the area.

Northern Transport Demand Model (NTDM)	A new transport demand model established to show how the volume and pattern of transport demand would respond to the changes in population and employment resulting from the economic growth envisaged by the NPIER.
Option Assessment Report (OAR)	For the purpose of this study, the OAR is a document outlining the current and future situation within the sub-corridors, identifies interventions to achieve the study objectives and reports the appraisal of these interventions for inclusion in the SOP.
Outline Business Case (OBC)	A business case document that builds upon an SOBC (if undertaken) but concentrates on detailed assessment of the options to find the best solution. Includes full economic and financial appraisals and selection of a preferred option.
Pollution Climate Mapping (PCM)	A collection of models designed to fulfil part of the UK's EU Directive (2008/50/EC) requirements to report on the concentrations of particular pollutants in the atmosphere.
Project Control Framework (PCF)	A joint Department for Transport and Highways Agency approach to managing major projects; draws together assorted legal requirements, standards and good practice into one easy to follow framework.
Registered Battlefield	Historic England's Register of Historic Battlefields identifies 46 important English battlefields.
Registered Park and Garden	A park or garden recorded on a statutory list for its special landscape, architectural and historic interest.
Scheduled Monument	A nationally important archaeological site or historic building.
Site of Special Scientific Interest (SSSI)	A nationally important site designated for its special nature conservation or geological interest.
Special Area of Conservation (SAC)	Areas of protected habitats and species as defined in the Habitats Directive (92/43/EEC).
Special Protection Area (SPA)	Sites classified in accordance with Article 4 of the Birds Directive (79/409/EEC). They are classified for rare and vulnerable birds (as listed on Annex 1 of the Directive), and for regularly occurring migratory species.
Strategic Development Corridor (SDC)	Each corridor represents an area where evidence suggests investment in transport infrastructure will enable transformational economic growth.
Strategic Environmental Assessment (SEA)	A systematic decision support process, aiming to ensure that environmental aspects are considered effectively in policy, plan and programme making.

Strategic Outline Business Case (SOBC)	A business case document setting out the justification for a scheme, and evidence base for decision making, with content and a level of detail less than an OBC.
Strategic Outline Case (SOC)	A business case document that sets out the justification for the programme of interventions, and evidence base for decision making, with content and a level of detail less than an SOBC.
Strategic Outline Programme (SOP)	A programme of interventions at an early stage of development and a low level of detail.
Strategic Programme Outline Case (SPOC)	A business case document combining the SOP and SOC.
Strategic Transport Plan (STP)	Transport for the North's 30 year vision for transport investment in the North of England, which explains the need for investment in transport across the North, identifies the priority areas for improved connectivity and identifies pan-northern transport objectives which need to be realised to enable transformational economic growth.
Sub-Corridor	Geographic corridors within the SDC which serve both discreet functions as inter-urban links between important economic centres, and as a constituent part of "pan-northern" links on strategic routes.
Sustainability Appraisal (SA)	An appraisal of the economic, environmental, and social effects of a plan from the outset of the preparation process to allow decisions to be made that accord with sustainable development.
Transport for Greater Manchester (TfGM)	The public body responsible for co-ordinating transport services throughout Greater Manchester.
Transport for the North (TfN)	Partnership of public and private sector representatives working with central government and national transport bodies to develop and deliver strategic transport infrastructure across the North of England.
Water Framework Directive (WFD)	European Union directive which commits member states to achieve good qualitative status of all water bodies.
WebTAG	The Department for Transport's website for guidance on the conduct of transport studies.
World Heritage Site	A place that is listed by the United Nations Educational, Scientific and Cultural Organization (UNESCO) as of special cultural or physical significance.

Appendix A

ENVIRONMENTAL BASELINE

APPENDIX A – ENVIRONMENTAL BASELINE

In order to assess the potential effects of the Strategic Outline Programme (SOP), it is necessary to establish a baseline against which predicted effects can be assessed. A baseline has been provided below under the following topics, covering environmental topics listed in the Transport Appraisal Guidance (TAG) Unit A3 'Environmental Impact Appraisal'. An environmental constraints map is provided in **Figure A-1**.

NOISE AND VIBRATION

Beyond issues associated with annoyance, there is growing evidence on the links between environmental noise, defined by the World Health Organisation (WHO) as 'noise emitted from all sources except industrial workplaces' and health outcomes.

Strategic Noise Mapping was undertaken by the Department for Environment, Food and Rural Affairs (Defra) to determine exposure to environmental noise from major source of road, rail, aircraft noise and in urban areas (known as agglomerations)[3]. The outputs of this mapping was used to designate 'Noise Important Areas' (NIAs) with respect to noise from major roads and railways, where the 1% of the population that are affected by the highest noise levels from major roads and railways are located. It is intended that Noise Action Plans will apply in particular to these NIAs, as the population at these locations are likely to be at the greatest risk of experiencing a significant adverse impact to health and quality of life as a result of their exposure to noise from road and rail traffic. 2,312 NIAs are designated along the road and rail network within the Southern Pennines SDC.

AIR QUALITY

Despite significant improvements in air quality over the last five decades, large parts of the UK are impacted by poor air quality. This includes areas within the Southern Pennines SDC, notably in and surrounding urban areas and the motorway network. Poor air quality is known to have adverse consequences across many areas, but is most closely linked to human health and biodiversity problems.

Air Quality Management Areas (AQMAs) are declared by local authorities where air quality monitoring has determined that National Air Quality Standards (AQSs) will be exceeded. There are 95 AQMAs declared within the SDC. Of these all are declared for exceedances in the annual exceedance of Nitrogen Dioxide. The extent of these AQMAs varies considerably, from localised extents covering specific junctions or road sections, to significant areas. City-wide AQMAs are designated in Liverpool and Sheffield, and much of the road network in Greater Manchester is declared as an AQMA. Local areas surrounding sections of the motorway network have also been designated as AQMAs, including the M1 between Sheffield and Wakefield and the M62 corridor south of Leeds.

[3] Defra (2014) Noise Action Plans: large urban areas, roads and railways

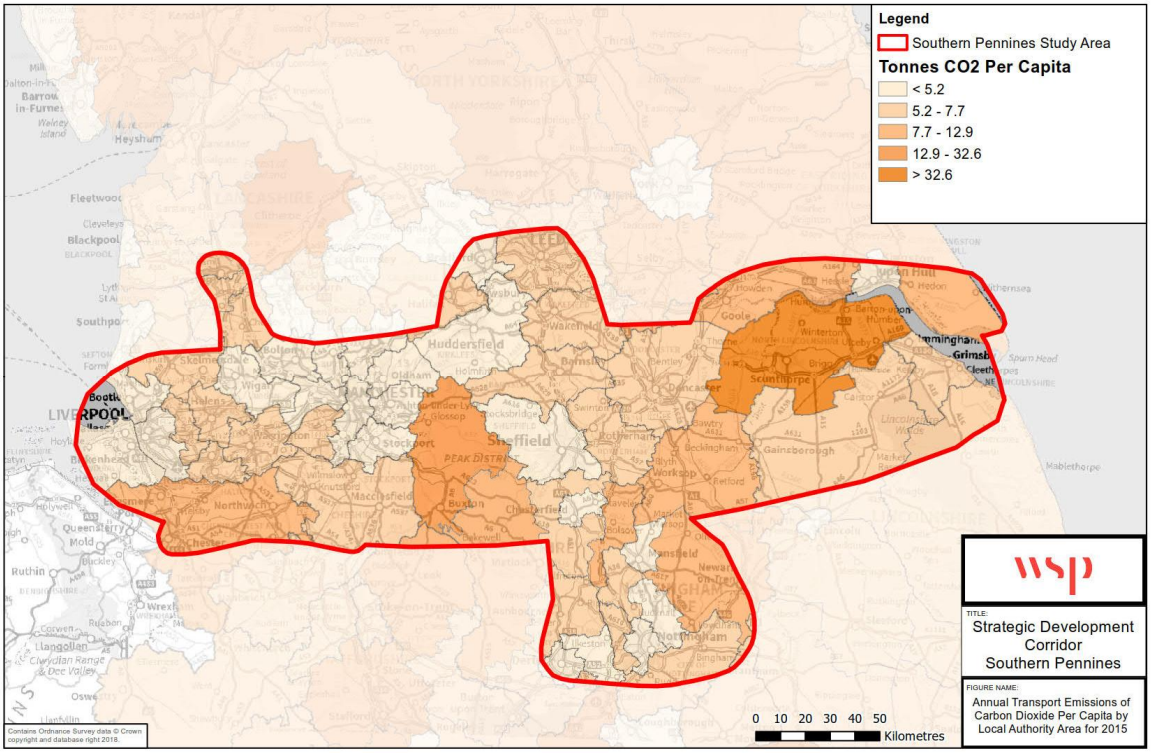
Roadside concentrations of air quality pollutants have been identified by Defra's Pollution Climate Mapping (PCM). This modelling identifies numerous road links, many of which are outside of designated AQMAs that are in exceedance of AQSs. As with AQMAs however, the majority of these are located in and surrounding the major urban areas within the east of the SDC.

GREENHOUSE GASES

The transportation sector is a significant contributor of greenhouse gases. Domestic emissions of road transport account for around a quarter of UK greenhouse gas emissions[4]. Carbon dioxide (CO_2) emissions are of particular relevance to a changing climate, and are emitted through the use of combustion engines and also result from the production of materials used in infrastructure.

Carbon emissions vary across the UK. The North West, East Midlands, and Yorkshire and the Humber regions make up a total of 30% of the UK total carbon dioxide emissions. Within regions there are also variations in carbon dioxide emissions between areas, as illustrated in **Figure A-2**.

