

South Bristol Link

NATA Assessment - Environment

March 2010

Bristol City and North Somerset Councils

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Transport Planning
Wilder House
Wilder Street
Bristol
BS2 8PH

Mott MacDonald, Stoneham Place, Stoneham Lane, Southampton SO50 9NW, United Kingdom
T +44(0) 23 8062 8800 F +44(0) 23 8062 8801 W www.mottmac.com

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Mott MacDonald, Stoneham Place, Stoneham Lane, Southampton SO50 9NW, United Kingdom
T +44(0) 23 8062 8800 F +44(0) 23 8062 8801 W www.mottmac.com

Content

1. Introduction

1.1 The South Bristol Link project (SBL) is one of a number of major schemes being promoted by the West of England Partnership. The West of England sub-region covers the area of the four unitary authorities of Bath and North East Somerset, Bristol, North Somerset and South Gloucestershire. Bristol City Council (BCC) and North Somerset Council (NSC) are jointly promoting this Scheme.

1.2 The local objectives of the SBL are:

- To facilitate regeneration and growth in South Bristol;
- To reduce congestion in South Bristol; and,
- To improve accessibility from South Bristol to the city centre and to strategic transport links, including the trunk road network and Bristol International Airport [BIA].

1.3 The Scheme

1.3.1 BCC, NSC, Bath and North East Somerset Council, the West of England Partnership, Atkins and Mott MacDonald have undertaken extensive optioneering work for the SBL to date. Over 20 route options were originally considered for the Scheme including Highway options, Quality Bus Corridors, Bus Rapid Transit, Rail and Park and Ride.

1.3.2 Following on from the recommendations of the Greater Bristol Strategic Transport Study (GBSTS, Atkins, 2006), the Scheme promoter has (with support from the South West of England Regional Development Agency [SWRDA]):

- Reviewed the evidence base (not only GBSTS, but also previous studies on transport issues in this area);
- Developed a 'long-list' of potential options;
- Built a transport model to compare options;
- Distilled the long-list of options down to a 'short-list' of 5 options by considering how they performed against the project objectives and whether they would be deliverable and fundable;
- Compared, appraised and reported on the performance of the 5 options using Department for Transport [DfT] criteria;
- Consulted with the public and stakeholders (November 2008 to March 2009, with a second phase in November 2009 for the Preferred Option) and reported on the opinions received; and,
- Collected additional data to update the transport model.

1.3.3 The project has now reached the stage where more detailed appraisal is required in order to develop a bid to the DfT for funding. This bid is programmed for submission in March 2010 and would be a bid for Programme Entry. If successful, the bid would trigger detailed design and planning permissions required to build the Scheme.

1.4 The Preferred Option

1.4.1 The Preferred Option (the Scheme), which is taken forward for more detailed appraisal at this stage, is identified on Figure 1 of Appendix A. The Scheme would commence at a junction on the A370 to the south of Long Aston Park and Ride. It would cross open farmland to the west of this location, before passing under the railway line at the existing underpass location. The route would then rise through steeper terrain to a junction on the A38 north of Castle Farm, passing through Colliers Brook and between Hanging Hill Wood to the west and a Site of Nature Conservation Interest (SNCI) to the east. The Scheme would then cross more open land, before traversing the corner of Highridge Common and entering the urban fringe. The alignment would then run along King George's Road to its junction with Queens Road, continuing through a safe-guarded corridor to join the roundabout at the western end of Hengrove Way.

