M6 – A1(M) Corridor Study

PCF Stage 0 Preliminary Environmental Risk Assessment

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SECTION ONE: Preliminary Environmental Risk Assessment

Part 1: Project and site description

1.1 Project Description	The M6-A1(M) Corridor Study proposes a link road across the Pennines between the M6 in Lancashire and the A1(M) to the south west of York. The aim of the project is to provide a through road between the M6 and the A1(M) in order to reduce Trans Pennine journey times and improve connectivity between important economic centres east and west of the Pennines, to increase growth and productivity. Highways England is investigating the feasibility of a new road via a number of different options to reduce congestion, improve journey times and reduce user frustration. At the time of production of this Preliminary Environmental Risk Assessment (PERA), two strategic corridor options were being considered for the study, these options are: • Option 1 (Orange Corridor) - Colne (M65), Skipton, Leeds Bradford Airport, A1(M) and York (A64); • Option 2 (Purple Corridor) - Colne (M65), LBA and M1 east of Leeds The corridor starts from the M65 and continues north east, crossing the A56 Skipton Road. The corridor runs through lower Bradley, south of Skipton and is predominantly rural in character. The corridor runs along the northern border of Keighley and Bradford, alleviating traffic congestion from the A560 commuting route between Keighley and Bradford improving access to Leeds Bradford Airport. The corridor continues across agricultural fields with some farmland towards East Keswick, where the corridor splits between the two options: • Option 1 (Orange Corridor) would continue north east through Collingham and join the A1(M) south of Junction 45. Development of a new road would continue north of Tadcaster and south west of York where it would connect with the existing A64 corridor. • The Option 2 (Purple Corridor) would run south east from East Keswick and cross the A58 at Scarcroft and the A64 at Potterton, and continue south to connect with the existing M1 corridor west of junction 47. These options are referred to in the report as the Orange Corridor or Purple Corridor. Within the Orange Corridor there are two options – The long Corridor and the short corridor. Both corridors are identical except the short one ends at the A1(M) and the long joins the A64 in the vicinity of Tadcaster. The orange long has been assessed within this PERA as the 'Worst case' scenario in terms of impacts on receptors, but where impacts are different for the short, this will be stated within this report or the associated WebTAG or AST assessment. As the West Corridor is identical for both options, the assessment has considered the impacts in this area once, and then discusses the differing potential effects for the eastern extents of the study corridors, the Orange and the Purple Corridor. The proposed route has been assumed within the modelling and appraisal to be a dual two-lane all-purpose road (D2AP) with an assumed opening date of 2041 and a standard speed limit of 70mph. The Orange and the Purple Corridors would require the construction of new road. A preferred route for the study would be chosen at a later stage in the Project Control Framework (PCF) process. The construction and opening years are anticipated to be similar for the two options, despite the slight variance in scale. The Orange Corridor is longer than the Purple Corridor but can reuse more existing road than the Purple Corridor.
1.2 Project length	The study corridor for both options covers a length of approximately 50 km. An environmental constraints plan has been produced for the study. This is included in Appendix A. This has been generated using an indicative centre line and a 4 km study area either side (8 km wide corridors). The centre line is not indicative of a fixed route, but rather as a realistic working corridor mid-point. A study area (up to 4 km from this centreline) has been assessed for each environmental topic and applied based in accordance with relevant guidance prescribed in Part 2. As the routes are not fixed at this point, the 4 km study area allows for all constraints within a reasonable distance, to be highlighted and inform future route options development.

1.3 Description of location and area	The corridors pass generally through rural areas of agricultural land or open space. A new link road would potentially pass close to small villages and market towns. The current air quality baseline varies across the corridors. There are more urban areas in the West Corridor outside Burnley, and areas in the Orange and Purple Corridors surrounding the A1(M) which are predominantly poor, however the area of the corridor running from Colne to Collingham is predominantly good. There are a large number Air Quality Management Areas across all the study corridors. There are a number of scheduled monuments, listed buildings and registered parks and gardens located within the study areas. The landscape within the study area comprises mainly agricultural and open countryside. The topography varies throughout the route as it passes through a variety of landscapes including low lying land, moors and rolling hills. The Yorkshire Dales National Park lies within the northern boundary of the 4 km study area for both options, and the Forest of Bowland Area of Outstanding Natural Beauty (AONB), lies in the west of the study area to the west of Barrowford. The southern portion of Nidderdale AONB also lies within the study area as shown in the constraints plan There are a number of European statutory designations across the study corridors including Sites of Special Scientific Interest (SSSI), Special Area of Conservation (SAC), Special Protection Areas (SPA) and Local Nature Reserves (LNR). The acoustic environment in the study area is likely to be dominated by traffic noise from the trunk roads within the study corridor, along with any agricultural operations that may be taking place in the rural areas. There are road and rail Noise Important Areas (NIA) located along these roads and within the study corridor. The study corridors pass through areas of Flood Zone 2 and Flood Zone 3. Flood Zone 3 areas include the land surrounding; Lake Burwain north of Colne, Lancashire Gill, the River Aire passing north of Keighley and Bradford, the Eccup Reservoir and Eccup Beck. The Orange Corridor and the Purple Corridor are located close to the River Wharfe and its tributaries surrounding Tadcaster and southern York within Flood Zone 3. The Orange Corridor also lies closely to the Cock Beck Flood Zone 3, west of Leeds. There are a number of Public Rights of Way (PRoW), including the national Pennine Way Trial, from Derbyshire running up through Pennines at Horton in the West Corridor. There are also many National Cycle Routes located within the study corridor also within the Pennines. The study corridors pass through different grades of Agricultural Land Classification (ALC) and geology with the grade gradually improving towards the east between Leeds and York.

Part 2: Environmental / Policy Baseline Summary

2.1 Air Quality	<u>National & Highways England policy</u> The **National Planning Policy Framework (NPPF**) (2019) contains statements which reference air quality, the most relevant being paragraph 109, 122 and 124 under 'Conserving and enhancing the natural environment'. **The National Policy Statement for National Networks (NPSNN)** (2014) records in Statements 5.3 – 5.15 where the Secretary of State should refuse planning permission with regards to air quality. The NPSNN also states that "any increase in carbon emissions is not a reason to refuse development consent, unless the increase in carbon emissions resulting from the study are so significant that it would have a material impact on the ability of Government to meet its carbon reduction targets A Green Future: Our 25 Year Plan to Improve the Environment (Defra, 2018) includes key drivers for Air Quality within Chapter 4: Increasing resource efficiency and minimising environmental impacts e.g. Reducing pollution by i) Publishing a Clean Air Strategy, ii) Curbing emissions from combustion plants and generators. The **Road Investment Strategy 2: (RIS2)** (2020) details the Governments '*The Road to Zero*' strategy, which sets out a commitment to end the sale of new conventional petrol and diesel cars and vans by 2040 and steps to decarbonise freight. As a result of these measures, all locations within Highways England's control will meet air quality targets before the end of RIS2, and emissions of the key pollutants will keep falling. The Key Performance Indicators (PIs) below have been identified as part of the Performance Specification within the RIS: • Air Quality: Bring links agreed with the Department and based on the Pollution Control Mapping model into compliance with legal NO_2 limits in the shortest possible time; and The **Highways England Licence** (Department for Transport, 2015) sets out that Highways England functions include minimising the environmental impacts associated with operating the network and seeks to enhance the quality of the surrounding environment.

	The **Highways England Environment Strategy** (2018) sets out briefly the purpose of Highways England to maintain and improve the strategic road network and the vision that will guide the environmental actions and activities during the first road investment period.. The strategy sets out that six Strategic Levers will be applied to achieve Highways England environmental vision. The Strategic Levers will be applied to environmental topics which includes air quality. The **Highways England Air Quality Strategy** (2017) makes a commitment to implement mitigation to achieve legislative requirements and to look for opportunities to improve air quality across the network. The purpose of the new link road is to improve traffic flow and reduce congestion, improve journey times and reduce user frustration. These measures would assist towards meeting the aims and objectives of the Highways England Licence, Environment Strategy and Air Quality Strategy. The M6-A1(M) Corridor Study has the potential to be in conflict with the **Highways England Environment Strategy** (2018) if appropriate measures are not incorporated into scheme design to enhance the quality of the surrounding environment of the scheme. Though it is likely that the six Strategic Levers will be assessed and avoided or mitigated during scheme design. <u>Physical Environment</u> Both corridors predominantly run through rural small / medium sized villages and market towns. The corridors pass through approximately 16 local authority areas of which two have declared AQMAs within the corridor. Pendle Borough Council have declared an AQMA in Colne and Leeds City Council have declared an AQMA in Pool in Wharfedale. Both AQMAs have been declared due to exceedances of the nitrogen dioxide (NO_2) annual mean objective of 40 µg/m^3 based on a 2 km study corridor. Both corridors encompass several of Defra's Pollution Climate Mapping (PCM) model compliance links however, none of these are shown to exceed the EU Limit Value of 40 µg/m^3 as an annual mean for NO2 in 2020. In 2020, the nearest compliance link shown to exceed the Limit Value is in Leeds city centre. The Orange Corridor runs along the outer edges of larger towns, north east of Leeds and south of the city of York until the route connects to the A1(M). The Purple Corridor runs in close proximity to the north east boundary of Leeds city centre heading in a south east direction. There are numerous designated ecological sites and Local Nature Reserves throughout the Orange and Purple corridors, including Breary Marsh SSSI, Trench Meadows SSSI, Tadcaster Mere SSSI and Chevin Forest Park Local Nature Reserve. The Biodiversity section of this PERA has further details on these.
2.2 Cultural Heritage	<u>National & Highways England policy</u> **National Planning Policy Framework** (2019) Section 12 define the policies enhancing the historic environment and heritage assets, and directs planning authorities to require developers to submit an appropriate level of assessment for sites with known heritage interest or potential. Local planning authorities have to balance the level of harm to a heritage asset from a development scheme against its public benefits. **National Policy Statement for National Networks** (2014) the Historic Environment set out the need and government policies for nationally significant infrastructure road projects for England, with Section 5 detailing the requirements in relation to the historic environment. It requires the significance of affected assets to be assessed, and the assessment of any likely significant heritage impacts. The **Highways England Licence** requirements have been reviewed and there are no cultural heritage specific requirements. The **Highways England Environment Strategy** (2018) includes a requirement for cultural heritage to be covered. The strategy contains details of six strategic levers to be applied for all environmental topics to enable the environmental strategy to be delivered. <u>Physical Environment</u> There are 20 Grade I listed buildings, 25 Grade II* listed buildings and approximately 498 Grade II listed buildings within or adjacent to the Orange Corridor. There is one WHS and approximately 17 scheduled monuments within or around the boundary of the study area. There is one Registered Battlefield within the study area (orange long only); the Battle of Towton, 1461, located at the southern extreme of the Orange Corridor south of Tadcaster. There are two Grade I and 1 Grade II entries on the Register of Parks and Gardens within the study corridor There are 17 Grade I listed buildings, 11 Grade II* listed buildings and approximately 243 Grade II listed buildings within the boundary of the Purple Corridor. There is one World Heritage Site and approximately 9 scheduled monuments within or adjacent to the study