Figure A-2 - Map extract showing Annual Transport Emissions of carbon dioxide per capita by Local Authority Area for 2014 (tonnes CO2 per capita) (Source: DECC, 2016)



[4] https://www.theccc.org.uk/charts-data/ukemissions-by-sector/transport/

LANDSCAPE AND TOWNSCAPE

The landscapes and townscapes across the Southern Pennines SDC vary greatly, with various different landscape types from upland fells and valleys to moorlands and estuaries. Most of the SDC area is rural with isolated farmsteads but there are also a full range of settlement types from hamlets to large urban conurbations including Greater Manchester and other significant cities such as Liverpool, Leeds, Sheffield and Nottingham.

The Southern Pennines SDC includes 34 National Character Areas (NCA). These are illustrated in **Figure A-3**. A series of profiles produced by Natural England describe the landscape of these areas, along with other aspects such as biodiversity, geodiversity, history, cultural and economic activity, all of which contribute to the landscape character of these areas.

Designated high value landscapes within the Southern Pennines SDC include National Parks, Areas of Outstanding Natural Beauty (AONB) and Heritage Coasts. National Parks are landscapes that are valued nationally, regionally and locally as recreational resources for their contrasting character to the major urbans within and outside the SDC. AONBs are statutory designations given to landscapes highly valued for their visual amenity whilst Heritage Coasts are non-statutory designations established to conserve the best stretches of undeveloped coast in England.

The Southern Pennines SDC contains one National Park, one AONB, and one Heritage Coast. These are:

- The Peak District National Park;
- Lincolnshire Wolds AONB; and
- Spurn Heritage Coast.

Various characteristics of a landscape may contribute to landscape character. This includes landscape pattern, cultural heritage, landcover and tranquillity. These characteristics vary between and within the NCAs within the SDC. Areas of the highest tranquillity tend to correspond with the high value landscapes outlined above, but local pockets of tranquillity exist throughout the SDC and are valued for their contrast with neighbouring urban areas of low tranquillity.

HISTORIC ENVIRONMENT

Features of historic importance are located throughout the Southern Pennines SDC; and include those protected by international, national and local designations.

Of these, the most highly valued are World Heritage Sites. Three World Heritage Sites are located within the SDC:

- Saltaire;
- Derwent Valley Mills; and
- Liverpool Maritime Mercantile City.

A wide range of other historic and cultural heritage features are located throughout the corridor, spanning the full range of human settlement from prehistoric to the present. These include Registered Battlefields, Scheduled Monuments, Registered Parks and Gardens and Listed Buildings. The numbers of these are outlined in **Table A-1**.

Table A-1 - Designated Heritage Assets within SDC

Asset Designation	Number
Registered Battlefields	3
Scheduled Monuments	1,154
Registered Parks and Gardens – Grade I and II*	60
Registered Parks and Gardens – Grade II	122
Listed Buildings – Grade I and II*	2,451
Listed Buildings – Grade II	30,345

Notable concentrations of these designated heritage assets occur within certain areas of the SDC. For example, Liverpool Maritime Mercantile City and Derwent Valley Mills contain notable concentrations of listed buildings. The National Park within the SDC also contains a high number of heritage assets such as scheduled monuments and listed buildings that contribute to the landscape character. However, the heritage assets listed above are located throughout the Southern Pennines SDC area, including within urban areas and non-designated rural areas.

Further to those designated heritage assets presented above, it must also be noted that not all historic features are designated or even known at present (i.e. buried archaeological remains). Such features are nonetheless of historic value.

BIODIVERSITY

Throughout the SDC area there are a number of sites designated at the International (European) or National (United Kingdom) level for nature conservation purposes. Protected at the International level are Special Areas of Conservation (SAC), Special Protection Areas (SPA) and Wetlands of International Importance (Ramsar) sites.

SACs protected habitats and species considered to be most in need of conservation at a European level, while SPAs are classified for rare and vulnerable birds and for regularly occurring migratory species. Ramsar sites are wetlands of international importance. 15 SACs, 9 SPAs and 11 Ramsar are located within the SDC. Many areas contain multiple designations such as the South Pennine Moors which are designated SCA and SPA. The Dee Estuary and the Humber Estuary are also both designated SAC, SPA and Ramsar.

Sites of Special Scientific Interest (SSSI) are considered the country's best wildlife and/or geological sites. There are 298 SSSIs within the SDC. Some of the largest of these are also designated as European sites (e.g. the South Pennine Moors and the Humber Estuary).

National Nature Reserves (NNR) were established to protect some of the most important habitats, species and geology. There are 9 NNR within the SDC.

A range of sites within the SDC have also been designated at the local level (i.e. at the regional, local authority or community level) for nature conservation purposes. There are 333 Local Nature Reserves within the SDC, the majority of which are located in the south and west of the SDC within or nearby urban areas.

The SDC corridor also contains areas of woodland that have been continuously wooded since at least 1600AD, termed Ancient Woodland. Ancient Woodland is present throughout the majority of the SDC.

Further to designated sites, there are a wide range of habitats and species found within the SDC. Semi-natural habitats most threatened and requiring conservation action have been identified as 'priority habitats' under the UK Biodiversity Action Plan. These include habitats such as blanket bog, traditional orchards and upland and lowland heathlands A variety of protected species are also found within the SDC, including great crested newt, species of bat, water vole and more.

WATER ENVIRONMENT

The Southern Pennines SDC falls predominantly within the North West and Humber River Basin Districts, although also within the Dee and Anglican River Basin Districts. Within the SDC, there are the following management catchments within each River Basin District; nine within the North West, 11 within the Humber, two within the Dee, and one within the Anglican. These catchments range from the uplands of the Peak District and the South Pennine Moors to fertile river valleys and chalk aquifers, and vary from rural catchments to others heavily influenced by urban and industrial use. Within each catchment lies water bodies of various forms including rivers, canals, lakes, estuarine and groundwater, as well as coastal on the eastern and western extents of the SDC.

Identified water management issues identified within the North West, Humber, Dee and Anglican catchments include the following:

- Pollution from waste water;
- Pollution from towns, cities and transport;
- Changes to the natural flow and level of water;
- Negative effects of non-native species;
- Pollution from rural areas; and
- Pollution from abandoned mines.

A range of local measures have been set for each catchment to address these issues, prevent deterioration and protect the many uses of the water environment and the benefits it provides.

The Environment Agency has defined numerous Source Protection Zones (SPZs) within the SDC for the protection of groundwater and the potable water supply it provides. Large areas of total catchment (lowest risk) are located within the central and eastern extent of the SDC between Nottingham and Doncaster and Lincoln and Kingston- Upon-Hull. Notable areas of outer and inner catchment are also located predominantly within the east of the SDC between Lincoln and Kingston-Upon-Hull. Furthermore, numerous areas of outer, inner and total catchment are scattered throughout the SDC.

Areas of flood risk are associated with fluvial sources throughout the SDC. Flood Risk Management Plans (FRMPs) have been developed by various authorities to explain the risk of flooding from various sources, and propose measures to manage flood risk

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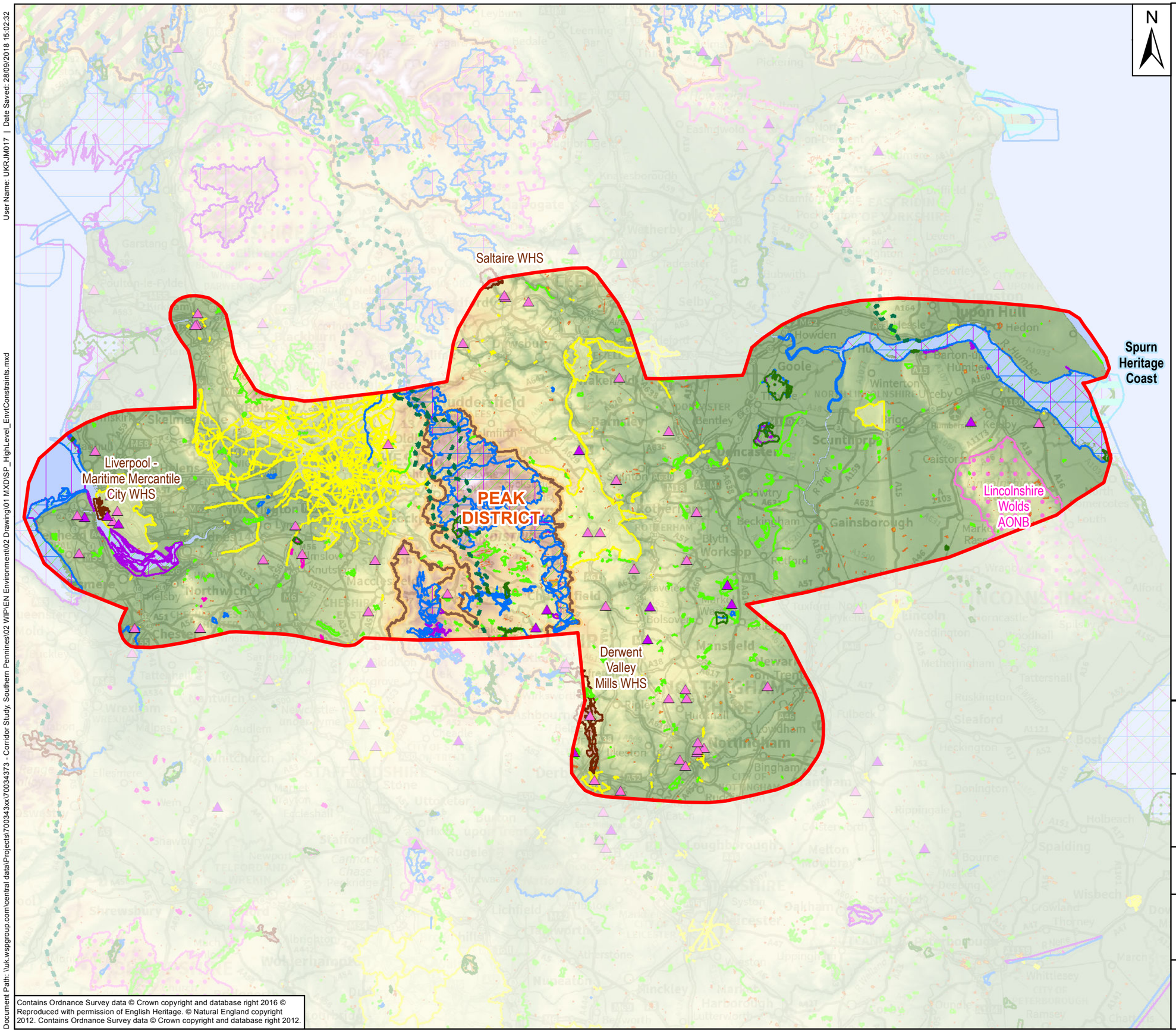