1.4.2 The Scheme would comprise a single carriageway highway option with additional lanes on approaches to junctions dedicated to turning traffic. Integral improvements to pedestrian and cycle networks due to dedicated cycleways and footpaths running the full length of the route would also be included. The Preferred Option would combine rapid transit with a single carriageway road. The rapid transit link would join another proposed rapid transit scheme between the Ashton Vale Park and Ride site and Bristol city centre. The rapid transit link would include integral cycle and pedestrian facilities for its full length. Initially the rapid transit link would be in the form of a segregated guided busway between the Park and Ride site and the A38. To the east of the A38 the public transport link would continue as centrally located bus lanes. The proposed new road would join the A370 to the south west of the Park and Ride site and merge with the rapid transit link at chainage 800m. The Link would continue eastwards passing under the Bristol to Weston-super-Mare railway line before rising to the A38. A climbing lane will be provided for eastbound traffic between the railway line and the A38. At the east end of the Link the new road and bus lanes would merge with the existing A4174, Hengrove Way."

1.5 Methodology

1.5.1 This report presents the NATA assessment for Environment Impact. The methodology for assessment is the DfT's website for guidance on the conduct of transport studies (WebTAG).

1.5.2 WebTAG allows the appraisal of transport options against 10 environmental sub-objectives. The 10 sub-objectives assess impacts on the built and natural environment, and on people. They are:

- Noise;
- Local Air Quality;
- Greenhouse Gases;
- Landscape;
- Townscape;
- Heritage of Historic Resources;
- Biodiversity;
- Water Environment;
- Physical Fitness; and,
- Journey Ambience.

1.5.3 Environmental constraints within a 2km study area of the Scheme are presented on Figure 1of Appendix A.

1.5.4 The Noise, Air Quality and Greenhouse Gases sub-objectives have assessed the proposed Scheme in terms of the Do-minimum scenario (without the Scheme) and Do-something scenario (with the Scheme) with the assessment years set at 2009 (Baseline) and 2017 (Opening Year) and 2031 (Design Year).

1.5.5 The Appraisal Summary Table (AST) is presented in Appendix B with the associated worksheets contained in Appendix C.

2. Landscape and Townscape

2.1 Introduction

2.1.1 This Scheme has been appraised using the principles of WebTAG guidance 3.3.7 and 3.3.8, focusing on both Landscape and Townscape Sub-objectives.

2.1.2 The study has been informed by the Countryside Agency's Landscape Character Assessment for the area, supported by the relevant county level Character Assessment, North Somerset Landscape Character Assessment (NSC, 2005).

2.1.3 Landscape encompasses many more elements than the common association which focuses merely upon the view or appearance of the land. The notion of landscape can be applied to both rural and urban environments with the term townscape frequently adopted within the urban context. From the perspective of Environmental Impact Assessment, 'landscape' apples to: physical elements such as topography, drainage, land use and management and vegetation; as well as ecology; and historical and cultural associations. All of these elements have been considered within the appraisal.

2.1.4 Townscape, as with landscape, encompasses the physical elements, patterns and social and cultural understandings of a built-up area. For the purpose of the study, townscape relates to the urban area on the south western edge of Bristol where the Scheme would pass through the residential areas of Hartcliffe and Bishopsworth. Where the Scheme would cross the unitary boundary with North Somerset, it has been appraised under the landscape sub-objective

2.2 Baseline conditions

2.2.1 The Scheme would pass through landscape varying in local character. All of the Scheme would sit within National Character Area 118: Bristol, Avon Valleys and Ridges. The county level Character Areas associated with the Scheme, as established by North Somerset District Council, include Character Area B1: Land Yeo and Kenn River Floodplain; and J4: Colliters Brook Rolling Valley Farmland.

Townscape

2.2.2 The townscape scene for the area is common to much of the UK, with large areas of 19th and 20th century residential expansion forming a strong urban fringe to the south of Bristol City. The study area is dominated by 1930s semi-detached and detached residential properties with a small amount of infill architecture. Bishopswoth and Malago Conservation Area covers part of the proposed alignment. The local townscape is set over rising topography, encapsulated by a considerable ridge to the south of Bristol.

Landscape

2.2.3 The landscape is characterised by a low lying floodplain within surrounding rising land. The settlement of Ashton Vale to the east of the area forms the urban fringe. Small scale irregular field patterns are interspersed with patches of woodland and screening vegetation around the periphery of the Long Ashton Park and Ride. A reasonably extensive footpath network traverses

the landscape, linking Bristol's southern fringe with smaller settlements of Long Ashton and Yanley.