	area. There are two Grade I, and two Grade II entries on the Register of Parks and Gardens within the Purple Corridor.
2.3 Landscape	National & Highways England policy **National Planning Policy Framework** (2019) NPPF Paragraphs 20, 133-134, 141-142, 170-172 of the contains statements with reference to landscape planning policy which relate to core planning principles, the protection of Green Belt, the opportunities offered by Green Belt and Community Forest Land, and conserving and enhancing the natural environment. **National Policy Statement for National Networks** (2014) (NPSNN) Statements 5.143 – 5.161 consider how landscape and visual impacts can influence the decision-making process, statements 5.164 and 5.170 cover the considerations for areas within Green Belt, statement 5.185 covers mitigation in relation to public rights of way. The DEFRA 25-year environment strategy includes key drivers for landscape within Chapter 2: Recovering nature and enhancing the beauty of landscapes by way of Reviewing National Parks and Areas of Outstanding Natural Beauty. The **Highways England Licence** states in paragraph 5.27 that Highways England must establish a Design Panel to provide advice on design issues and in doing so ensure that the design panel includes representation from credible experts and stakeholders. Highways England as the Licence holder shall seek advice from the Design Panel where a scheme is located within sensitive locations or where it is expected to have a substantial impact on the surrounding landscape. The **Highways England Environment Strategy** (2018) sets out that six Strategic Levers will be applied to achieve Highways England environmental vision. The Strategic Levers will be applied to environmental topics which includes Landscape. Physical Environment The study corridor (for this landscape assessment this is up to 4 km from the centre of each corridor) is located within: **National Character Areas (NCA) Profile 35: Lancashire Valleys.** The areas key characteristics are: Broad valleys of the rivers Calder and Ribble and their tributaries run north east to south west between the uplands of Pendle Hill and the Southern Pennines. A Millstone Grit ridge extends between the Ribble and Calder catchments (including the Mellor Ridge and part of Pendle Hill). A broad trough underlain by Carboniferous Coal Measures provided the basis for early industrialisation. **National Character Areas (NCA) Profile 36: Southern Pennines**. The areas key characteristics are: Large-scale, open, sweeping landscape with high flat-topped hills providing extensive views, cut into by narrow valleys with wooded sides. Mosaics of moorland vegetation on the plateaux, including blanket bog and heathland, supporting internationally important habitats and assemblages of upland birds, invertebrates and breeding waders. Enclosed upland pastures and hay meadows enclosed by drystone walls on the hillsides, and narrow valleys with dense gritstone settlements in the valleys, with steep slopes often densely wooded, providing strong contrast with open moorlands. Many reservoirs on the moors, supplying drinking water to adjacent towns, wintering and breeding habitats for birds and high quality recreation experiences. **National Character Areas (NCA) Profile 38: Nottinghamshire, Derbyshire and Yorkshire Coalfield. The areas key characteristics are:** A low-lying landscape of rolling ridges with rounded sandstone escarpments and large rivers running through broad valleys, underlain by Pennine Coal Measures. Local variations in landscape character reflecting variations in underlying geology. Several major rivers flow through the rural and urban areas of the NCA, generally from west to east in broad valleys. A mixed pattern of built-up areas, industrial land, pockets of dereliction and farmed open country. Small, fragmented remnants of pre-industrial landscapes and more recent creation of semi-natural vegetation, including woodlands, river valley habitats and subsidence flashes, with field boundaries of clipped hedges or fences. An extensive network of multi-user trails on former railway lines and canal towpaths, such as the Trans Pennine Trail and the Ebor Way. Continuing development pressure including land renewal and regeneration projects, especially along river corridors and around towns.

	National Character Areas (NCA) Profile 22: Pennine Dales Fringe. The areas key characteristics are: Side slopes of Pennine Dales uplands, predominantly sloping down to the east, but with locally varied topography formed by several significant river valleys running from west to east, including the Wharfe, Washburn, Nidd, Ure, Swale and the broad vale of the Tees. A transitional landscape between the Pennine uplands to the west and the low-lying fertile landscape of the Vale of York to the east; mainly pastoral in the west, with rough grazing on the moorland edge, merging into mixed farming, with arable on the lighter soils in the east. A well-wooded landscape, with woodland along valleys, many copses and plantations on the side slopes, and hedges with hedgerow trees in the lower lying arable areas. Several historic parklands, with woodlands and veteran trees. A generally tranquil and rural area, with a distinctly ancient character in some parts, with several small, historic market towns including Kirkby Malzeard, Middleham, Masham, Richmond and Barnard Castle, linked by a network of minor roads. Vernacular buildings predominantly built of Millstone Grit, mingling with Magnesian Limestone in the east, with roofs of stone flags, Welsh slate and some pantiles, creating strong visual unity to rural settlements and farmsteads. Many rivers, including the Tees, Ure, Nidd and Wharfe, forming important landscape features along with their broad, glacially widened valleys. Smaller rivers, such as the Burn, Laver, Kex Beck and the Skell flow through steep-sided valleys following courses cut by glacial meltwaters. Historically rich area with many parklands, abbeys and historic buildings, well visited by adjacent urban populations, as well as medieval and Roman earthworks The National Character Areas are taken into account in local Landscape Character Assessments, which set out Landscape Character Areas and/or Landscape Character Types. The route crosses through several such Landscape Character Area's and Landscape Character types within the areas covered by the Landscape Strategy for Lancashire, the North Yorkshire and York Landscape Character Assessment, the Bradford Landscape Character Assessment Supplementary Planning Document and the Leeds Landscape Character Assessment. The Yorkshire Dales National Park and the Nidderdale Area of Outstanding Natural Beauty both cross into the northern part of study area, the former to the north-west of Skipton and the latter north of Otley. There are several areas of Green Belt within the study corridors, therefore it is anticipated that a link road would run partially through Green Belt land in some places across the study area, including towards north and north-east of Burnley and north of the Leeds conurbation. Green belt is a planning designation to avoid coalescence and preserve openness rather than a designation of landscape value. Part of the study area in Yorkshire's White Rose Forest, which is a part of the wider Northern Forest initiative.
2.4 Biodiversity	<u>National & Highways England policy</u> **National Planning Policy Framework** (2019) Chapter 11, Pages 26 and 41, concern conserving and enhancing the local environment and provide guidance for local planning authorities on assessing the significance of nature conservation and biodiversity effects. **National Policy Statement for National Networks** (2014) Statements 5.20 - 5.38 of the concern impacts to biodiversity and ecological conservation. **RIS** 2 identifies **KPI** targets achieving no net loss of biodiversity over the whole of HEs soft estates **Highways England Delivery Plan** 2015 – 2020 – Chapter 6 Improved Environment, Page 45-46 Biodiversity. Highways England will identify works to fix deep-seated environmental problems and reduce net biodiversity loss to contribute to Biodiversity 2020 outcomes. The RIS states that by 2020 the company must deliver no net loss of biodiversity, and that by 2040 it must deliver a net gain in biodiversity. **Highways England Biodiversity Action Plan** 2019 / 2020 sets out KPI as follows: • KPI: Biodiversity: delivery of improved biodiversity, as set out in the company's Biodiversity Action Plan. • KPI: – Biodiversity: the company should publish its Biodiversity Action Plan by the 30 June 2015 and report annually on how it has delivered against the plan to reduce net biodiversity loss on an annual basis. The DEFRA 25 year environment strategy includes key drivers for biodiversity within Chapter 2: Recovering nature and enhancing the beauty of landscapes by way of protecting and recovering nature: i) Publishing a strategy for nature ii) Developing a Nature