Key

- Southern Pennines Study Area

Environmental Designations

- Grade I Registered Park and Garden
- Grade II* Registered Park and Garden
- National Trail
- Area of Outstanding Natural Beauty (AONB)
- Heritage Coasts
- National Nature Reserve (NNR)
- Special Area of Conservation (SAC)
- Special Protection Area (SPA)
- Wetland of International Importance (Ramsar)
- Site of Special Scientific Interest (SSSI)
- Scheduled Monument
- World Heritage Site (WHS)
- Air Quality Management Area (AQMA)

Elevation (mAOD)

High : 1079

Low : -3

0 10 20 30 40 50 km

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Client: Transport for the North

Project: Southern Pennines Corridor - Strategic Development Corridor Study

Title: High Level Environmental Constraints

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Key

Southern Pennines Study Area

National Character Areas (NCA)

- Bowland Fringe and Pendle Hill- 33
- Central Lincolnshire Vale- 44
- Cheshire Sandstone Ridge- 62
- Dark Peak- 51
- Derbyshire Peak Fringe and Lower Derwent- 50
- Holderness- 40
- Humber Estuary- 41
- Humberhead Levels- 39
- Lancashire Coal Measures- 56
- Lancashire Valleys
- Lancashire and Amounderness Plain- 32
- Leicestershire and Nottinghamshire Wolds-74
- Lincolnshire Coast and Marshes- 42
- Lincolnshire Wolds- 43
- Manchester Conurbation- 55
- Manchester Pennine Fringe- 54
- Mersey Valley- 60
- Merseyside Conurbation- 58
- Needwood and South Derbyshire Claylands- 68
- Northern Lincolnshire Edge with Coversands- 45
- Nottinghamshire, Derbyshire and Yorkshire Coalfield- 38
- Potteries and Churnet Valley- 64
- Sefton Coast- 57
- Sherwood- 49
- Shropshire, Cheshire and Staffordshire Plain- 61
- South West Peak- 53
- Southern Magnesian Limestone- 30
- Southern Pennines- 36
- Trent Valley Washlands- 69
- Trent and Belvoir Vales- 48
- White Peak- 52
- Wirral- 59
- Yorkshire Southern Pennine Fringe- 37
- Yorkshire Wolds- 27

0 10 20 30 40 50 km

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Client: Transport for the North

Project: Southern Pennines Corridor - Strategic Development Corridor Study

Title: National Landcape Character Areas

Drawing No:	Figure A3	Drawn:	RMcC
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Appendix B

ANTICIPATED BASELINE TRENDS

APPENDIX B – ANTICIPATED BASELINE TRENDS

This Appendix outlines the baseline trends that have the potential to change the baseline environment and characteristics and value of environmental resources. These trends are extracted from Appendix D.1 of the Integrated Sustainability Appraisal (ISA) (Atkins, 2018), adapted from the ISA Objectives to the applicable WebTAG environmental topics and where appropriate tailored to the Southern Pennines SDC.

NOISE

No applicable ISA objective.

Current – Short Term

There are 2,312 Noise Important Areas (NIAs) designated along the road and rail network in the Southern Pennines SDC. NIAs are designated as locations where the 1% of the population that are affected by the highest noise levels from major roads and railways are located, based on strategic noise mapping.

Noise Action Plans[5] have been developed that apply in particular to these NIAs, as the population at these locations are likely to be at the greatest risk of experiencing a significant adverse impact to health and quality of life as a result of their exposure to noise from road and rail traffic. These Action Plans outline approaches to the management of environmental noise issues and effects.

Medium Term

It is expected that localised reductions in exposure to environmental noise will be achieved. In accordance with the requirements of the Environmental Noise (England) Regulations 2006, exposure to environmental noise from major sources of road, rail and aircraft noise and in urban areas will be determined on a five year cycle and Noise Action Plans adopted to manage environmental noise and its effects. Furthermore, new development is increasingly required to mitigate the effects of noise. The use of low-noise surfacing in new road schemes and improvements can reduce noise levels. The adoption of electric propulsion (road and rail) will also reduce mechanical noise impact significantly, although will not eliminate tyre / wheel noise.

However, it is to be noted that Government forecasts for road traffic growth range from 19% to 55% growth between 2010 and 2040, with growth particularly strong on the Strategic Road Network (up to 60%)[6]. As such there is the potential for receptors to be exposed to increased noise levels associated with increased traffic flows. New transport infrastructure development may also expose receptors to increased levels of road and rail noise that it was previously not exposed to.

[5] https://www.gov.uk/government/publications/noise-action-plans-large-urban-areas-roads-and-railways

[6] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/411471/road-traffic-forecasts-2015.pdf

Long Term

Continued measures under the Environmental Noise (England) Regulations 2006 are likely to reduce exposure to environmental noise from major sources. Further use of low-noise surfacing and mitigation of noise effects in new and upgraded transport infrastructure, and increasing adoption of electric propulsion transport will also reduce exposure to environmental noise in many locations. Other locations may however experience increases in environmental noise as a result of increased traffic flows and new infrastructure.

AIR QUALITY

Adapted from Objective 4 of Appendix D.1 of the ISA

Current – Short Term

There have been significant improvements in air quality across UK in recent years, but local hotspots remain where National Air Quality Standards are exceeded – particularly in urban areas and along roads. Local authorities across the SDC have designated 95 AQMAs aimed at addressing these local issues.

Medium Term

It is expected that local instances of poor air quality will become more severe. Congested and slow moving traffic will be experienced more frequently resulting in higher levels of vehicle emissions at localised concentrations and potential issues with local air quality especially when including the likely diversion of traffic due to congestion onto less appropriate roads with adjacent housing. To address this, the UK has adopted ambitious, legally-binding targets to significantly reduce emissions of NOx and four other damaging air pollutants for 2020 and 2030[7].

Long Term

Fossil fuelled engine technology is increasing in efficiency and there is a gradual roll out of Electric Vehicle (EV) charging points. This will help make EV a more attractive vehicle option and may lead to improvements in air quality in the mid to long term. It is the UK Governments aim that almost every car and van should be zero emission by 2050[8]. Although curtailed in some parts due to the extent of network adaptation required, there are current plans to increase the electrification of the rail network including the introduction of bi-mode trains (running on electric where installed and diesel through remaining non-electrified lines). Non-electric trains can have an adverse effect on air quality, especially in and around stations.

[7] https://consult.defra.gov.uk/airquality/air-quality-plan-for-tackling-nitrogen dioxide/supporting_documents/Draft%20Revised%20AQ%20Plan.pdf P.12

[8] https://consult.defra.gov.uk/airquality/air-quality-plan-for-tackling-nitrogen-dioxide/supporting_documents/Draft%20Revised%20AQ%20Plan.pdf P.1

GREENHOUSE GASES

Adapted from Objective 1 and 11 of Appendix D.1 of the ISA

Current – Short Term

Overall CO2 emissions vary between regions, with the North West contributing 10% of UK emissions and the North East approx. 5%. In the UK transport accounts for approximately a quarter of CO2 emissions, with road transport being the majority source. Variance between regions is likely to be due to a number of factors such as dispersion of the population. At present the vast majority of transport modes are traditionally fuelled by hydrocarbons. However, total UK GHG have declined by 38% between 1990-20159 and are set to decline further. The Government is working to reduce emissions by promoting public transport choices and supporting the market for innovative forms of transport and encouraging a move to cleaner and lower carbon vehicles[10]. The UK now has 115,000 Ultra Low Emission Vehicles (ULEV) on the road[11]. Electrification of the rail network is also being undertaken[12], but despite significant progress, this will be a long process and subject to continued high levels of investment. By 2020 it is predicted that renewables will provide 30% of energy in the UK and it is predicted that 'Plug In' vehicles will account for approximately 6% of new car sales by 2020 (mid-range forecast)[13].

Medium Term

There is considerable uncertainty regarding estimates of carbon emissions as those from individual road vehicles have fallen in recent decades due to improvements in engine technology, though it is recognised these benefits have been outweighed by an overall increase in vehicle numbers and movements. Nevertheless, there is significant potential for emissions reductions in the Medium Term through continued improvement in fuel efficiency for conventional vehicles, switching to alternatively fuelled vehicles and from changing behaviour. This potential will be aided by schemes such as those to promote and support the use of Electric Vehicles and as such, it is anticipated that the uptake of EV will continue to grow. ULEVs should become progressively more affordable as economies of scale are realised and they could provide savings for consumers compared to equivalent internal combustion engine cars by the mid-2020s or sooner. As a result, at least 30% of new car sales are expected to be ULEVs by 2030, and possibly as many as 70%. For new vans, up to 40% of sales could be ULEVs by 2030. This will reduce CO2 emissions from road transport. Total GHG emissions from transport in 2035 are estimated to be 109 MtCO2e, down from 119 MtCO2e in

9 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/589602/2015_Final_Emissions_Statistics_one_page_summary.pdf

10 https://www.gov.uk/government/policies/transport-emissions

11 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/651916/BEIS_The_Clean_Growth_online_12.10.17.pdf

12 https://www.networkrail.co.uk/our-railway-upgrade-plan/key-projects/electrification/

13 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/3986/plug-in-vehicle-infrastructure-strategy.pdf

2017[14]. It is to be noted that Government forecasts for road traffic growth range from 19% to 55% growth between 2010 and 2040, with growth particularly strong on the Strategic Road Network (up to 60%)[15].