2.3 Impacts

Townscape

2.3.1 As the proposed Scheme would pass through a well populated suburban residential area, there would be impacts upon both the local townscape character and the visual amenity value. This is particular important given the number of residential properties which would be considered as key receptors. Given the width of the proposed road, the new Scheme would have greater dominance within the landscape than existing road network. Impacts of the Scheme would include a change in the urban grain of the townscape, as well as scale, land use and human interaction.

Landscape

2.3.2 Despite the presence of an existing transport network including road, rail and Park and Ride facilities, the proposed Scheme would further fragment the landscape, degrading levels of both audible and visual tranquillity and landscape character as a whole. Given the varying topography and open nature of the landscape, views to the Scheme would be afforded, which would have an adverse impact on key receptors within local settlements.

Mitigation

2.3.3 Wherever practicable, effort should be made to follow existing road layout, keeping road infrastructure to a minimum. Vertical and horizontal alignments should be considered to keep visual intrusion to a minimum. Screening vegetation should be planted where appropriate.

2.4 Overall Assessment Score

2.4.1 The overall assessment score is considered **Moderate Adverse** for Landscape and Townscape (refer to Appendix C.1).

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3. Heritage of Historic resources

3.1 Introduction

3.1.1 The Scheme has been appraised using the principles of WebTAG guidance 3.3.9 Heritage of Historic Resources Sub-objective. The Heritage of the Historic resource (Heritage resource) broadly comprises archaeology, built heritage and the historic landscape.

3.1.2 The assessment of effects to the heritage resource presented here takes into account both the known (i.e. recorded) resource and also the potential resource. In this instance, the potential resource relates to the possibility for additional, previously unrecorded archaeological remains to survive within the footprint of the Scheme.

3.2 Baseline conditions

3.2.1 Baseline data was collated from the North Somerset Historic Environment Record, the Bristol Sites and Monuments Record and English Heritage online datasets within a 1km wide study area centred on the proposed Scheme. Additional baseline information, including the results of recent archaeological surveys, within the study area was obtained from the Ashton Park Environmental Statement, Cultural Heritage Chapter (Land Trust Developments 2009).

Archaeological resource (known and potential)

3.2.2 The Scheme alignment does not correspond with the location of any known archaeological sites or finds. There are no designated archaeological sites or monuments within the study area, nor any other archaeological sites of national importance. The recorded archaeological resource ranges in date from the Neolithic to the Second World War and totals 118 records (excluding archaeological investigations). Overall, the recorded resource within the study area is of local importance (as of December 2009). The nature of the potential archaeological resource is informed by the following:

- Artefact based evidence for prehistoric activity;
- Recorded medieval resource characterised by the remnants of the medieval settlement pattern and industry surviving within the later partially suburban landscape; and,
- Early medieval settlement favouring the higher ground overlooking the Colliter's Brook.

3.2.3 Potential archaeological remains, where present, would likely relate to prehistoric or later settlement activity, with possibly more potential on the gravel and alluvial deposits in the region of the Long Ashton Park and Ride. Evidence for agrarian practices dating from the medieval period onwards is also likely to be present. Deposits associated with watercourses may contain palaeoenvironmental information relating to the environmental development and anthropogenic activity.

3.2.4 Survival of remains is likely to be variable. No survival is anticipated in areas of existing highway. Historic ploughing will have compromised survival in agrarian areas. Land between chainages 1400 to 1600 and 1700 to 1800 (refer to Figure 1 of Appendix A) is considered to be archaeologically sterile due to previous quarrying and landfill activities.

Built heritage (Listed Buildings, Conservation Areas)

3.2.5 There are 41 Listed Buildings within the study area, of which only one is located in close proximity (within *c.*75m) of the Scheme. Castle Farm (Listed Building Schedule Number 33495; National Grid Reference 355753, 168968) is a two story Grade II Listed Farmhouse of 19th century date, set back from the A38 and bounded to the north and west by a farmyard and farm buildings. The Listed Building is separated from the Scheme by hedgerow bounded pasture fields.