	recovery network iii) Providing opportunities for the reintroduction of native species iv) Exploring how to give individuals the chance to deliver lasting conservation v) Improving biosecurity to protect and conserve nature. Physical Environment Within the 4 km study area, The South Pennine Moors Special Area of Conservation (SAC) and Special Protection Area (SPA) are split into three catchment areas along the route. The following designated sites are located within or adjacent to the whole route study corridor; The South Pennine Moors Special Area of Conservation (SAC) and The South Pennine Moors Phase 2 Special Protection Area (SPA) are overlapping sites of International importance covering large areas. A section of each designated site is located in the centre of the West Corridor north of Bradford and spans across most of the West Corridor. None of these international sites are designated for bats. Seven SSSIs are located within the western corridor (i.e. Orange and Purple combined);, Eccup Reservoir SSSI, Breary Marsh SSSI, Hetchell Wood SSSI, Norwood Bottoms SSSI, Bingley South Bog SSSI, Trench Meadows SSSI, and the South Pennine Moors SSSI. The South Pennine Moors SSSI corresponds with the boundaries of the South Pennine Moors SAC and The South Pennine Moors Phase 2 SPA, There are two single additional SSSI in close proximity to the Orange Corridor, Tadcaster Mere SSSI and East Keswick Fitts SSSI. There are no further statutory designated SSSI's within the study corridor of the Purple Corridor. There are 8 Local Nature Reserves across the study corridors. There are areas of ancient woodland within all study areas. Predominantly the main notable habitats along the route are upland heathland, grass moorland, floodplain grazing marsh, broadleaf and mixed woodland, unimproved grassland, hedgerows and potential other habitats of principal importance. These habitats have the potential to support a range of legally protected and other notable fauna and flora species, including bats, birds and invertebrates.
2.5 Noise & Vibration	National & Highways England policy The **National Planning Policy Framework** (2019) is the primary document setting out planning policies for England. The **Noise Policy Statement for England** (NPSE) 2010 sets out the long term vision of the government's noise policy, which is to "promote good health and a good quality of life through the effective management of noise within the context of policy on sustainable development". The **National Planning Policy Framework** (2019) provides guidance for local planning authorities on assessing the significance of noise and vibration effects of proposed developments. **National Policy Statement for National Networks** (2014) Statements 5.186 – 5.200 specifically apply to noise and how noise impacts affect the decision-making process, The NPSNN states that: "the Secretary of State should not grant development consent unless satisfied that the proposals will meet the following aims, within the context of Government policy on sustainable development: • avoid significant adverse impacts on health and quality of life from noise as a result of the new development; • mitigate and minimise other adverse impacts on health and quality of life from noise from the new development; and • Contribute to improvements to health and quality of life through the effective management and control of noise, where possible." The RIS has defined KPIs to mitigate at least 1,150 Noise Important Area (NIA)s over the Road Period 1 (RP1) (2015/16 - 2019/20), as identified through the Defra Noise Action Plan which will help deliver a better quality of life to around 250,000 people as noise exposure is reduced. Physical Environment Considering up to the 4 km buffer, the Orange and Purple Corridors before they split, pass through a predominantly rural area with some residential areas along the way. These areas may have other sensitive receptors including educational facilities, medical facilities and community facilities such as places of worship. The existing noise climate along the corridor is likely dominated by road traffic noise from the A6068, A682, A56, A59 A629,

	A658, A660, A61 and surrounding local roads. Other localised noise sources may include agricultural and commercial activities, the Airedale railway line and aircraft noise in the vicinity of Leeds Bradford Airport. The Orange Corridor is located in a rural area between Leeds and the outskirts of York, with residential properties and other sensitive receptors in surrounding towns and villages including East Keswick, Collingham, Boston Spa, Bramham, Clifford and Tadcaster. The existing noise climate along the corridor is likely to be dominated by road traffic noise from the A58, A1(M), A64 and surrounding local roads, other localised noise sources may include agricultural and commercial activities. The Purple Corridor is also located in a predominantly rural area with residential properties and other sensitive receptors primarily surrounding areas towards the east of Leeds. The existing noise climate along the corridor is likely to be dominated by road traffic noise from the A58, the A64 and the A1(M), and wider road network towards Leeds, other localised noise sources may include agricultural and commercial activities. A number of designated sites fall within the study corridors, including AONB, SAC, SSSI and Scheduled Monuments. The NPSNN identifies "certain parks and open spaces" as potentially noise sensitive, designated sites "where noise may have an adverse impact on the special features of interest, protected species or other wildlife", and "quiet places and other areas that are particularly valued for their tranquillity, acoustic environment or landscape quality such as National Parks, the Broads or Areas of Outstanding Natural Beauty", which may also be located within the study corridors. There are a large number of road NIA which fall within the study corridors, and surrounding routes. A small number of railway NIA are located on the Airedale Line.
2.6 Road Drainage & the Water Environment	<u>National & Highways England policy</u> The **National Planning Policy Framework** (2019) contains a number of statements with reference to road drainage and water the most relevant of which are: • Paragraph 2 – LPA in exercising their functions should take account of the obligations of European Directives; • Paragraph 100 – 104 under 'Meeting the challenge of climate change, flooding and coastal change; • Paragraph 146 under 'Facilitating the sustainable use of minerals'; and • Paragraph 156 under 'Local Plans'. **National Policy Statement for National Networks** (2014) Statements 5.90 – 5.115 and 5.219 – 5.231 apply to flood risk and water quality respectively, and how impacts on the water environment affect the decision-making process. **Highways England Delivery Plan** 2015-2020 states HE will invest £78m over the next five years to address flooding and pollution from highway runoff through measures to attenuate and improve flood resilience on the strategic road network and to improve water quality. The DEFRA 25 year environment strategy includes key drivers for water within Chapter 4: Increasing resource efficiency and minimising environmental impacts at end of life, part 2 – iv) Minimising the risk of chemical contamination in our water v) Ensuring we continue to maintain clean recreational waters and warning about temporary pollution. <u>Physical Environment</u> The study corridor crosses many areas of fluvial flood risk within Flood Zone 2 and Flood Zone 3. This includes the river corridors of the Earby Beck, Aire, Wharfe and the Foss. There may also be other flood risks that need to be considered (e.g. surface water, reservoir/canals, groundwater etc.). Bedrock geology is generally classified as a Secondary A aquifer to the west of the M1, and as a Principle Aquifer to the east of the M1. Superficial deposits are thinly spread and mainly associated with valley bottoms. These tend to be classified as Secondary A aquifers with some secondary undifferentiated strata spread more widely. It is likely that bedrock in this area support licenced and licenced abstractions, but the presence of these is not yet known. Certainly, there is a small Source Protection Zone to the west of Colne and around Tadcaster. There is also a larger Drinking Water Protected Area surrounding Likely. Finally, locally, groundwater may also be important for some of the designated nature conservation sites (i.e. Groundwater Dependent Terrestrial Ecosystems).
2.7 Population and Health	<u>National & Highways England policy</u> The **National Planning Policy Framework** (2019) provides advice on how schemes can be considered in relation to sustainable development, including: • Supporting the transition to a low carbon future; • Consideration of whether the opportunities for sustainable transport modes have been taken up;

	• Protecting and utilising opportunities for the use of sustainable modes for the movement of goods or people; • Protection and enhancement of public rights of way and access; and • Encouragement to make the fullest possible use of public transport, walking and cycling by considering pedestrian and cycle movements, access to high quality public transport, creation of safe crossing points and the needs of people with disabilities. It also sets out objectives in terms of building a strong and competitive economy, supporting a prosperous rural economy, promoting healthy communities, protecting green belt land and conserving and enhancing the natural environment. The **National Policy Statement for National Networks** (2014) states that new road schemes should address the needs of cyclists and walkers in their design and tackle existing problems where the national road network acts as a barrier to cycling and walking. It also considers development impacts upon land uses including open space, green infrastructure, Green Belt and Highways England accessibility and cycling strategies. The DEFRA 25 year environment strategy includes key drivers for population and health within Chapter 3: Connecting people with the environment to improve health and wellbeing, part 1 – Helping people improve their health and wellbeing using green spaces (ii) Promoting health and wellbeing through the natural environment. <u>Physical Environment</u> The corridors run through a combination of rural and slightly more urban land, passing in close proximity to small towns and villages. They run close by to public service areas and community buildings including schools and Doctors surgeries. At the western extent, both corridors pass in close proximity to the Lancashire settlements of Colne and Earby amongst others. As the corridor crosses through into Yorkshire, the corridor runs north of settlements including Keighley, Baildon and Guiseley. Where the route splits, the Orange Corridor passes between the urban fringes of Leeds and York where the population progresses to become more urban as larger villages and market towns become denser in population and community services. Settlements include; Collingham, Boston Spa and Tadcaster. The Purple Corridor passes down the east side of Leeds city centre where the population becomes relatively rural. The 4 km study area would include the urban areas of east Leeds.
2.8 Geology & Soils	<u>National & Highways England policy</u> The **National Planning Policy Framework** (2019) contains reference to geology and soils. Geology and Soils issues are covered by Paragraph 112, 117, 120 and 121 of the NPPF. The **National Policy Statement for National Networks** (2014) considers development impacts upon land use and states that decision-making should account for the economic and other benefits of the 'best and most versatile' agricultural land, and that little weight should be given to the loss of agricultural land in grades 3b, 4 and 5, except in area where particular agricultural practices may themselves contribute to the quality and character of the environment or the local economy. There are no specific **KPI's** relating to geology, soils and materials within the **RIS 2.** The DEFRA 25 year environment strategy includes key drivers for Geology and Soils within Chapter 3 – Improving soil health and restoring and protecting our peatlands (i) Developing better information on soil health. <u>Physical Environment</u> According to the British Geological Survey maps, (Geo-Index BGS website, accessed 08/04/2020), at a scale of 1:50,000 along the proposed route from west to east, worked infilled and made ground crossed sections of the proposed route. In addition to the reworked ground identified on the BGS Geo-Index it is anticipated artificial ground will be present around various urbanised areas and road infrastructure. Along the Corridor from west to east from Borrowford to the A61 where the route splits between Purple Corridor and Orange Corridor there are six types of superficial geology noted. These are: Till, Devensian diamicton; Alluvium, clay, silt, sand and gravel; Alluvial Fan Deposits, gravel, sand, silt and clay; River Terrace Deposits sand and gravel; Hummocky (Moundy) Glacial Deposits, Devensian diamicton; and Harrogate Till Formation clay, sandy, and gravelly. Where the proposed route splits along the Purple Corridor the superficial deposits noted along this proposed route are: Harrogate Till Formation clay, sandy and gravelly; and Alluvium, clay, silt, sand and gravel. Following the Orange Corridor, the superficial deposits noted are: Harrogate Till Formation, clay, sandy and gravelly; Head, clay, silt, sand and gravel; Alluvium, clay, silt, sand and gravel; Glaciofluvial Deposits Mid Pleistocene, sand and gravel; Glaciofluvial Terrace Deposits, Devensian sand and gravel; Escrick Moraine Member, clay, sandy and gravelly; York Moraine Member, sand, clayey and gravelly; and Vale of York Formation, clay, sand and gravelly.