Long Term

Engine technology is increasing in efficiency and there is a gradual roll out of EV charging points, with fresh government initiatives in this area for example through a refresh of the 'Plug In Vehicle Infrastructure strategy'[16]. This will help make EV a more attractive vehicle option and may lead to reductions in GHG in the mid to long term. To meet Government targets, almost every car and van will need to be zero emission by 2050[17] and emissions from Heavy Goods Vehicles (HGV) will also need to reduce significantly. It is important to note that Aviation and shipping emissions are not included within UK carbon targets but the trajectory is consistent with a 2050 target which would include those emissions.

LANDSCAPE AND TOWNSCAPE

Adapted from Objective 9 of Appendix D.1 of the ISA

Current – Short Term

The landscapes and townscapes across the Southern Pennines SDC vary greatly, with various different landscape types from upland fells and valleys to moorland and estuaries. Most of the SDC area is rural with isolated farmsteads but there are also a full range of settlement types from hamlets to large urban conurbations including Greater Manchester and other significant cities such as Liverpool, Leeds, Sheffield and Nottingham. The SDC has 34 different National Character Areas.

There is also one National Park within the SDC and one AONB designated nationally and given the highest state of protection in law and Government policy for their landscapes and scenic beauty. One Heritage Coast is also designated within the SDC.

Countryside Quality Counts showed that between 1999-2003 existing landscape character was being maintained in 51% of England's landscapes[18]. In many areas, the landscape character has been sustained or strengthened. Areas where the landscape character was neglected or diverging are generally close to major centres of population and transport routes.

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[14] https://www.gov.uk/government/publications/updated-energy-and-emissions-projections-2016 Annex A

[15] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/411471/road-traffic-forecasts-2015.pdf

[16] https://www.gov.uk/government/organisations/office-for-low-emission-vehicles/about

[17] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/651916/BEIS_The_Clean_Growth_online_12.10.17.pdf P85

[18] http://webarchive.nationalarchives.gov.uk/20140712063806/http://www.naturalengland.org.uk/ourwork/landscape/englands/character/cqc/default.aspx

Medium Term

A review of National Parks and AONBs was announced in the 25 Year Environment Plan[19], to include an assessment of whether more may be needed. There is therefore the potential for new or extended National Parks and AONBs. Those areas currently protected for their landscape are anticipated to still receive that protection and in line with aspirations announced in the 25 Year Environment Plan may be subject to environmental enhancement measures.

Other areas may deteriorate due to increased urbanisation or along major transport corridors and as such the overall trend is likely to decline.

Long Term

Further environmental enhancement measures to National Parks and AONBs may be undertaken in the long term, building upon any recommendations of the assessment of National Parks and AONBs announced in the 25 Year Environment Plan and any later reviews. A trend of deterioration of other landscapes may continue subject to continuing trends of urbanisation and development.

HISTORIC ENVIRONMENT

Adapted from Objective 8 of Appendix D.1 of the ISA

Current – Short Term

Of pre-eminence in cultural heritage terms within the Southern Pennines SDC are the World Heritage Sites of Saltaire, Derwent Valley Mills and Liverpool Maritime Mercantile City. It is anticipated that these sites will continue to receive the highest levels of protection. There are, of course, a wide range of other historic and cultural heritage features located across the SDC and which span the full range of human settlement, from the prehistoric to the present. Protection will continue to be provided to these cultural heritage features and it is likely that new sites will join the list, e.g. through archaeological discovery, or new interpretations of existing sites.

Medium Term

Increased levels of development in the North (as noted under NPIER) could increase the potential for disturbance to assets and their setting. Levels of protection are also likely to increase for tentative World Heritage Sites such as Creswell Crags. Protection of the full range of known sites will continue and it is likely that new sites will join the list, e.g. through archaeological discovery, or new interpretations of existing sites. A sensitive approach to enhancing physical access to sites of cultural and historic importance will improve social awareness and enjoyment of such assets without reducing their quality and distinctiveness.

Long Term

Further increased levels of development could continue to increase the potential for disturbance to assets and their setting. Protection of known sites will continue and it is likely that new sites will join

[19] https://www.gov.uk/government/publications/25-year-environment-plan

the list, e.g. through archaeological discovery, or new interpretations of existing sites. Improvements to strategic transport networks will be essential to alleviate projected traffic congestion and pressures on historic towns, landscapes as well as designated heritage assets such as bridges, roman roads, canals and railways. As recognised by Historic England, well-designed traffic management proposals, that recognise and complement local and regional character, can be a positive addition to the historic environment.

BIODIVERSITY

Adapted from Objective 2 and 3 of Appendix D.1 of the ISA

Current – Short Term

There are a number of statutory and non-statutory sites designated for their importance for nature conservation and geodiversity within the Southern Pennines SDC. Many of the Local authorities within the SDC have produced Biodiversity Action Plans (BAPs) to target priority habitats and species[20] that require conservation efforts to improve their status and distribution at the local level.

Constant pressures from development (direct and indirect), climate change, invasive alien species and inappropriate management practices have the potential to adversely affect the integrity of local, national and international (European) designated sites, and the status and distribution of priority habitats and species.

International and national designated sites are afforded high levels of protection under international and national legislation, and it is anticipated that the number of designated sites will increase over the STP Plan period. The Natural England condition summary for SSSIs (including units that cover SPAs, SACs and Ramsar sites) shows that 94.22% of these sites in the North East are at favourable or unfavourable but recovering status. However, it should be noted that these sites are subject to pressures from development (direct and indirect impacts), for example, increased accessibility (recreation) to designated sites has the potential to adversely impact on the integrity of these sites. Similarly, increasing levels of transport movements could increase levels of disturbance – many of the existing designated areas are in proximity to transport infrastructure.

Despite pressures, there are opportunities through development to protect and enhance biodiversity. One such example to aid certain species is the National Pollinator Strategy[21], produced by DEFRA to support bees and other pollinators. Furthermore, some local authorities, major private developers and infrastructure companies have also implemented a biodiversity net gain approach.

[20] http://jncc.defra.gov.uk/page-5705

[21] https://www.gov.uk/government/publications/national-pollinator-strategy-for-bees-and-other-pollinators-in-england

Medium Term

The EU is committed to halt the loss of biodiversity by 2020[22], which is supported in UK policy by the Biodiversity 2020 strategy[23] and the National Planning Policy Framework (NPPF)[24]. Highways England share a commitment to this target in its Biodiversity Plan[25], as does Network Rail[26]. In the UK, there is a statutory basis for planning to seek to minimise impacts on biodiversity and provide net gains in biodiversity where possible through Section 40 of the Natural Environment and Rural Communities Act 2006[27]. This places a statutory duty on all public authorities to have regard, in exercise of their functions, to the purpose of conserving biodiversity. In consideration of this duty, policies should seek to make a significant contribution to the achievement of the commitments made by government in its Biodiversity 2020 strategy. Furthermore, the 25 Year Environment Plan sets a goal for 'thriving plants and wildlife'.

Transport interventions will need to aim to avoid and/or minimise potentially adverse impacts through development and put an emphasis on no net loss[28] of biodiversity in order to achieve these targets. The requirement for biodiversity net-gain may be strengthened in planning policy, in line with aspirations set in the 25 Year Environment Plan. Strategies aiming towards the wider adoption of ULEV and particularly electric vehicles will result in positive impacts on local biodiversity through reduced emissions and occurrences of hydrocarbon, oil and associated fluid spillages. Measures outlined in the 25 Year Environment Plan also have the potential for positive effects on biodiversity. This includes woodland and wildlife-rich habitat creation, efforts to enhance designated sites and measures to recover threatened species.

It is expected that new interventions may have the potential to negatively affect international designated sites. However, the high level of protection afforded to international designated sites necessitates the undertaking of formal assessment for any plan or project where this risk is encountered. It is assumed that this level of protection to European sites will remain after the UK's withdrawal from the European Union.

Long Term

Statutory duties concerning planning policy and existing commitments to no net loss of biodiversity within the transport infrastructure sector have the potential to improve the state of nature within the UK, specifically in the North of England. In addition to the ongoing commitments to no net loss by

[22] http://ec.europa.eu/environment/nature/biodiversity/strategy/index_en.htm

[23] https://www.gov.uk/government/publications/biodiversity-2020-a-strategy-for-england-s-wildlife-and-ecosystem-services

[24] https://www.gov.uk/government/publications/national-planning-policy-framework--2

[25] https://www.gov.uk/government/publications/biodiversity-plan

[26] https://www.railengineer.uk/2014/08/22/biodiversity/

[27] https://www.gov.uk/guidance/natural-environment#biodiversity-and-ecosystems

[28] http://ec.europa.eu/environment/nature/biodiversity/nnl/index_en.htm

bodies such as Highways England, the 25 Year Environment Plan announced by the Government aims to embed an environmental net gain principle for development, enhance designated sites and create or restore wildlife rich habitats, increase woodland cover and improve sustainable land management practices.