3.2.6 The Scheme is partially located within the Bishopsworth and Malago Valley Conservation Area. The Conservation Area incorporates the historic core of Bishopsworth to the north of the alignment. It includes Highridge Common, an area historically used as common land by the settlement of Bishopsworth, now surrounded by 20th century housing on two sides. The common is an important surviving component of the historic landuse and settlement patterns of the area, which is described as part of the Historic Landscape below.

Historic landscape

3.2.7 The existing landscape context of the study area is an undulating landform underlain by a predominantly Lias geology, with coal measures and fluvial gravel and alluvium in the area of Long Ashton Park and Ride.

3.2.8 The eastern half of study area is characterised by modern suburban development of Highridge, Bishopsworth and Hengrove. The western part of study area is predominantly pastoral land cover, with streams, springs, ponds and brooks. Fields are bounded by hedges with hedgerow trees. Settlement is clustered around the intersection between the main road and smaller rural roads.

3.2.9 Immediately adjacent to the north western end of the study area is the landscaped parkland of Ashton Court, included on the Register of Historic Parks and Gardens Grade II*.

3.2.10 To the west of Highridge, the landscape is predominantly an open arable and pasture fieldscape. The pattern of medium-sized irregular parcels of arable and pasture land appears to have been influenced by the undulating topography, survey planned enclosure and, in localised areas, the possible fossilisation of medieval open fieldscape. At Highridge and on Bedminster Down, two areas of common land represent survivals of historic land management. The integrity of the historic landscape is interrupted by modern insertions, such as the golf course south of Yanley and a number of current and former landfill sites. The main arterial routes of the A370, the A38 and the mainline railway traverse the study area. The pattern of earlier routes within the study area appear to traverse north-south, linking settlements on the high ground at Dundry with the higher ridge on which the settlement of Long Ashton is situated.

3.3 Impacts

3.3.1 Predicted impacts to the heritage resource resulting form the construction and/or operation of the Scheme are summarised as follows (refer to Appendix 1 for further details):

- Physical impacts - Adverse effects to the survival of physical form/fabric of the archaeological and historic landscape resource resulting from groundworks and earth movements associated with construction; and,
- Non-physical impacts - Adverse effects to the present context/setting of the extant built heritage resource (Conservation Areas and Listed Buildings) resulting form aural and visual changes associated with the Scheme operation.

Mitigation

3.3.2 Adverse effects to the archaeological resource could be successfully mitigated using standard industry techniques. Mitigation would be likely to take the form of 'preservation by record' as set out in PPG16 and local planning policy. The results of further archaeological surveys such as detailed desk-based analysis, geophysical survey and/or trial excavations within the footprint of the Scheme would inform the need for and scope of archaeological mitigation.

3.3.3 The mitigation of adverse effects on the historic landscape and built heritage resource is most readily achieved through sympathetic design. Where possible, the design should fit with the grain of the landscape, seek to retain existing areas of woodland and hedgerows. Where practicable the natural course of streams should not be altered and the line of historic boundaries and routeways retained. Where significant components of the historic landscape can not be retained provision should be made for their preservation by record, such as earthwork survey and/or photographic survey.

3.3.4 The scope and timing of mitigation would need to be decided in conjunction with LPA archaeologist.

3.4 Overall Assessment Score

3.4.1 The Scheme would not affect any designated heritage asset, although construction of the Scheme could result in physical loss of the potential archaeological resource. However, adequate mitigation to prevent and/or reduce the significance of the predicted effects can be specified using standard techniques. An overall **Slight Adverse** impact on the heritage of the historic resource is assessed (refer to Appendix C.2).