There are thirty-two different types of bedrock geology across the proposed route from west to east. These are predominantly sandstones, mudstone and siltstones and also include limestone. The bedrock formations consist of the Millstone Grit Group; Kinderscout Grit; Sabden Shales; Warley Wise Grit; Pendle Grit; Hodder Mudstone Formation; Pendleside Sandstone Member; Bowland Shale Formation; Chatburn Limestone Formation; Thornston Limestone Formation; Bradley Flags; Marchup Grit; Nesfield Sandstone; Middleton Grit; Longridge Sandstone; Doubler Stones Sandstone; High Moor Sandstone; Addingham Edge Grit; Woodhouse Flags; Midgley Grit; Rough Rock Sandstone; Pennine Lower Coal Measures Formation; 80 Yard Rock; 48 Yard Rock; Middle Band Rock; Guiseley Grit; East Carlton Grit; High Moor Sandstone; Doubler Stones Sandstone; Midgley Grit; Huddersfield White Rock; and High Moor Sandstone. Along the Purple Corridor the bedrock geology is predominantly Millstone Grit Group; Huddersfield White Rock; Rough rock, Pennine Lower Coal Measures Formation; Thick Stone Sandstone and Slack Bank Rock. The bedrock geology along the Orange Corridor consists of Millstone Grit Group; Upper Plompton Grit; Addlethorpe Grit; Lower Plompton Grit, Cadeby Formation Dolostone; Edlington Formation Dolostone; Brotherton Formation Limestone; Roxby Formation Mudstone and Siltstone; and the Sherwood Sandstone Group.

There are two geological designated sites identified along the proposed route (accessed MAGIC website 07/04/20). These are South Pennine Moors SSSI and Great Dibb Wood SSSI.

Landfill

There are potentially 34 historic landfill sites across the proposed Corridors (accessed historical Environment Agency 'WIYBY' datasets 08/04/20). The proximity of the landfills will vary depending on the route choices of the proposed route. There are six authorised landfills identified within the proximity of the proposed Corridors which will vary depending on the alignment of the final scheme. The authorised landfills identified along the proposed route are:

- Bingley Brickworks, issue date 1987 takes other wastes;
- Meadow Bank Farm, landfill taking non biodegradeable wastes, licence issued from 1999;
- Black Hill Quarry, accepting inert waste from 2009;
- Field adjacent to Black Hill Quarry accepting non biodegradable waste from 1992;
- Woodacre Lane accepting non biodegradable waste from 1987; and
- Cereco Limited (Orange Corridor), accepting inert waste from 2002.

Agricultural Land

The western section of both Corridors, i.e. where they both follow the same alignment, starts outside Burnley where the Agricultural Land Classification (ALC) is predominantly Grade 4 and 5 with some small areas of Grade 3 land towards the north of Leeds and beneath Nidderdale AONB. The area south of Harrogate consists of mostly Grade 3 land with some small areas of Grade 2 land which is a 'best and most versatile' category of land.

Wetherby, Boston Spa and Tadcaster are classed as urban land; however, the rest of the study corridor for the Orange Corridor is made up of both Grade 2 and 3 very good to good quality agricultural land.

The area along the Purple Corridor is split between Grade 2 and 3 land with some areas classified as 'non-agricultural'. The non-agricultural land area is within Braham Park forest.

2.9 Material Assets and Waste

National & Highways England policy

The **National Planning Policy Framework** (2019) contains reference to materials. With regard to waste, paragraph 5 of the NPPF confirms that national waste planning policy will be published as part of the National Waste Management Plan for England.

The **NPPF** (paragraph 5) refers to the National Planning Policy for Waste (NPPW), which sets out the Government's ambition to work towards a more sustainable and efficient approach to resource use and management. The NPPW (paragraph 8) requires planning authorities to ensure that the likely impact of proposed, non-waste related development on existing waste management facilities, and on sites and areas allocated for waste management, is acceptable and does not prejudice the implementation of the waste hierarchy and/or the efficient operation of such facilities; and that the handling of waste arising from the construction and operation of development maximises reuse/recovery opportunities, and minimises off-site disposal.

The **NPPF** (Section 13) requires that local planning authorities and mineral planning authorities safeguard mineral resources (and associated facilities such as railheads and minerals processing facilities) to avoid their sterilisation by non-minerals development.

	The **National Policy Statement for National Networks** (2014) (Section 5.42) requires that schemes should seek to minimise the volume of waste produced and the volume of waste sent for disposal unless it can be demonstrated that the alternative is the best overall environmental outcome. <u>Physical Environment</u> Lancashire County have designated a Minerals Safeguarding Area (MSA) surrounding the eastern area of Burnley and the southern area of Pendle. North Yorkshire County Council have sand and gravel MSA designated to the south of Skipton and in the south of Nidderdale AONB, both of which lie approximately at the northern boundary of the study area. West Yorkshire has a large number of areas within the West Corridor of the scheme which are designated as a sandstone MSA. Leeds District Council has designated MSA's for sand and gravel and surface coal. The MSA for sand and gravel runs along the north border of Leeds District Council and ends south of Wetherby. There are also large areas of MSA's for surface coal along the north of Leeds city centre within the study corridor. North Yorkshire County Council has a designated MSA for sand and gravel directly north of Tadcaster within the centre of the Orange study corridor. There are several historic landfill sites surrounding Boston Spa, Walton and Tadcaster. There are also a number of permitted waste sites within the study corridor. There are no designated areas of sand and gravel along the Purple Corridor; however, Leeds District Council has designated MSA's for surface coal within the village of Thorner to the east of Leeds city centre within the study corridor. There is also one Historic Landfill site at Sandcroft Hill, directly north of Thorner.
2.10 Climate (resilience and greenhouse gases)	<u>National & Highways England policy</u> The **Climate Change Act** (2008, updated 2019) contains statements which reference the 2050 Net Zero target. '*The amendment in this Order has the effect that the minimum percentage by which the net UK carbon account for the year 2050 must be lower than the 1990 baseline is increased from 80% to 100%.*' The **National Planning Policy Framework** (2019) contains statements which reference to Climate in Chapter 10 entitled 'Meeting the challenge of climate change, flooding and coastal change'. Paragraph 93 of the NPPF states that Planning plays a key role in helping shape places to secure radical reductions in greenhouse gas emissions, minimising vulnerability and providing resilience to the impacts of climate change. Paragraph 94 of the NPPF states that Local planning authorities should adopt proactive strategies to mitigate and adapt to climate change, taking full account of flood risk, coastal change and water supply and demand considerations. The **National Policy Statement for National Networks** (2014) states in Paragraph 5.18 that an increase in CO_2 emissions is not a reason to refuse development consent, unless the increase was large enough to have a material impact on the ability of the Government to meet its carbon reduction targets. As noted in the NPSNN (paragraph 3.8) the carbon emissions anticipated over the next 10-15 years from the strategic road building programme are considered to be small (less than 0.1% of annual carbon budget) and the increases associated with the Scheme are part of that small increase. The **Road Investment Strategy 2 (RIS2)** (2020) contains statements which reference climate change. • *SRN is resilient to climate change and incidents, such as flooding, poor weather conditions* • *Changes in climate are forecast to bring greater challenges to the network, which will need to be able to cope with a wider range of climactic conditions and extreme weather events.* • *Extreme weather has the potential to cause extreme disruption to the road network. This is especially true in the north of England, and in exposed areas.* The RIS 2 also details the Highways England Carbon Emissions Target. The respective Key Performance Indicator identified as part of the Performance Specification is: • Carbon: *Reduce Highways England's carbon emissions as a result of electricity consumption, fuel use and other day-to-day operational activities during RP2, to levels defined by baselining and target setting activities in 2020-21.* The DEFRA 25 year environment strategy includes key drivers for Climate Change within Chapter 6 Protecting and improving our global environment 1) Providing and improving our global environment i) Tackling climate change. Within the Highway England Good Design Principle document 'The road to Good design' a key principle is 6 – Environmentally sustainable: Making an important contribution to the

conservation and enhancement of the natural, built and historic environment. Good road design seeks to achieve net environmental gain. Its multi-functional, resilient and sustainable allowing for future adaptations and technical requirements while minimising waste and the need for new materials.