It is considered that application of HRA will highlight any potentially adverse impacts on international designated sites arising from new or improved transport interventions. The HRA methodology focuses on the principles of the mitigation hierarchy, as outlined in Environmental Impact Assessment, which firstly aims to avoid, then minimise/reduce any negative effects on designated sites. If any adverse impacts cannot be adequately mitigated for, then compensatory measures would be required.

WATER ENVIRONMENT

Adapted from Objective 6 of Appendix D.1 of the ISA

Current – Short Term

Water quality has been impacted severely across the north of England – often by transport activities. Currently across England 17% of surface water bodies are at good or better ecological status or potential[29], with 53% of groundwater bodies at good chemical status (69% at good quantitative status).

Medium Term

Specific measures are being introduced under the WFD to address water pollution from the transport network, in particular from roads. The use of Sustainable Drainage Systems (SuDS) is also becoming a more common / standard element to road drainage design. The WFD anticipates that measures such as these will help improve water quality status in future. It is assumed that WFD legislation transposed in the UK and associated measures to improve water quality will remain after the UK's withdrawal from the European Union.

By 2021 6.3% of surface water bodies in England are expected to improve by at least one ecological status class.

Long Term

Continued measures under the WFD are likely to continue to improve water quality. Increased usage of EV and/or Hybrid could also lead to an improvement in water quality as it will lead to the removal of large quantities of hydrocarbons from the road network. This improvement would be most particularly noted in the event of an accident, where the rupturing of fuel tanks or lines would not be an issue.

[29] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/514944/National_evidence_and_data_report.pdf

Appendix C

POLICY REVIEW

APPENDIX C - ENVIRONMENTAL POLICY

NOISE AND VIBRATION

National Policy

National Planning Policy Framework (NPPF)

The main reference to noise within the NPPF is at paragraph 180 which aims to avoid significant adverse noise impacts on health and quality of life as a result of new development and to mitigate / reduce any impacts to a minimum. Reference is made here to the Noise Policy Statement for England (NPSE). This paragraph states that planning policies and decisions should also identify and protect tranquil areas.

Noise Policy Statement for England (NPSE)

The NPSE sets out the long term vision for government policy on noise and aims to avoid / mitigate significant adverse impacts on health and quality of life and contribute to improvement.

National Policy Statement for National Networks (NPSNN)

Paragraph 5.189 states where a development is subject to EIA and significant noise impacts are likely to arise from the proposed development, the applicant should produce a noise assessment, which includes Noise and Vibration baseline, sensitive receptors, predictions of changing in baseline with the proposed development and mitigation measures. Paragraph 5.193 requires developments to be undertaken in accordance with the statutory requirements for noise. Paragraph 5.199 states that for most national network projects, the relevant Noise Insulation Regulations will apply.

Road Investment Strategy (RIS) Policy Paper

Department for Transport has outlined an aspiration for a 90% reduction in the number of people impacted by noise from the SRN by 2040.

The RIS identifies a capacity to improve noise levels through the management and redevelopment of Highways England assets, via low noise road surfacing and noise barriers etc. It is expected that Highways England will deliver investigation and mitigation measures to at least 1,150 NIAs, helping to deliver a better quality of life to around 250,000 people by the end of the first road period. All new and improved road schemes will therefore utilise low noise road surfaces as a default, with investigation of noise attenuating barriers and other potential mitigation options, where practicable.

Highways England Licence

As an arm's length company Highways England operates under a licence granted by the Secretary of State in April 2015. The licence sets out various requirements including environmental objectives: 4.2 (g) "Minimise the environmental impacts of operating, maintaining and improving its network and seek to protect and enhance the quality of the surrounding environment." The Licence in 5.23 (a) goes on to state that it must "Ensure that protecting and enhancing the environment is embedded into its business decision-making processes" and in 5.23 (b) to ensure "best practicable environmental outcomes across its activities."

'A Green Future: Our 25 Year Plan to Improve the Environment'

Although the 25 Year Environment Plan does not have any goals or topics aimed directly at noise, the Plan states “over the next 25 years, we must significantly cut all forms of pollution and ease pressure on the environment. We must ensure that noise and light pollution are managed effectively”.

Regional Policy

Greater Manchester Transport Strategy 2040

Greater Manchester’s Transport Strategy sets out ambitions for the transport system in Greater Manchester and establishes policies and actions to achieve this. This includes Policy 8 ‘we will work with partners to reduce, as far as possible, the emissions from transport, particularly CO_2, NO_2, particulates and noise’.

West Yorkshire Combined Authority (WYCA) – Transport Strategy 2040

WYCA’s Transport Strategy 2040 sets out ambitions for the transport system in West Yorkshire, and establishes policies and actions to be taken to achieve this. This includes to reduce noise levels associated with road transport. Actions related to this include to assist in the delivery of a comprehensive electric vehicle charging network.

AIR QUALITY

National Policy

The Air Quality Strategy (AQS) For England, Scotland, Wales and Northern Ireland (Volumes 1 And 2) July 2007

The AQS sets out a framework for reducing hazards to health from air pollution and ensuring that international commitments are met in the UK. For construction activities and road traffic emissions, which are a focus of this assessment, the main pollutant of concern is NO2.

In July 2017, DEFRA and the Department for Transport published a UK plan for tackling roadside nitrogen dioxide concentrations. This plan outlines the issue, the roles and responsibilities for tackling nitrogen dioxide concentrations and actions to be taken. This includes support for low emission freight, funding to accelerate uptake of low emission buses and taxis, more stringent emission testing requirements and support for Clean Air Zones in England. Principles that local authorities should follow when setting up Clean Air Zones in England are outlined in the Clean Air Zone Framework.

NPPF

Paragraph 181 of the NPPF requires that planning policies and decisions should “sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of AQMAs and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in

Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan".

NPSNN

The Governments policy with regards to air quality is to: "…bring forward specific works to address existing environmental problems on the Strategic Road Network and improve the performance of the network. This includes ….. addressing areas of poor air quality." In decision-making, the NPS states that "the Secretary of State should refuse consent where, after taking into account mitigation, the air quality impacts of the scheme will result in a zone/agglomeration which is currently reported as being compliant with the Air Quality Directive becoming compliant; or affect the ability of a non-compliant area to achieve compliance within the most recent timescales reported to the European Commission at the time of the decision".

RIS Policy Paper

The Department for Transport has published its Road Investment Strategy for the 2015/16 – 2019/20 Road Period which sets out policies relating to the strategic planning and funding of the road network. A £100 million Air Quality Fund is to be established to deliver air quality improvements for both new and existing schemes.

By 2040 the plan states there will be "Zero breaches of air quality regulations and major reductions in carbon emissions across the network."

Highways England Licence

As an arm's length company Highways England operates under a licence granted by the Secretary of State in April 2015. The licence sets out various requirements including environmental objectives: 4.2 (g) "Minimise the environmental impacts of operating, maintaining and improving its network and seek to protect and enhance the quality of the surrounding environment". Section 5.23 (e & h) it must seek to "minimise carbon emissions" and "other greenhouse gases from its operations and take opportunities to influence road users to reduce the greenhouse gas emissions from their journey choices."

'A Green Future: Our 25 Year Plan to Improve the Environment'

The 25 Year Environment Plan sets out government action to help the natural world regain and retain good health. The first of the 10 25-year goals of the plan is to achieve 'clean air'. The plan states that this will be achieved by: "meeting legally binding targets to reduce emissions of five damaging air pollutants…; ending the sale of new conventional petrol and diesel cars and vans by 2040; and maintaining the continuous improvement in industrial emissions…".

The Plan also seeks to embed a 'net environmental gain' principle for development that in the future is expanded more widely from its current use in biodiversity to include wider natural capital benefits, including air quality.

Chapter 4 Section 2 refers to the Plan's actions to reduce pollution. This includes publishing a new Clean Air Strategy for consultation in 2018.

Clean Growth Strategy

The Clean Growth Strategy sets out policies and proposals that aim to accelerate the pace of "clean growth", referred to as delivering increased economic growth and decreased emissions. Key policies

and proposals in the strategy include ending the sale of new conventional petrol and diesel cars and vans by 2040; support for the uptake of ultra-low emission vehicles (ULEV); investment in the electric charging network; support for low emission taxis and buses; work to enable options to shift freight from road to rail; and investment of public funds in innovation in low carbon transport technology and fuels.

Road to Zero Strategy

The Road to Zero Strategy sets out the Government's aim for all new cars and vans to be effectively zero emission by 2040. The sale of new conventional petrol and diesel cars and vans will be ended by 2040; by then it is expected that the majority of new cars and vans sold will be 100% zero emission and all new cars and vans will have significant zero emission capability. By 2050, the Government aims for almost every car and van to be zero emission.

Regional Policy

Greater Manchester Low-Emission Strategy and Greater Manchester Air Quality Action Plan

Greater Manchester's Low-Emission Strategy sets out priority areas for future investment which will contribute to a reduction of air pollution in Greater Manchester. Actions proposed include measures to stimulate the uptake of Ultra-Low-Emission Vehicles (ULEVs), measures to reduce emissions from Heavy Good Vehicles (HGVs), measures to reduce emissions from buses on key urban corridors, measures to change travel behaviour, investigation of clean air zones and measures to reduce emissions of new development. The strategy also outlines key measures to be taken in specific focus areas, which includes the M60/M62 corridor and major routes into the town centre.

Greater Manchester's Air Quality Action Plan sets out actions to improve air quality across Greater Manchester. Actions across the following broad subjects are established: development management and planning regulation, freight and heavy good vehicles, buses, cycling, travel choices, cars, information and resources.

Greater Manchester Transport Strategy 2040

Greater Manchester's Transport Strategy sets out ambitions for the transport system in Greater Manchester and establishes policies and actions to achieve this. This includes Policy 8 'we will work with partners to reduce, as far as possible, the emissions from transport, particularly CO_2, NO_2, particulates and noise'.