4. Biodiversity

4.1 Introduction

4.1.1 The Scheme has been appraised using the principles of WebTAG guidance 3.3.10 the Biodiversity Sub-Objective.

4.1.2 Baseline data has been collated from existing sources including the UK Biodiversity Action Plan (UK BAP), and the Joint Nature Conservation Committee (JNCC). Site habitat surveys and protected species surveys have been previously undertaken by Baker Shepherd Gillespie in 2009 for the Ashton Park Environmental Statement, which included both Phase 1 and Phase 2 surveys concentrating on the site and the land to the west. In addition, a Phase 1 Habitat survey, extended for European Protected Species, as well as Local Record Centre searches and National Biodiversity Network surveys have been undertaken by Mott MacDonald.

4.2 Baseline conditions

4.2.1 A 500m buffer zone of the route corridor has been appraised, with the exception of internationally designated Natura 2000 sites (Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and Ramsar sites), where a 2km buffer zone has been applied. In addition, SACs that are recognised as being important bat roosts have been considered within a 10km boundary of the works corridor.

4.2.2 The Scheme area is characterised in the north by a rural landscape, dominated by species poor and improved grassland, as well as arable fields surrounded by hedgerows interspersed by woodland blocks. To the south of the route the area is predominantly urban and residential.

4.2.3 There are a number of statutory designated sites that fall within the study area, to include internationally recognised Natura 2000 sites and nationally designated Sites of Special Scientific Interest (SSSIs) (refer to Figure 1 of Appendix A). These habitats support a wide range of species that are prioritised by the UK BAP for conservation of which there are records within the study area of otter *Lutra lutra*, great crested newt *Triturus cristatus*, bats (including greater horseshoe *Rhinolophus ferrumequinum*, lesser horseshoe *Rhinolophus hipposideros* and barbastelle *Barbastella barbastellus*), reptiles and birds (including Starling *Sturnus vulgaris,* house sparrow *Passer domesticus*, linnet *Carduelis cannabina*, skylark *Alauda arvensis* and song thrush *Turdus philomelos*). Additionally, habitat suitable for supporting populations of dormice *Muscardinus avellanarius* (UKBAP) has been identified along the route corridor, as well as badgers *Meles meles* (not UKBAP species).

4.3 Impacts

4.3.1 The Scheme would have no direct impact as a result of damage or disturbance for the majority of international and statutory designated sites for nature conservation. However, the Scheme proposals would require land take from the known foraging and commuting grounds of both greater and lesser horseshoe bats, which are primary reasons for the designation of the North Somerset and Mendip Bats SAC. Scheme impacts on this internationally designated site are therefore assessed as Large Adverse. However, with mitigation such as that detailed below, these impacts can feasibly be reduced to Moderate Adverse.

4.3.2 There is potential for the works to have a Large Adverse impact on European Protected Species and habitats within the proposed Scheme area. There are recent records of great crested newt, otter and a number of bat species identified within the Scheme limits. However, with suitable licences and appropriate mitigation this impact is likely to be reduced to Slight Adverse.

4.3.3 There would be a Moderate Adverse impact to the non-statutory designations of Colliters Brook Site of Importance for Nature Conservation (SINC) and Ashton Vale Fields SINC which the proposed Scheme runs through and adjacent to.

4.3.4 Hedgerows which are categorised as Important under the Hedgerows Regulations 1997 are expected to be affected as a result of the Scheme. Removal of these features of high importance within known lesser horseshoe bat foraging areas would result in a Large Adverse impact for Biodiversity. However, this impact can feasibly be reduced to Moderate Adverse with appropriate mitigation.

4.3.5 The Scheme is to be designed to resolve residual congestion on the strategic road network thus improving journey reliability, and as such there is expected to be a beneficial change in noise, vibration and air quality (refer to Chapters 8: Noise and 9: Air Quality). Due to the distance of the Scheme from the designated areas there is unlikely to be a significant indirect impact on the integrity of statutory designated sites for nature conservation and protected species within the route corridor from these sources.