Highways England Sustainable Development Strategy details targets of improvement in areas including: Financial capital - Climate change adaption, Human capital - Sustainability leadership, Natural capital - Carbon management, Social capital - Responsible sourcing and Manufactured capital - Circular economy.

Physical Environment

The existing roads within the study area have associated greenhouse gas emissions (GHG) particularly associated with road users and ongoing maintenance. With reference to Met Office Data, the Scheme lies within the defined 'North West England' region and both the Orange and Purple Corridors lie within the 'Yorkshire and the Humber' region.

The climate of the 'Yorkshire and the Humber' region sees mean annual temperatures of between 6°c and 8°c. July is the warmest month with temperatures typically in the region of 20°c. The least amount of rainfall occurs in February. The average in this month is 58 mm. The greatest amount of precipitation occurs in June, with an average of 109 mm.

The climate projections for the increase in rainfall (%) and temperature (°c) for the Yorkshire and Humber region are detailed below from the 50th percentile data (with the ranges of 5th to 95th percentile).

Yorkshire and the Humber	Concentration Pathway				
	Timescale	RCP8.5	RCP6.0	RCP4.5	RCP2.6
Rainfall	Baseline	-1% (-16% - 16%)	-0.5% (-16% - 15%)	-1% (- 16% - 15%)	-1% (-16% - 16%)
	2030-2049	-1.5% (-19% - 16%)	1.5% (-17% - 14%)	-2% (-18% - 15%)	-2% (-18% - 15%)
	2050-2069	-6% (-27% - 17%)	-5% (-24% - 14%)	-5% (-24% - 14%)	-3.5% (-21% - 15%)
	2070-2089	-7% (-33% - 22%)	-5.5% (-27% - 16%)	-5.5% (-25% - 15%)	-4% (-21% - 13%)
Temperature	Baseline	1°C (0.3°C - 1.8°C)	0.8°C (0.2°C - 1.5°C)	0.9°C (0.2°C - 1.6°C)	1°C (0.3°C - 1.8°C)
	2030-2049	1.3°C (0.4°C - 2.3°C)	1°C (0.2°C - 1.8°C)	1.1°C (0.3°C -2°C)	1.2°C (0.3°C - 2.1°C)
	2050-2069	2.1°C (0.9°C – 3.6°C)	1.5°C (0.4°C - 2.6°C)	1.5°C (0.4°C - 2.7°C)	1.2°C (0.3°C - 2.3°C)
	2070-2089	3.3°C (1.5°C - 5.4°C)	2.3°C (0.9°C - 3.9°C)	2.1°C (0.7°C - 3.5°C)	1.3°C (0.3°C – 2.5°C)

The climate of the "North West England' region sees mean annual temperatures of between 10°c and 12°c. July is the warmest month with temperatures typically in the region of 19°c. The region experiences rainfalls of between 1250mm to 1500m per year.

The climate projections for the increase in rainfall (%) and temperature (°c) for the North West England region are detailed below from the 50th percentile data (with the ranges of 5th to 95th percentile).

North West England	Concentration Pathway				
	Timescale	RCP8.5	RCP6.0	RCP4.5	RCP2.6
Rainfall	Baseline	-1% (-16% - 15%)	0.5% (-15% - 13%)	-1% (-16% - 14%)	-1% (-15% - 14%)
	2030-2049	-2% (-19% - 15%)	-2.5% (-18% - 13%)	-2.5% (-18% - 14%)	-2.5% (-19% - 14%)
	2050-2069	-4% (-25% - 19%)	-3.5% (-21% - 15)	-4% (-21% – 16%)	-2.5% (-18% - 15%)
	2070-2089	-6% (32% - 23%)	-5% (26% - 17%)	-5% (24% - 17%)	-4.5% (021% - 13%)
Temperature	Baseline	1°C (0.3°C – 1.8°C)	0.8°C (0.2°C – 1.5°C)	0.9°C (0.2°C – 1.6°C)	1°C (0.3°C – 1.7°C)
	2030-2049	1.3°C (0.4°C – 2.3°C)	1°C (0.2°C – 1.8°C)	1°C (0.3°C – 1.9°C)	1.2°C (0.3°C – 2.1°C)

	2050-2069	2.1°C (0.8°C – 3.5°C)	1.4°C (0.4°C – 2.5°C)	1.5°C (0.4°C – 2.6°C)	1.2°C (0.2°C – 2.2°C)
	2070-2089	3.2°C (1.5°C – 5.3°C)	2.3°C (0.9°C – 3.8°C)	2°C (0.9°C – 3.4°C)	1.3°C (0.3°C – 2.5°C)

These projections are based on average climate projections for the UK from Met Office data. UKCP18 provides climate change projections for defined 20-year periods (for example 2020-2039, 2040-2059, 2060-2079 and 2080-2099), at annual and seasonal levels for changes to mean climatic conditions over land areas.

2.11 Design

National & Highways England policy

The principles of good road design shall be adopted, including the 10 Design Principles set out in the Highways England document ***'The Road to Good Design (January 2018)'***

Part 7 of the **National Planning Policy Framework** (2019) is entitled 'requiring good design'. It is stated that good design is a key aspect of sustainable development, is indivisible from good planning, and should contribute positively to making places better for people.

Within the **RIS 2** Strategy, it is outlined that impacts on the landscape, as an example, are carefully controlled, trying to make the road fit into the existing landscape. This starts at the very beginning of scheme design, finding a route that matches the local topography and tries to hide the road behind existing features such as established woodland or natural contours.

Highways England has a duty under the **Highways England Licence** to develop and implement strategic plans which aim to support and promote sustainable development, including the principles of good design. Highways England projects must also demonstrate that due regard has been given to the relevant principles and guidance on good design.

Physical Environment

The scheme design team should work collaboratively to maximise any opportunities to provide mitigation and enhancements within an approach to good scheme design. This might include biodiversity enhancements, landscape integration and enhancements, flood storage and resilience measures. A Design Panel approach is likely to be required.

The route of a scheme would pass through a large area which features a number of environmental sensitivities. As such, the design for a scheme will need to incorporate suitable measures to mitigate the potential for any increase in pollutant concentrations and noise at sensitive receptors in close proximity to a scheme. There is potential for increases in vehicle flows which could lead to exceedances or exacerbations of the NO_2 annual average objective / limit value for the area.

Archaeological investigations, suitable hard and soft landscaping, SuDS, flood storage and ecological features to provide biodiversity enhancements should be included in the design for the scheme. Additional land adjacent to the scheme may be required to provide these features. Additional time should be included in the programme along with budget to provide for the discussions, design and inclusion of these features and measures.

RAG ratings are attributed at follows:

Red: Environmental constraints that cannot be addressed using established and readily deliverable design solutions or mitigation thereby posing a threat to project delivery;

Amber: Environmental constraints that, whilst likely to cause substantially adverse impacts, can potentially be resolved / mitigated but with possible implications for a project program; and

Green: Environmental constraints that are likely be resolved/ mitigated for a project program

	Political conflicts & environmental risks / opportunities	RAG Rating	
		Orange Corridor	Purple Corridor
3.1 Air Quality	**Environmental risk and Potential Policy Conflicts**: There is an uncertainty around the vehicles flows predicted for a scheme at this stage. There is a risk that the scheme may result in large increases in vehicle flows and reduction in speeds. Locations are unknown at this point in time. This increases the likelihood that there would be a deterioration in air quality at sensitive receptors closest to the route and on the existing road network due to the re-routing of traffic. There are two AQMAs within the study corridor. There is a risk of a new scheme resulting in larger exceedances of the objective limit value in these AQMAs if the scheme increases traffic flows. It should be noted however that by predicted year of opening (2041), the status of the AQMA's may have changed /redefined and limit values may have changed. Where these increases in traffic flows occur near to receptors such as residential properties (e.g. the Purple Corridor runs in close proximity to the north east boundary of Leeds city centre) which are located in areas where pollutant concentrations are already near or above the objective, then potentially significant adverse impacts may occur. In areas where existing air quality is near relevant objective values, there is an uncertain risk that large increases in vehicle flow could cause exceedances of the NO_2 annual average objective / limit value on the wider road network which would be in conflict with policy however this risk is low. There are a large number of relevant ecological receptors along the study corridors. Increased emissions would increase nitrogen deposition rates at these sites. The Orange and Purple corridors encompass several of Defra's Pollution Climate Mapping (PCM) model compliance links; however, none of these are shown to exceed the EU Limit Value of 40 $\mu g/m^3$ as an annual mean for NO2 in 2020. Therefore, the risk of the scheme resulting in a compliance risk is low. If any of the above conflicts or significant effects do occur, this would conflict with the NPPF and NPSNN Policy for air quality impacts which may affect the consenting process. However, these conclusions can only be confirmed once detailed traffic and air quality modelling is undertaken at later PCF stages. There could be opportunities to adjust the route alignment in this area to avoid significant impacts on residential areas to the east of Leeds centre with the Purple corridor. **Environmental Opportunities and Policy Support:** The re-routing of traffic is likely to reduce traffic flows and congestion on existing roads within the study area, which would provide opportunity to improve air quality in these areas. Emissions of greenhouse gases could also decrease local air pollutants. The West Corridor which is the same for the Orange and Purple Corridors, would be expected to re-route a proportion of the traffic which currently use surrounding trunk and local authority roads including the A56, A6068 and the A658. This would be likely to reduce traffic flow on these roads and thus reduce pollutant concentrations at nearby sensitive receptors. The Orange Corridor runs along the outer edges of larger towns, north east of Leeds and south of the city of York until the route connects to the A1(M). It is expected there could be large reductions in emissions where congestion is reduced on the main commuting roads surrounding Leeds and York as well as along. the A58 and between the towns of Wetherby, Collingham and Tadcaster. Therefore, it is concluded that a new link road could bring about a potentially beneficial effect for sensitive receptors within this study corridor. The Purple Corridor runs in close proximity to the north east boundary of Leeds city centre heading in a south east direction. This route could		