West Yorkshire Combined Authority (WYCA) – Transport Strategy 2040

WYCA's Transport Strategy 2040 sets out ambitions for the transport system in West Yorkshire, and establishes policies and actions to be taken to achieve this. This includes to reduce air pollution and carbon emissions associated with road transport. Actions related to this include to assist in the delivery of the West Yorkshire Low Emission Strategy, support the implementation of Clean Air Zones where needed and provide a comprehensive electric vehicle charging network.

Sheffield City Region (SRA) Combined Authority Transport Strategy 2018-2040

SRA's Transport Strategy sets out ambitions for greater transport network connectivity for the whole of South Yorkshire, parts of Derbyshire and Nottinghamshire and the Peak District National Park, and establishes policies and actions to be taken to achieve this. This includes references to the role of transport in improving air quality. Policy 6 and 7 set actions to improve air quality by eliminating

AQMAs within the SRA through adopting sustainable transport modes and creating the public transport system as a 'zero emission service'.

GREENHOUSE GASES

International Policy

The UK is a signatory of the United Nations Framework Convention on Climate Change (UNFCCC) which drives international action on climate change. The UK has pledged to reduce GHG emissions under the Paris Agreement, as a part of a joint pledge by members of the European Union (EU). This provides an overarching commitment by the UK.

National Policy

UK Climate Change Act

The Climate Change Act 2008 established the world's first long term legally binding framework to tackle the dangers of climate change10. A key provision was the setting of legally binding targets for GHG emission reductions of at least 80% by 2050 and at least 26% by 2020, against a 1990 baseline.

NPPF

Paragraph 150 states that new development should be planned for in ways that "can help to reduce greenhouse gas emissions, such as through its location, orientation and design".

NPSNN

Paragraph 5.18 states that the range of non-planning policies included in the Government's overarching national carbon reduction strategy will ensure that any carbon increases from road development do not compromise its overall carbon reduction commitments. "Therefore, any increase in carbon emissions is not a reason to refuse development consent, unless the increase in carbon emissions resulting from the proposed scheme are so significant that it would have a material impact on the ability of the Government to meet its carbon reduction targets".

RIS Policy Paper

The Road Investment Strategy for the 2015/16 – 2019/20 Road Period includes an aspiration for major reductions in carbon emissions across the network.

Highways England Licence

As an arm's length company Highways England operates under a licence granted by the Secretary of State in April 2015. Section 5.23 (e & h) states it must seek to "minimise carbon emissions" and "other greenhouse gases from its operations and take opportunities to influence road users to reduce the greenhouse gas emissions from their journey choices."

'A Green Future: Our 25 Year Plan to Improve the Environment'

The 25 Year Environment Plan sets out government action to help the natural world regain and retain good health. The Plan refers to national commitments to reductions in greenhouse gas emissions, and the actions outlined in the Clean Growth Strategy.

Clean Growth Strategy

The Clean Growth Strategy sets out policies and proposals that aim to accelerate the pace of "clean growth", referred to as delivering increased economic growth and decreased emissions. Key policies and proposals in the strategy include ending the sale of new conventional petrol and diesel cars and vans by 2040; support for the uptake of ultra-low emission vehicles (ULEV); investment in the electric charging network; support for low emission taxis and buses; work to enable options to shift freight from road to rail; and investment of public funds in innovation in low carbon transport technology and fuels.

Road to Zero Strategy

The Road to Zero Strategy sets out the Government's strategy for reducing emissions of the road transport sector. This reinforces an ambition to end the sale of new conventional petrol and diesel cars and vans by 2040. The paper also sets out an ambition for at least 50%, and as many as 70%, of new car sales and up to 40% of new van sales to be ultra-low emission by 2030. The Strategy sets out measures to meet these ambitions, which includes measures such as a £1.5 billion support package towards battery research and investment in charging infrastructure.

Regional Policy

Greater Manchester Low-Emission Strategy and Greater Manchester Air Quality Action Plan

Greater Manchester's Low-Emission Strategy sets out priority areas for future investment which will contribute to a reduction of air pollution in Greater Manchester. Actions proposed include measures to stimulate the uptake of Ultra-Low-Emission Vehicles (ULEVs), measures to reduce emissions from Heavy Good Vehicles (HGVs), measures to reduce emissions from buses on key urban corridors, measures to change travel behaviour, investigation of clean air zones and measures to reduce emissions of new development. The strategy also outlines key measures to be taken in specific focus areas, which includes the M60/M62 corridor and major routes into the town centre.

Greater Manchester's Air Quality Action Plan sets out actions to improve air quality across Greater Manchester and embed low-emission behaviours into the cultural of organisations and lifestyles by 2025. Actions across the following broad subjects are established: development management and planning regulation, freight and heavy good vehicles, buses, cycling, travel choices, cars, information and resources.

Greater Manchester Transport Strategy 2040

Greater Manchester's Transport Strategy sets out ambitions for the transport system in Greater Manchester and establishes policies and actions to achieve this. This includes Policy 8 'we will work with partners to reduce, as far as possible, the emissions from transport, particularly CO_2, NO_2, particulates and noise'.

Greater Manchester Combined Authority – Springboard to a Green City Region

Following on from a 'Green Summit' held in March 2018, the Springboard report sets out Greater Manchester's plans to make it one of the leading green city regions in the UK and Europe. This contains immediate actions including measures to shift transport to zero emissions.

West Yorkshire Combined Authority (WYCA) – Transport Strategy 2040

WYCA's Transport Strategy 2040 sets out ambitions for the transport system in West Yorkshire, and establishes policies and actions to be taken to achieve this. This includes to reduce air pollution and carbon emissions associated with road transport. Actions related to this include to assist in the delivery of the West Yorkshire Low Emission Strategy, support the implementation of Clean Air Zones where needed and provide a comprehensive electric vehicle charging network.

Sheffield City Region (SRA) Combined Authority Transport Strategy 2018-2040

SRA's Transport Strategy sets out ambitions for greater transport network connectivity for the whole of South Yorkshire, parts of Derbyshire and Nottinghamshire and the Peak District National Park, and establishes policies and actions to be taken to achieve this. This includes references to the role of transport in improving air quality. Policy 7 sets actions to improve air quality by adopting sustainable transport modes and Policy 8 includes reducing 'tailpipe carbon emissions' in line with targets for the UK and creating a 'zero carbon service' public transport network by 2040.

LANDSCAPE AND TOWNSCAPE

National Policy

NPPF

The NPPF Paragraph 170 states that 'the planning system should contribute to and enhance the natural and local environment by: protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality)'. Paragraph 172 states that great weight should be given to conserving landscape and scenic beauty in National Parks and Areas of Outstanding Natural Beauty, which 'have the highest status of protection in relation to these issues'. Paragraph 173 states that "within areas defined as Heritage Coast, planning policies and decisions should be consistent with the special character of the area and the importance of its conservation. Major development within a Heritage Coast is unlikely to be appropriate, unless it is compatible with its special character'. The NPPF also emphasises the need for good design, stating 'Good design is a key aspect of sustainable development, creates better places in which to live and work and helps make development acceptable to communities'. Paragraph 127 states that planning policies and decisions should ensure that development 'are sympathetic to local character and history, including the surrounding built environment and landscape setting'.

NPSNN

Paragraph 5.144 states where the development is subject to EIA the applicant should undertake an assessment of any likely significant landscape and visual impacts in the EIA and describe these in the ES. Paragraphs 5.146-148 require that the applicants assessment to consider any relevant national and local development policy; significant effects during construction and operation and; visibility and conspicuousness, would need to comply with the respective duties in section 11A of the National Parks and Access to Countryside Act 1949 and section 85 of the Countryside and Rights of Way Act 2000. Paragraphs 5.148 and 5.150 – 5.155 repeats the statements set out in the NPPF with regards to development within, or adjacent to, a National Park. Paragraph 5.154 specifically applies these considerations to areas outside the Park boundary, in that the duty to have regard to the purposes of nationally designated areas also applies when considering applications outside these areas. The NPSNN in paragraph 5.152 and 5.154 states a presumption against any significant

road widening or the building of new roads in a National Park, or development outside the National Park which might affect it.

RIS Policy Paper

Although landscape as a topic does not have any direct KPI's or targets, the plan states that the proposed Environmental fund will be used to maintain an attractive landscape, and work to halt the loss of biodiversity.

Highways England Licence

As an arm's length company Highways England operates under a licence granted by the Secretary of State in April 2015. The licence sets out various requirements including environmental objectives: 4.2 (g) "Minimise the environmental impacts of operating, maintaining and improving its network and seek to protect and enhance the quality of the surrounding environment."

'A Green Future: Our 25 Year Plan to Improve the Environment'

The sixth of the 10 25-year goals of the plan is to achieve 'enhanced beauty, heritage and engagement with the natural environment'. The plan states a desire to ensure that England's most beautiful landscapes are not only conserved but enhanced. The plan announces a review of National Parks and AONBs, to consider coverage of these designated areas, whether there is scope for expansion and opportunities to enhance the environment within these designations. The plan also states that action will be taken to identify 'opportunities for environmental enhancement in all of England's 159 National Character Areas and monitoring indicators of our landscape's character and quality to improve landscapes for people, places and nature'.

Environment Act 1995

There is a responsibility under Section 62 of the Environment Act 1995 to have due regard for the purposes of the National Parks, which includes 'to conserve and enhance the natural beauty, wildlife and cultural heritage of the National Parks'. Where there is a potential conflict with Highways England's proposals, greater weight should be attached to the purpose of conserving and enhancing the natural beauty, wildlife and cultural heritage of the area comprised in the National Park.