4.3.6 All internationally designated sites within 2km of the site would require an Appropriate Assessment Screening Matrix under the Conservation (Natural Habitats, &c.) Regulations 1994 (As Amended). The matrix would determine the likely impact of the Scheme, identify the necessity for Appropriate Assessment and additional mitigation measures to reduce and/ or eliminate this impact.

Mitigation

4.3.7 Appropriate mitigation would act to reduce potential adverse impacts. Mitigation measures should include an ecological watching brief with works undertaken under appropriate licences. Land take would require compensation in the form of suitable habitat creation. In addition, Highridge Common is common land, and compensation beyond that required by the Habitats Directive may be necessary. The provision of alternative commuting and dispersal corridors such as replanted hedges and hop-overs would also act to reduce the impact to bats.

4.4 Overall Assessment Score

4.4.1 With the provision of appropriate mitigation, as detailed in Paragraph 4.3.7, the impact of the Scheme for biodiversity features is likely to be **Slight Adverse** (refer to Appendix C.3).

5. Water Environment

5.1 Introduction

5.1.1 The Scheme has been appraised using the principles of WebTAG guidance 3.3.11 The Water Environment.

5.2 Baseline conditions

5.2.1 The area studied for the Scheme has the following baseline attributes relating to the water environment:

- Surface water courses crossing or in close proximity to the Scheme include Pigeonhouse Stream, The Malago, Colliter's Brook & associated tributaries, Colliter's Brook Culvert, Colliter's Brook Relief Channel and Longmoor Brook.
- Colliter's Brook and The Malago are included on the Environment Agency's Draft River Basin Management Plan (RBMP) for Rivers as part of the Severn River Basin District. The ecological & chemical qualities of these streams have not yet been assessed but they both have a 'highly modified' hydromorphological status and are designated as "at risk" and "probably at risk" respectively.
- Colliter's Brook passes through Ashton Vale Trading Estate, and close to landfill site at Yanley and other landfill sites. These industrial sites may discharge to the stream.
- The Scheme would cross several areas designated as zones of flood risk by the Environment Agency including:
  - 'low' (<1/200 chance each year) flood risks relating to Pigeonhouse Stream, sections of Colliter's Brook and Longmoor Brook;
  - 'moderate' (<1/200-1/75 chance each year) flood risks relating to The Malago and sections of Colliter's Brook and Longmoor Brook, and;
  - 'significant' (>1/75 chance each year) flood risks relating to sections of Colliter's Brook and Longmoor Brook.
- The Scheme would mainly pass over non-aquifer rock, though it crosses a minor aquifer with soil of a High (Urban) classification at the connection to Hengrove Way and with Intermediate 1 classified soil at Yanley and close to the A370. There is also a small area of minor aquifer with soil of a low leaching potential near to the A370.
- The Scheme location would be approximately 2 kilometres from a Source Protection Zone (Inner Zone).
- Groundwater in the area is included on the RBMP for Groundwater as part of the Severn River Basin District.
- According to the Soilscape Maps, the majority of soils in the area are loamey or clayey with impeded drainage, particularly to the north of the railway line where seasonally wet pastures are indicated.
- The Scheme would cross several historic and active landfill areas which accepted a variety of household, commercial, industrial and special waste. These include Hartcliffe Way Landfill, Castle Farm/Stones Landfill, Yew Tree Farm/Yanley Landfill, Yanley Lane Landfill,

South Liberty Lane Brickworks Landfill, Viridor Land Ashton Landfill and the Ashton Gate Landfill.

- The Link road and BRT would pass in close proximity to several small ponds. A few of these are related to the waste industries, whilst others are natural. There is no link to the Site of Special Scientific Interest (SSSI) at Ashton Court Estate. The SSSI is designated for its underlying geology and invertebrate fauna and is therefore not connected to the water environment.