	be beneficial in alleviating congestion surrounding the commuting routes in Leeds. The scheme will result in the re-routing of traffic and therefore on some roads traffic flow will reduce. This will improve local air quality at relevant receptors. Design route to avoid sensitive receptors where possible. **RAG Rating:** A **Red** rating has been given for both corridors due to the scale of a new scheme. There are two AQMAs within the corridors and there is a risk that both options will result in a large increase in vehicle flows and reductions in speeds resulting in deterioration in air quality at sensitive receptors. Further study will need to be undertaken to determine the exact location of the route to assess air quality effects.	
3.2 Cultural Heritage	**Environmental Risk and Potential Policy Conflicts:** There are a large number of designated heritage assets including a World Heritage Site, scheduled monuments, Conservation Areas, entries on the Register of Parks and Gardens and registered battlefields within the study corridor. It is uncertain at this stage as to how close the options will be to heritage assets; however, given the large number of assets within the study corridor, there is a risk that there may be impacts. There is scope within the study area for the route to be amended to not physically impact any of the Registered Battlefields (orange long only) or Parks and Garden sites. There is a possible physical impact on scheduled monuments and listed buildings located along the West Corridor and along the Orange and Purple Corridors due to the scale of a scheme during the construction phase. Although good design may also limit this. There is also a potential for the setting of significant heritage assets to be impacted. There is also a possibility of an impact on the setting of designated assets within the study area during the construction phase of both options. There is a risk of policy conflicts identified in respect of cultural heritage; however, this cannot be confirmed until design of the scheme has been completed. Further risks include the duration and cost of consultation with Historic England and Local Authority, which should be considered at later PCF stages. Whilst this is usual good practice, the extent of engagement may be larger than for typical projects. There is likely to be a requirement for extensive archaeological valuation and mitigation. Any significant physical impacts on heritage assets or effects deemed to cause substantial harm would lead to policy conflicts with the NPS for National Networks and could be grounds for refusal. Further assessment is needed to determine the effect of the scheme. **Environmental Opportunities and Policy Support:** Investigation should be undertaken to identify where there is potential to improve the current setting of heritage assets through design at later PCF stages. There is potential for improvement of archaeological knowledge relating to previously unrecorded heritage assets. The design of the scheme could be developed to avoid physical effects on some significant heritage assets. Design considerations could also be used to mitigate effects on the setting of heritage assets Design route to avoid sensitive receptors where possible. **RAG Rating:** The summary of the assessment on cultural heritage is currently anticipated to be a **Red** RAG rating on a precautionary basis. Whilst it is likely that through good design a scheme could avoid direct adverse impacts, there remains a risk of significant effects requiring bespoke design or mitigation solutions due to the large number of high value assets in the study area. An options appraisal will need to be done to assess further environmental effects. If even through considerate design, a scheduled monument would be impacted this would be a significant effect and is likely to have policy conflicts, and as such a **Red** rating would be relevant.	

3.3 Landscape	**Environmental Risk and Potential Policy Conflicts:** With regards to NPS paragraphs 5.150 and 5.151, great weight should be given to conserving landscape and scenic beauty in nationally designated areas. National Parks, the Broads and Areas of Outstanding Natural Beauty have the highest status of protection in relation to landscape and scenic beauty. Each of these designated areas has specific statutory purposes which help ensure their continued protection and which the Secretary of State has a statutory duty to have regard to in decisions. The Secretary of State should refuse development consent in these areas except in exceptional circumstances and where it can be demonstrated that it is in the public interest. There is the risk of significant impacts on the Yorkshire Dales National Park, the Forest of Bowland Area of Outstanding Natural Beauty and the Nidderdale Area of Outstanding Natural Beauty through the introduction of a scheme into these sensitive landscapes resulting in visual effects and loss of amenity value. This would be in conflict with the relevant policies as outlined above. The large extent of the study area means that any proposed scheme would pass through and nearby a large number of rural towns and villages, which has potential to result in a high impact on sensitive residential and recreational receptors. Loss of trees and hedgerows has the potential to lead to a reduction on the functionality and effectiveness of green infrastructure; which may be in conflict with Paragraphs 5.162 - 5.185 of the NPSNN. The National Character Areas identified may be affected by a new scheme, as would the Landscape Character Areas and Landscape Character Types covered in local assessments. Subject to landscape design mitigation being incorporated into the proposed works, it is considered that the magnitude of some of these impacts could be reduced. A proposed scheme located within the study area is likely to result in an alteration to landscape character throughout both the construction and operation phases. There is potential for alteration of, or fragmentation to • Field Patterns; • Natural land cover including woodland and mature hedgerow trees • Open space and visual amenity; and • A reduction of arable agricultural land. In relation to visual impact and amenity, the corridors would be in close proximity to several small villages and market towns, individual residential and agricultural properties, public rights of way and recreational destinations (listed in section 2.3) all of which could experience visual change during construction and operation of a new scheme. It is anticipated that the Orange Corridor will have a slightly greater impact on the landscape as it involves a longer new road and has the potential to run through more existing towns compared to the Purple Corridor which is more rural. A landscape-led approach to good design is likely to be required. In addition to the land required to construct a scheme it may be necessary to acquire additional land for planting and other landscape mitigation. The cost associated with additional land to provide landscape mitigation may pose a risk to the budget for a new scheme. The emerging business case for a scheme will need to consider the weight of public interest in the project against the landscape effects. **Environmental Opportunity and Policy Support:** The design should be developed in a way that is sympathetic to landscape character and quality, giving the opportunity to improve local landscape features such as woodland blocks and hedgerows to help screen transport infrastructure from the surrounding rural landscape. Features which could be enhanced include the restoration of adjacent hedgerows with native local species, by gapping up, planting hedgerow trees and developing transitional scrub communities between woodland and adjoining habitats to create a coherent, robust habitat network reflecting local field patterns.	

	Such measures should be carefully combined with engineering earthworks and other scheme ecological and landscape design measures to contribute towards the landscape integration and screening of the proposed works. **RAG Rating:** Overall, a **Red** rating has been given for both corridors; whilst there are landscape and visual constraints that are likely to cause substantially adverse impacts, these can potentially be resolved / mitigated but with possible implications for a project programme. A landscape-led approach to design is likely to be required. Whilst the Purple Corridor is shorter and therefore has potential to affect slightly fewer receptors, the corridor still has a large extent and so remains a **Red** RAG rating. Whilst significant effects would be anticipated from the construction of a new road within a rural area, a good design approach from the outset may reduce the impacts and minimise the landscape intrusion. Further assessment of scheme design will need to be undertaken to determine the location of the route to assess the impacts on the surrounding landscape and the change in views.	
3.4 Biodiversity	**Environmental Risk and Potential Policy Conflicts:** There may be conflicts with the policy of the NPSNN. There is potential for direct and indirect effects upon all the designated areas within the study corridors due to the scale of a scheme. There would be considerable uncertainty with regard to the potential success of measures to mitigate effects upon these statutorily designated sites. It is likely that detailed survey would be required to inform the development of mitigation proposals. Locations of local non-statutory designated sites and trees which may be impacted are also currently unknown. There is the potential for localised direct or indirect effects on notable woodland, grassland, hedgerow and aquatic habitats, habitat of principal importance under section 41 of the Natural and Environment and Rural Communities (NERC) act. The South Pennine Moors Special Area of Conservation (SAC) and The South Pennine Moors Phase 2 Special Protection Area (SPA) are overlapping sites of International importance covering large areas. A section of each designated site is located in the centre of the West Corridor north of Bradford and spans across most of the West Corridor. None of these international sites are designated for bats. Seven SSSIs are located within the western corridor (i.e. Orange and Purple combined);, Eccup Reservoir SSSI, Breary Marsh SSSI, Hetchell Wood SSSI, Norwood Bottoms SSSI, Bingley South Bog SSSI, Trench Meadows SSSI, and the South Pennine Moors SSSI. The South Pennine Moors SSSI corresponds with the boundaries of the South Pennine Moors SAC and The South Pennine Moors Phase 2 SPA, There are two single additional SSSI in close proximity to the Orange Corridor, Tadcaster Mere SSSI and East Keswick Fitts SSSI. There are no further statutory designated SSSI's within the study corridor of the Purple Corridor. There are 8 Local Nature Reserves across the study corridors. There are areas of ancient woodland within all study areas. Predominantly the main notable habitats along the route are upland heathland, grass moorland, floodplain grazing marsh, broadleaf and mixed woodland, unimproved grassland, hedgerows and potential other habitats of principal importance. These habitats have the potential to support a range of legally protected and other notable fauna and flora species, including bats, birds and invertebrates. Standard mitigation measures would be implemented which may involve the adoption of best working practices to maintain water supply and quality near watercourses, such as pollution prevention controls to avoid indirect impacts on the designated sites; however detailed mitigation proposals would need to be developed to ensure compliance with policy. Additionally, the current RIS period from 2020	