Regional Policy

Greater Manchester Transport Strategy 2040

Greater Manchester's Transport Strategy sets out ambitions for the transport system in Greater Manchester and establishes policies and actions to achieve this. This includes Policy 9: 'we will work with partners, including the Canals and Rivers Trust, to enhance green and blue infrastructure to provide a safe and attractive environment for walking and cycling'. Furthermore, Policy 10 states that 'we will aim to minimise the impact of transport on the built and natural environment, (including townscape, the historic environment, cultural heritage, landscape, habitats and biodiversity, geodiversity, water quality, pollution, flood risk and use of resources) and will seek to deliver environmental enhancements and biodiversity net gain where possible.

West Yorkshire Combined Authority (WYCA) – Transport Strategy 2040

WYCA's Transport Strategy 2040 sets out ambitions for the transport system in West Yorkshire, and establishes policies and actions to be taken to achieve this. This includes a policy to 'protect and enhance green infrastructure and the built environment'. Action related to this includes to protect

and where possible enhance Green Infrastructure and townscapes, and to minimise the impact of transport schemes by requiring that all large transport improvement schemes are subject to an environmental assessment and action to mitigate adverse impacts.

Sheffield City Region (SRA) Combined Authority Transport Strategy 2018-2040

SRA's Transport Strategy sets out ambitions for greater transport network connectivity for the whole of South Yorkshire, parts of Derbyshire and Nottinghamshire and the Peak District National Park, and establishes policies and actions to be taken to achieve this. This includes Policy 9 which outlines action to enhance the natural and built environment to improve townscapes and to ensure these improvements support sustainable transport systems.

HISTORIC ENVIRONMENT

National Policy

NPPF

Paragraph 189 requires an applicant to describe the significance of any heritage assets affected, including any contribution made to their setting. Paragraph 190 requires the identification and assessment of the particular significance of any heritage asset that may be affected by a proposal (including by development affecting the setting of heritage asset) taking account of the available evidence and any necessary expertise.

In assessing the impact of a proposed development on the significance of a designated heritage asset, paragraph 193 requires great weight to be given to the conservation of the asset. Where a proposed development will lead to substantial harm to (or total loss of significance of) a designated heritage asset, local planning authorities should refuse consent, unless it can be demonstrated that the substantial harm or total loss is necessary to achieve the substantial public benefits that outweigh the harm or loss. Paragraph 196 notes that where development will lead to less than substantial harm to the significance of a designated heritage asset the harm should be weighed against the public benefits of the proposal. Furthermore, paragraph 172 requires that great weight is given to the conservation of cultural heritage in National Parks.

NPSNN

Paragraph 5.126 states that where the development is subject to EIA the applicant should undertake an assessment of any likely significant heritage impacts of the proposed project as part of the EIA and describe these in the ES. The applicant should describe the significance of any heritage assets affected, including any contribution made by their setting. The level of detail should be proportionate to the asset's importance and no more than is sufficient to understand the potential impact of the proposal on their significance. Paragraph 5.131 states that in decision making when considering the impact of a proposed development on the significance of a designated heritage assets, great weight should be given to the asset's conservation, and the more important the asset the greater the weight should be. In paragraph 5.133 it is stated that where a proposed development will lead to substantial harm to or total loss of significance of a designated heritage asset, consent should be refused unless it can be demonstrated that the substantial harm or loss of significance is necessary in order to deliver substantial public benefits that outweigh that loss or harm.

RIS Policy Paper

There are no relevant policies, KPI's or PIs within the RIS for this topic area. However, there is a commitment to 'invest over £100 million to enhance the network's landscape, address areas where there are negative impacts on sites of historic or cultural heritage, and improve the impact on local biodiversity,' within RIS period 1.

Highways England Licence

As an arm's length company Highways England operates under a licence granted by the Secretary of State in April 2015. The licence sets out various requirements including environmental objectives: 4.2 (g) "Minimise the environmental impacts of operating, maintaining and improving its network and seek to protect and enhance the quality of the surrounding environment." The Licence in 5.23 (a) goes on to state that it must "Ensure that protecting and enhancing the environment is embedded into its business decision-making processes" and in 5.23 (b) to ensure "best practicable environmental outcomes across its activities."

'A Green Future: Our 25 Year Plan to Improve the Environment'

The sixth of the 10 25-year goals of the plan is to achieve 'enhanced beauty, heritage and engagement with the natural environment'. The plan states that this will be done by 'safeguarding and enhancing the beauty of our natural scenery and improving its environmental value while being sensitive to considerations of its heritage'.

Environment Act 1995

There is a responsibility under Section 62 of the Environment Act 1995 to have due regard for the purposes of the National Parks, which includes 'to conserve and enhance the natural beauty, wildlife and cultural heritage of the National Parks'. Where there is a potential conflict with Highways England's proposals, greater weight should be attached to the purpose of conserving and enhancing the natural beauty, wildlife and cultural heritage of the area comprised in the National Park.

Regional Policy

Greater Manchester Transport Strategy 2040

Greater Manchester's Transport Strategy sets out ambitions for the transport system in Greater Manchester and establishes policies and actions to achieve this. This includes Policy 9: 'we will work with partners, including the Canals and Rivers Trust, to enhance green and blue infrastructure to provide a safe and attractive environment for walking and cycling'. Furthermore, Policy 10 states that 'we will aim to minimise the impact of transport on the built and natural environment, (including townscape, the historic environment, cultural heritage, landscape, habitats and biodiversity, geodiversity, water quality, pollution, flood risk and use of resources) and will seek to deliver environmental enhancements and biodiversity net gain where possible.

West Yorkshire Combined Authority (WYCA) – Transport Strategy 2040

WYCA's Transport Strategy 2040 sets out ambitions for the transport system in West Yorkshire, and establishes policies and actions to be taken to achieve this. This includes a policy to 'protect and enhance green infrastructure and the built environment'. Action related to this includes to protect and where possible enhance Green Infrastructure and townscapes, and to minimise the impact of transport schemes by requiring that all large transport improvement schemes are subject to an environmental assessment and action to mitigate adverse impacts.

Sheffield City Region (SRA) Combined Authority Transport Strategy 2018-2040

SRA's Transport Strategy sets out ambitions for greater transport network connectivity for the whole of South Yorkshire, parts of Derbyshire and Nottinghamshire and the Peak District National Park, and establishes policies and actions to be taken to achieve this. This includes Policy 9 which outlines action to improve the natural and built environment through the 'protection and enhancement of heritage sites'.

BIODIVERSITY

National Policy

NPPF

At a national level, planning policy is driven by the NPPF (2018) which states that planning policies and decisions should contribute to and enhance the national and local environment by… (Paragraph 170 requires) 'minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures'. Paragraph 172 requires great weight is given to the conservation of wildlife in National Parks. Paragraph 175 states that if significant harm to biodiversity resulting from a development cannot be avoided, adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused, and that 'development resulting in the loss or deterioration of irreplaceable habitat (such as ancient woodland and ancient or veteran trees) should be refused, unless there are wholly exceptional reasons and a suitable compensation strategy exists'. Paragraph 175 also states that development likely to have an adverse effect on a SSSI should not normally be permitted and that opportunities to incorporate biodiversity improvements in and around developments should be encouraged.

NPSNN

Paragraph 5.22 requires that where the project is subject to EIA the applicant should ensure that the ES clearly sets out any likely significant effects on sites designated as ecological or geological conservation importance on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity and that the statement considers the full range of potential impacts on ecosystems. Paragraph 5.24 requires the applicant to show how the project has taken advantage of opportunities to conserve and enhance biodiversity conservation interests. Paragraph 5.25 states that as a general principle in decision making, development should avoid harm to biodiversity and geological conservation interests, while Paragraph 5.26 requires that appropriate weight is attached to designated sites of international, national and local importance, protected species, habitats and other species of principal importance for the conservation of biodiversity, and to biodiversity and geological interests within the wider environment. Paragraph 5.36 states that applicants should include appropriate mitigation measures as an integral part of their project.

RIS Policy Paper

Highways England has an aspiration that the operation, maintenance, and enhancement of the Strategic Road Network should deliver no net loss of biodiversity. In the long term, it should deliver a net gain across its broader range of works. Highways England published their Highways Biodiversity plan in June 2015. This contains a review of Highways England's historical biodiversity performance and goes on to set five outcomes for biodiversity to be achieved by Highways England over the

Road Investment Strategy RIS1 period, i.e. 2015 - 2020. Central to the Highways Biodiversity Plan is the requirement for Highways England to achieve no net loss of biodiversity by 2020 (i.e. within RIS1) and a net gain in biodiversity by 2040, in line with objectives set within the RIS.

Highways England Licence

As an arm's length company Highways England operates under a licence granted by the Secretary of State in April 2015. The licence sets out various requirements including environmental objectives: 4.2 (g) "Minimise the environmental impacts of operating, maintaining and improving its network and seek to protect and enhance the quality of the surrounding environment."

'A Green Future: Our 25 Year Plan to Improve the Environment'

The third of the 10 25-year goals of the plan is to achieve 'thriving plants and wildlife'. On land and freshwaters, the plan states that this goal will be achieved by restoring 75% of protected sites to favourable condition, creating or restoring 500,000 hectares of wildlife-rich habitat outside the protected site network (including a focus on priority habitats as part of a wider set of land management changes), taking action to recover threatened, iconic or economically important species and increase woodland in England in line with an aspiration of 12% cover by 2060.

The plan states that it will seek to embed a 'net environmental gain' principle for development to deliver environmental improvements locally and nationally. While current policy is that the planning should provide biodiversity net gains where possible, it will be explored whether this requirement can be strengthened to other areas and the government will consult on making this mandatory.

The plan's actions to assist the recovery of nature includes the development of a 'Nature Recovery Network' that will deliver on the recommendations in 'Making Space of Nature' (2010) for landscape scale conservation.