	aims to achieve no-net loss in biodiversity. Areas located adjacent to a new scheme may need to be considered for ecological compensation to meet biodiversity objectives and ensure compliance with relevant policy. The Orange and Purple Corridor have the potential for both direct and indirect effects only on the designated sites as there may be a need to acquire private and public land as a result of a new scheme. It is currently anticipated that the total area of land take will be confirmed at a later design stage. Duration, programming and cost of ecology surveys, protected species licencing, mitigation design and construction are a consideration for both options. Consultation with Natural England should be undertaken at an early stage and may pose a risk to the programme. It may be necessary to provide substantial biodiversity compensation for the loss of any priority habitat which may present a risk to the programme for a scheme. Each option has the potential to generate direct and indirect effects at varying scales upon statutory and non-statutory designated sites, notable habitats (including deciduous woodland, unimproved grasslands, and wet heath). Standard mitigation measures would need to be implemented, and detailed mitigation proposals would need to be developed as appropriate. **Environmental Opportunities and Policy Support:** Potential to consider ecological mitigation and compensation design to realise beneficial effects, potentially achieving a net gain in biodiversity. Design route to avoid sensitive receptors where possible. **RAG Rating:** A Red rating has been given for both corridors due to the potential direct and indirect impacts on the designated sites which include SAC's, SPA's, SSSI's and LNR's as discussed in section 2 and potential for policy conflicts All options will result in the loss of mature vegetation and habitat along the corridors. It is anticipated that this effect could be reduced through good design and mitigation; however due to the scale of a new scheme, the impact will still be adverse. Further baseline surveys would be required. There is the potential for significant adverse effects, which may require compensation.	
3.5 Noise & Vibration	**Environmental Risk and Potential Policy Conflicts:** The introduction of new sections of road for both Purple and Orange corridors is likely to increase traffic noise levels at residential properties and other noise sensitive receptors along the new routes. Mitigation may be required to avoid significant adverse effects and conflict with policy such as the guidance laid out in the NPSE and the NPPF, due to the potential for the route to pass close to existing villages, in particular within the western section common to both corridors and the orange corridor in the east. Traffic re-routing from existing routes onto the potential scheme within both corridors may result in significant beneficial effects along these routes. However, increased traffic on sections of the route which use existing roads, and on affected routes along which traffic is drawn to the scheme may give rise to significant adverse effects. Duration and cost of traffic noise modelling should be considered at later PCF stages, along with supporting traffic modelling. Cost of potential mitigation, such as noise bunds/barriers or noise insulation at residential properties in close proximity to a scheme. Both options have the potential to result in adverse operational noise effects at residential properties and other noise sensitive receptors, though this is likely to be limited to receptors in close proximity to the routes. There is the potential for significant changes in nigh time noise particularly in rural areas. Some properties could qualify for insulation under the Noise Insulation Regulations depending on the predicted noise levels. Traffic may be brought nearer to residential properties within the study corridors. **Environmental Opportunities and Policy support:** The use of, screening bunds/barriers and low noise surfacing may reduce	

	adverse impacts. These measures may also allow beneficial effects to be realised along sections of the scheme which include modifications to existing roads. Benefits may be realised along affected routes from which traffic would re-route onto the scheme, potentially including NIA. During construction, nearby sensitive receptors are likely to experience some level of temporary noise (and possibly vibration) effects which will be highly adverse due to the scale of a scheme in a predominantly rural area. With the implementation of careful and sensitive scheduling of works, best practice mitigation measures and legal requirements for construction works, impacts could be reduced. Design route to avoid sensitive receptors where possible. **Rag Rating:** An **Amber** rating has been given for both corridors as they will move traffic close to sensitive receptors along the route and effects may be significant requiring additional design or mitigation.	
3.6 Road Drainage & the Water Environment	**Environmental Risk and Potential Policy Conflicts:** Due to the scale of a new scheme, it is uncertain whether there will be conflicts with planning policy. A Flood Risk Assessment (FRA) will be required for each corridor due to the size of the development and the potential for it to affect fluvial flood zones 2 and 3 (and potentially other sources of flood risk) under the requirements of the NPS (how impacts on the water environment affect decision-making process). There is potential for a scheme to be designed outside of Flood Risk Zones; however, there will need to be further assessment on the potential impact and how to avoid areas of higher flood risk where possible. Any loss of flood storage capacity must be compensated for by providing equivalent flood storage capacity following construction. Highway runoff will also need to be attenuated. Numerous watercourses may be crossed and thus there is the potential to introduce new sources of urban pollutants. Many of these watercourses (as well as groundwater) are Water Framework Directive (WFD) waterbodies and new development must not cause deterioration or prevent improvement in order that policies are not conflicted. Some of these watercourses may be associated with designated nature conservation sites or be a source of water for abstraction. All attributes of these watercourses must be considered when determining their importance and the need for treatment and spillage containment measures. A water quality risk assessment will be required for the corridors to determine the impact of road runoff and the pollution risk to receiving water bodies. An assessment of the existing risk from routine runoff and spillage potential from existing road catchments should also be undertaken as for the roads the provision of new treatment measures could be a benefit. Excavations, new cuttings and foundation construction could introduce new pollutant pathways to groundwater, require temporary or permanent dewatering, or alter groundwater levels and flows. The implications of this on any water abstractions or groundwater dependent terrestrial ecosystems will need to be assessed. New development must be compliant with the objectives of the WFD, including the River Aire, River Wharfe and their tributaries. Development must not cause deterioration or prevent improvement, and where possible should support improvement. The scheme may also require a crossing of the Leeds-Liverpool Canal. It is important that the design of new watercourse crossings takes into account the hydromorphology of the watercourse and suitable designs are proposed that minimise impacts where possible. Clear-span bridges should be proposed other than where sufficient justification can be made for more impacting designs (i.e. culverts). Early consultation with the Environment Agency, Lead Local Flood Authority and the Canals and Rivers Trust (CRT) is recommended. Scheme design will need to take into account areas of flood risk to ensure that there would be no loss of flood storage capacity or impede flow of flood water. It may be necessary to acquire additional land to	

	provide compensatory flood water storage capacity. Any changes in the rate and volume of highway runoff also needs to take account of fluvial flood risk. Flood risk modelling, the acquisition of the land and creation of flood water storage areas poses a risk to the programme and budget. There is also the potential to increase the risk to surface and groundwater quality and hydrology from all options. Adequate space will be required for the provision of sustainable vegetated treatment systems. If the route is sufficiently close to Leeds-Bradford Airport or along the flight path for aircraft taking-off or landing, safeguarding requirements may influence the type and design of sustainable treatment systems (especially ponds and wetlands). Consideration of the potential impact to the hydrology of surface or groundwater dependent terrestrial ecosystems is also required. Any works above the navigable River Aire or the Leeds-Liverpool Canal affecting structures or requiring new land will require permission from the CRT. **Environmental Opportunities and Policy Support:** There is an opportunity for all options to integrate sustainable drainage systems into the design to provide improved management of surface water runoff, treatment and spillage containment, where these do not exist or are sub-standard. Areas set aside for new flood water storage present an opportunity to provide areas of biodiversity enhancement. There may be other opportunities for environmental enhancement supporting meeting water quality objectives yet not identified. Design route to avoid sensitive receptors where possible. **Rag Rating:** A **Red** rating has been given for the Orange Corridor and the Purple Corridor, as they crosses a number of watercourses and flood risk areas which will require additional consideration during the design and assessment of a new scheme.	
3.7 Population and Health	**Environmental Risk and Potential Policy Conflicts**: Due to the scale of a new scheme, it is uncertain whether there will be conflicts with planning policy with regards to population and human health. There is a risk that a scheme could potentially affect population and human health. A scheme would introduce a new road across a large area which would increase traffic in isolated rural areas and impact small villages and agricultural properties and farmland There are various PRoW and cycleways across the corridors which would be impacted during construction and operation and this may be in direct conflict with the NPS e.g. new road schemes such address the needs of non-motorised users and prevent the road network acting as a barrier Nearby residential properties will be impacted by construction, e.g. noise, dust and temporary diversions). Post construction, some impacts will be permanent e.g. visual intrusion. It is likely that the Orange Corridor will have a larger impact on population and health than the Purple Corridor as it is slightly longer and runs through a more rural area. It is unlikely these would be affected by the route as there is a wide scope for a good approach to route design; however, mitigation would need to be incorporated into the design to prevent adverse effects on population and health including extra noise, dust from traffic along the route and other air pollutants. The assumption is that a new road would not go through existing urban areas where possible. Good design and mitigation measures are likely to be needed to ensure public services including doctors and dentists are not impacted by the construction or operation of a new scheme. Access to these types of public amenities may be improved by a scheme, with the potential for beneficial effects. Duration, programming and cost of Walkers, cyclists and horse rider (WCHAR) surveys and consultation with stakeholders should be considered at later PCF stages. The closure of PRoW and cycleways could pose a risk to the programme for the project. The risk to the budget and programme associated with the acquisition of land to facilitate the proposed development.	

	Environmental Opportunity and Policy support: Potential to improve upon the existing PRoW and cycle network and provide new routes in the study area to ensure safety is maintained and optimum connectivity between communities / settlements and community settlements including healthcare providers is supported. The proposals may alleviate congestion for services including ambulance and fire engines. Design route to avoid sensitive receptors where possible. **RAG Rating:** An **Amber** rating has been given for both corridors due to the potential introduction of a new road impacting a high number of receptors in the area. This will require additional consideration during the design and assessment process.	
3.8 Geology & Soils	**Environmental Risk and Potential Policy Conflicts:** A new scheme may conflict with national planning policy in regard to the potential 'loss of best and most versatile' agricultural land (BMV). This is particularly relevant to the Orange Corridor which includes a larger area of Grade 2 land. It will be a requirement that the works are undertaken in a manner that employs best practice construction methods such that risk associated with land contamination and ground stability will be appropriately managed in accordance with national legislative requirements. Potential to encounter made ground or contaminated soils during Site Investigations/construction leading to remediation and/or higher disposal costs and impacts on the construction programme. Potential delay if loss of BMV is opposed. It is anticipated that a new scheme will result in potentially significant impacts as related to geology and soils. This is due to the scale of the project with the potentially to impact and disturb Grade 2 and 3 land. The risks associated with land contamination and ground stability are required to be appropriately managed in accordance with national legislative requirements. The overall grade of land ranges between Grade 2 and Grade 4 land. As Grade 3a land and above is classed as 'best and most versatile' agricultural soils; a scheme may have a significant adverse effect on the soils through both construction and operation. Alleviation and mitigation measures will need to be incorporated into scheme design to protect the areas with a higher grade of ALC to reduce the scale of the potentially adverse effects. **Environmental Opportunities and Policy Support:** Design route to avoid sensitive receptors where possible. Scheme design would need to incorporate mitigation measures to avoid decreasing the quality of the soils in the surrounding area. **RAG Rating:** A **Red** rating has been given to both corridors due to the loss of Grade 3 agricultural land and potential policy conflict. The loss of BMV would likely be a key consideration for the decision maker in later stages, and therefore the scheme is likely to have to consider the loss of BMV much earlier in the optioneering stages than projects may have previously done, to demonstrate that the route decision has given enough weight to the economic impact of farmland loss, and the loss of soils in line with the NPS.	
3.9 Material Assets and Waste	**Environmental Risks and Potential Policy Conflicts**: Due to the scale of a new scheme, it is uncertain whether there will be conflicts with planning policy with regards to waste and materials policy. There are a large number of historic waste management facilities, operational waste facilities and several areas designated as mineral safeguard areas within the study corridor. The likely impacts on historical waste facilities and MSA's is deemed low but on operational facilities this is deemed a medium risk as it is likely these facilities will need to be utilised during any construction works. There may be a requirement to either import or export fill materials (subject to design), in which case due to the scale of the project it is likely that the quantities of material required or produced will be large.	

	Scheme design should aim to minimise the use of materials and follow the waste hierarchy by minimising waste generation, recycling or recovering waste where feasible, and reducing where possible the need for waste disposal. The earthworks associated with the scheme should aim to achieve a cut / fill balance to avoid the need to import or export material during the construction of a new scheme. Where possible the construction should make use of products made from secondary and recycled materials. Where practicable, construction materials should be sourced from locations close to the scheme e.g. aggregate, tarmac and drainage products e.g. pipework. Non adherence to the waste hierarchy and utilising high volumes of virgin material would conflict with NPPF with regards to minerals. The criteria of significance for waste management relate to regional landfill capacity and the quantity of waste that would be generated by the project. It is not feasible to estimate potential impacts at this early stage since waste quantities are not known. Identification of landfill and other waste management capacity within the region would be carried out as part of the baseline assessment during subsequent environmental assessment. In terms of regional targets, and assuming these relate to the targets for use of secondary and recycled aggregates, in a similar fashion the potential for use of these materials cannot be determined at such an early stage in the design but these should be considered. Made ground or waste materials could be encountered during construction which will require excavation and suitable treatment or disposal. This presents a risk to the programme and budget for a scheme. **Environmental Opportunities and Policy Support:** To make use of materials within the footprint of a scheme such as soil generated during the earthworks. This presents an opportunity to reduce the use of virgin soil and aggregate materials required during the construction phase. Design route to avoid sensitive receptors where possible. **Rag Rating:** A **Green** rating has been given due to the number of MSA's and the volume of materials needed for construction. The design has the potential to avoid / mitigate the historic landfill sites or affect existing mineral sites.	
3.10 Climate (resilience and greenhouse gases)	**Environmental Risks and Potential Policy Conflicts:** Whilst there will be reduced congestion on existing routes resulting in slight to negligible improved fuel efficiency and associated reduction in Greenhouse Gas (GHG) emissions on existing routes; it would be expected that this new route may well result in mode shift with increased road journeys and a consequently increased user greenhouse gas (GHG) emissions. The impact on the existing overall UK GHG baseline would be expected to be low, in line with other similar projects. However, this is becoming an increasingly high profile policy issue, and due consideration to the justification of increases in GHG in light of UK targets will be required. There will also be associated loss of carbon sinks associated with the land take for the new road. Emissions of greenhouse gases are expected associated with the construction phase particularly associated with plant and use of materials with high embodied carbon content (e.g. concrete). Given the length of the road, this could a result in a significant amount of GHG emissions albeit only over a short period associated with construction. **Environmental Opportunity and Policy Support:** Sustainable construction techniques and use of recycled materials with a lower embodied carbon will reduce the carbon impact associated with construction. **Rag Rating:** A new scheme is unlikely to result in a significant change in the resilience of the surrounding environment to climate change other than that associated with drainage and flooding which will be considered as part of any flood risk assessment. However, it is anticipated that the new road will increase the journeys made within	

	the study boundary and therefore increase emissions in the area. As a result, an Amber rating has been given for both options. The scheme may lead to an increase in traffic across a rural area. This may lead to an increase in emissions and an adverse contribution to climate change despite the UK target of net zero by 2050 which could be a consideration in decision making later. Congestion will be alleviated on surrounding local routes. Therefore, both corridors are given an **Amber** RAG rating.	
3.11 Design	**Environmental Risk and Potential Policy Conflicts:** Provided Highways England principles of good road design are employed, then it is unlikely that there will be any significant conflict with the policies discussed in section 2. The scheme design team should work collaboratively as part of a design panel to maximise any opportunities to provide mitigation and enhancements within scheme design. This might include biodiversity enhancements, landscape mitigation and enhancements, flood storage and resilience measures. The route of a new scheme passes through environmentally sensitive areas and as such the design for a scheme will need to incorporate the principles of good design, and suitable measures to mitigate the impacts of the scheme including the potential for any increase in pollutant concentrations and noise at sensitive receptors in close proximity to a scheme. The risk of an adverse increase in GHG emissions could lead to exacerbations of the NO2 annual average objective / limit value. Archaeological investigations, suitable hard and soft landscaping, SuDS, flood storage and ecological features to provide biodiversity enhancements should be included in the design. Additional land adjacent to the study area may be required to provide these features. Additional time should be included in the programme along with budget to provide for the discussions, design and inclusion of these features and measures. Potential for additional time to be included in the programme along with budget to design suitable mitigation measures for noise, road drainage and the water environment, land use and ecological concerns which may require the involvement of stakeholders. Allow additional time and budget for the design of mitigations which may include archaeological investigations and reporting, the design of landscape mitigation, consideration of flood risk and providing biodiversity enhancements. Consultation may be required with landscape, flood risk, cultural heritage and ecological consultees. **Environmental Opportunity and Policy Support:** Opportunity to enhance the surrounding environment through good road design which takes environmental issues into account at an early stage of the project to deliver SuDs and biodiversity enhancements by integrating different types of mitigation during the design of a new scheme. **RAG Rating:** A **Green** rating has been assigned on the basis that good design will be engaged from inception of the project thus minimising, where possible, effects.	

Part 4: Summary

4.1 Environmental Impact Assessment (EIA) likely to be required?	The scale of the project and location of sensitive receptors means that this project is highly likely to be EIA development as defined by the Infrastructure Planning (EIA) Regulations 2017.
4.2 Is a Habitat Regulations Assessment (HRA) likely to be required?	There are International designated sites within the study corridors, and the potential for these to be directly or indirectly affected by a new scheme. An HRA screening assessment will therefore at least be required to determine if a further detailed Appropriate Assessment is required. The Appropriate Assessment would provide detailed baseline information, include (where appropriate) mitigation or compensation measures and evaluate the likelihood of a significant adverse effect upon the qualifying features of the International sites.

4.3 Difficulties encountered in obtaining environmental information and constraints in undertaking assessments	This Preliminary Environmental Risk Assessment is based on a high-level data review using publicly available datasets, without site survey or modelling. The preliminary environmental risk assessment has been focused on wide 8 km corridors in which a potential route could be located in future PCF stages. There is uncertainty around the design and specific location of a future scheme. At this stage the assessment has remained proportionate to the level of certainty. This uncertainty has made it difficult to specifically identify which environmental receptors are directly and indirectly at risk, and the magnitude of impacts that may be experienced by these receptors. Further detailed assessment of these impacts would be required in future PCF stages as route options are developed.

4.4 Summary of policy and physical environment risks and opportunities

Option	Confirm the RAG rating for each environmental factor per solution identified and provide an overall rating											
	Air Quality	Cultural Heritage	Landscape	Biodiversity	Noise & Vibration	Road Drainage & the Water Environment	Population and Health	Geology & Soils	Material Assets and Waste	Climate (resilience and greenhouse gases)	Design	Overall RAG rating
Orange Corridor												
Purple Corridor												

Figure 1: Environmental Constraints – Purple and Orange Corridors