The plan's aspirations for woodland planting includes increased tree planting while also supporting increased protection of existing trees and forests. The plan also supports for the planting of a new 'Northern Forest' using the M62 as its spine.

Environment Act 1995

There is a responsibility under Section 62 of the Environment Act 1995 to have due regard for the purposes of the National Parks, which includes 'to conserve and enhance the natural beauty, wildlife and cultural heritage of the National Parks'. Where there is a potential conflict with Highways England's proposals, greater weight should be attached to the purpose of conserving and enhancing the natural beauty, wildlife and cultural heritage of the area comprised in the National Park.

Regional Policy

Greater Manchester Transport Strategy 2040

Greater Manchester's Transport Strategy sets out ambitions for the transport system in Greater Manchester and establishes policies and actions to achieve this. This includes Policy 9: 'we will work with partners, including the Canals and Rivers Trust, to enhance green and blue infrastructure to provide a safe and attractive environment for walking and cycling'. Furthermore, Policy 10 states that 'we will aim to minimise the impact of transport on the built and natural environment, (including townscape, the historic environment, cultural heritage, landscape, habitats and biodiversity, geodiversity, water quality, pollution, flood risk and use of resources) and will seek to deliver environmental enhancements and biodiversity net gain where possible.

West Yorkshire Combined Authority (WYCA) – Transport Strategy 2040

WYCA's Transport Strategy 2040 sets out ambitions for the transport system in West Yorkshire, and establishes policies and actions to be taken to achieve this. This includes a policy to 'protect and enhance green infrastructure and the built environment'. Action related to this includes to protect and where possible enhance Green Infrastructure and townscapes, and to minimise the impact of transport schemes by requiring that all large transport improvement schemes are subject to an environmental assessment and action to mitigate adverse impacts.

Sheffield City Region (SRA) Combined Authority Transport Strategy 2018-2040

SRA's Transport Strategy sets out ambitions for greater transport network connectivity for the whole of South Yorkshire, parts of Derbyshire and Nottinghamshire and the Peak District National Park, and establishes policies and actions to be taken to achieve this. This includes Policy 6 which outlines ambitions to protect natural resources and assets. Furthermore, Policy 9 outlines the 'use of green space to alleviate floods and enhance biodiversity'.

WATER ENVIRONMENT

National Policy

NPPF

Section 14 'Meeting the challenge of climate change, flooding and coastal change' of the NPPF states that 'inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk'. Paragraph 163 states that when determining any planning application, local planning authorities should ensure that flood risk is not increased elsewhere.

NPSNN

Paragraph 5.96 advises that applicants for projects which may be affected by, or may add to, flood risk to seek sufficiently early pre- application discussions with the Environment Agency, and, where relevant, other flood risk management bodies such as lead local flood authorities, Internal Drainage Boards, sewerage undertakers, highways authorities and reservoir owners and operators. Paragraph 5.97 states that surface water flood issues need to be understood and then account of these issues can be taken. The NPS states that in decision-making, the SoS will generally need to give impacts on the water environment more weight where a project would have adverse effects on the achievement of the environmental objectives established under the Water Framework Directive.

RIS Policy Paper

There are no relevant policies, KPI's or PIs within the RIS for this topic area.

Highways England Licence

As an arm's length company Highways England operates under a licence granted by the Secretary of State in April 2015. The licence sets out various requirements including environmental objectives: 4.2 (g) "Minimise the environmental impacts of operating, maintaining and improving its network and seek to protect and enhance the quality of the surrounding environment."

'A Green Future: Our 25 Year Plan to Improve the Environment'

The third of the 10 25-year goals of the plan is to achieve ‘clean and plentiful water’. The plan states that this will be achieved by several actions, including reaching or exceeding objectives for rivers, lakes, coastal and ground waters that are specially protected’. The plan also looks to put in place more sustainable drainage systems, which it will do through amending planning practice guidance to clarify construction and ongoing maintenance arrangements for SuDS in new developments, and considering changes to the NPPF and Building Regulations in the longer term to encourage SuDS.

Regional Policy

Greater Manchester Transport Strategy 2040

Greater Manchester’s Transport Strategy sets out ambitions for the transport system in Greater Manchester and establishes policies and actions to achieve this. This includes Policy 9: ‘we will work with partners, including the Canals and Rivers Trust, to enhance green and blue infrastructure to provide a safe and attractive environment for walking and cycling’. Furthermore, Policy 10 states that ‘we will aim to minimise the impact of transport on the built and natural environment, (including townscape, the historic environment, cultural heritage, landscape, habitats and biodiversity, geodiversity, water quality, pollution, flood risk and use of resources) and will seek to deliver environmental enhancements and biodiversity net gain where possible.

West Yorkshire Combined Authority (WYCA) – Transport Strategy 2040

WYCA’s Transport Strategy 2040 sets out ambitions for the transport system in West Yorkshire, and establishes policies and actions to be taken to achieve this. This includes a policy to ‘protect and enhance green infrastructure and the built environment’. Action related to this includes to protect and where possible enhance Green Infrastructure and townscapes, and to minimise the impact of transport schemes by requiring that all large transport improvement schemes are subject to an environmental assessment and action to mitigate adverse impacts.

Sheffield City Region (SRA) Combined Authority Transport Strategy 2018-2040

SRA’s Transport Strategy sets out ambitions for greater transport network connectivity for the whole of South Yorkshire, parts of Derbyshire and Nottinghamshire and the Peak District National Park, and establishes policies and actions to be taken to achieve this. River flooding and surface water flooding are addressed in Policy 9 which outlines the use and enhancement of ‘green space to alleviate floods’ within the urban environment.

Appendix D

ISA ASSESSMENT AID QUESTIONS

APPENDIX D – ISA ASSESSMENT AID QUESTIONS

The following is an extract of Table 8-1 from the Transport for the North (TfN) Strategic Transport Plan (STP) Integrated Sustainability Appraisal (ISA) (Atkins, 2018).

Table D-1 - ISA Framework Objectives and Assessment Aid Questions (Atkins, 2018)

Objective No.	Objective	Decision making questions
1	Reduce greenhouse gas emissions from transport overall, with particular emphasis on road transport	*Will the Strategic Transport Plan…* § Encourage a greater proportion of passenger and freight movement by lower carbon modes? § Encourage greater carbon efficiency in the movement of goods and people? § Encourage use of innovative new low carbon transport technologies? § Encourage use of the transport estate for low carbon energy generation? § Encourage the protection and enhancement of carbon sinks in the transport estate? Will it support the creation of carbon sinks?
2	Protect and enhance biodiversity, geodiversity and the green infrastructure network	*Will the Strategic Transport Plan…* § Lead to the direct physical loss of wildlife and habitats? § Prevent damage to / destruction of / disturbance of sites designated for nature conservation and or geodiversity? § Affect greenfield and/or brownfield land which has significant biodiversity or geological interest of recognised local importance? § Support the protection and enhancement of green infrastructure and avoid severance of habitats links / promote or provide wildlife corridors and cohesive habitat networks? § Support new habitat creation and enhancement? § Promote good design to secure biodiversity / green infrastructure benefits?
3	Conserve and enhance the international sites (HRA specific objective)	*Will the Strategic Transport Plan…* § Affect international sites designated for nature conservation identified as part of the HRA screening process (including positive and negative effects)?
4	Protect and enhance air quality	*Will the Strategic Transport Plan…* § Support the minimisation of emissions of air pollutants and enhancement of air quality
6	Protect and enhance the inland and coastal water environment	*Will the Strategic Transport Plan…* § Support the protection of the quality of inland and coastal surface water and groundwater resources?

Objective No.	Objective	Decision making questions
		§ Promote the minimisation of the use of impermeable hard surfacing and promote the use of SuDS? § Provide opportunities to improve Green / blue infrastructure? § Provide opportunities to improve water body status?
8	Support the conservation and enhancement of the quality and distinctiveness of historic assets, industrial and cultural heritage and their settings	*Will the Strategic Transport Plan…* § Support the conservation, protection and enhancement of the region's cultural and designated / non-designated historic assets (e.g. locally important buildings, § archaeological remains, World Heritage Sites, Scheduled Monuments, Listed Buildings and structures, registered Parks and Gardens, Registered Battlefields and Conservation Areas), their integrity and their settings? § Improve access to historic / culturally important sites by sustainable transport modes? § Appropriately manage elements of the transport infrastructure which are designated heritage assets? § Aid the appropriate management of any relevant Heritage at Risk to help remove it from the HAR register?
9	Protect and enhance the character and quality of landscapes and townscapes	*Will the Strategic Transport Plan…* § Encourage design, construction, repair and maintenance of transport infrastructure (and associated green / blue infrastructure) that respects and enhances the landscape character and townscapes of the north of England? § Promote the conservation, protection and enhancement of the natural environmental assets (e.g. National Parks, AONBs, parks and green spaces, common land, woodland / forests, etc.) of the north of England? § Consider avoidance of sensitive areas and respect of the integrity and setting of landscapes / townscapes? § Support the protection of 'tranquil' areas (e.g. areas free from visual intrusion, noise, light pollution etc)? § Promote the protection and enhancement of locally important buildings and townscapes, maintaining and strengthening local distinctiveness and a sense of place?
11	Enhance lower carbon, affordable transport choice	*Will the Strategic Transport Plan…* § Support the minimisation of dependence upon the private car? § Promote a shift to rail travel into and between city centres? § Promote the transportation of freight by waterways and rail? § Enhance public transport availability, convenience, accessibility and affordability? § Promote a wider choice of passenger travel through quality integrated facilities and services, walking and cycling improvements, demand management, network management, travel planning and intelligent transport systems?

Objective No.	Objective	Decision making questions
		§ Consider the specific transport needs of rural communities? § Contribute to the creation of infrastructure to encourage people to switch to low emission vehicles?

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