Mitigation

5.2.2 Potential water quality and drainage impacts, either generated or exacerbated by the proposed Scheme can be mitigated by limiting surface water runoff rates and volumes to those from the site prior to development and taking climate change into account. This can be achieved through the use of Sustainable Drainage Systems (SUDS) where suitable. The principle of SUDS is to maintain, as far as possible, the original drainage pattern of the site, catchment topography, ground conditions and the location of discharge points. These may include drains, swales, soakaways, reed beds and detention ponds.

5.2.3 However, such infiltration drainage would not be considered suitable in areas of landfill and at such locations surface water runoff should remain separated from filled materials to protect underlying groundwaters.

5.2.4 Drainage systems should provide a level of containment should accidental spillage occur. This may include the use of a detention/retention pond and penstock system. In addition, and during construction, appropriate measures should be adopted to avoid contamination of watercourses by silt or materials used in construction. A Construction Environmental Management Plan (CEMP) should be employed during construction detailing the reasonable and precautionary steps to be taken for the prevention of pollution of the water environment.

5.3 Impacts

5.3.1 Any drainage discharged to surface water bodies may decrease surface water quality through both diffuse pollution and accidental spillage. Two surface water bodies in the area are designated as ‘at risk’ – Colliter’s Brook and The Malago. The Scheme would cross several water courses which would require culverting/bridging, which could result in disruption/alterations to surface water flows and potential water quality impacts. Any groundwater drawdown as a result of the Scheme has the potential to impact surface water flows. Biodiversity may be adversely impacted, although water courses in the area are generally highly modified.

5.3.2 The Scheme would cross several areas of Environment Agency designated flood zones with chances of flooding varying from low/moderate in the eastern and central areas to moderate/significant in the northern area. The creation of additional hardstanding and the increased speeds and quantities of surface water runoff have the potential to exacerbate flooding in these areas. In addition, the underlying soils predominantly have impeded drainage and are seasonally wet in the north, meaning the use of infiltration drainage/SUDS may be problematic.

5.3.3 From road construction it is likely that subsoil cover would be removed and areas of shallow aquifer in superficial deposits excavated. This can lead to a drawdown in groundwater levels in

areas of cuttings and excavations which has the potential to impact seasonally wet habitats. Any drainage discharged via infiltration may decrease groundwater quality through both diffuse pollution and accidental spillage. The construction of additional hardstanding could result in a reduction in aquifer recharge. The proposed link would also cross several landfills and the disturbance of landfill material has the potential to generate/release contaminated leachates to underlying groundwaters.

5.4 Overall Assessment Score

5.4.1 The Scheme would have a **Slight Adverse** impact on the water environment (refer to Appendix C.4).

6. Physical Fitness

6.1 Introduction

6.1.1 The Scheme has been appraised using the principles of WebTAG guidance 3.3.12 Physical Fitness.

6.1.2 The physical sub-objective focuses on the potential health benefits of increased non-motorised travel associated with a Scheme. Improved pedestrian and cyclist facilities and linkages should provide opportunities for residents, local employees and tourists to cycle and walk.

6.1.3 The impact on physical fitness is assessed in terms of the number of travellers walking or cycling who exceed a 30 minute level of activity threshold. Distance and journey times were not calculated for the appraisal and instead, a subjective assessment has been made of the changes in opportunities for increased physical activity based on a desk top study.

6.2 Baseline conditions

6.2.1 There are a number of amenities located within 500m of the proposed route corridors within the urban areas of Hartcliffe, Withywood and Highridge, including schools, play areas, community centres, allotment gardens, games courts, surgeries, nursing homes, super stores, a bowling green and tennis courts, care homes and Woodspring Golf and Country Club. In addition, there is a traffic free cycle route connecting Headley Lane with Bishopsworth Road and another cycle route connecting the A4174 with Hengrove Way. There are also a number of National Trails and footpaths in the Yanley area and several bus routes within the urban area.

6.3 Impacts

6.3.1 The Scheme would have a Moderate Beneficial impact on the physical fitness of travellers as a result of the additional cycle route provided. The cycle route would link in with the existing cycle routes in the area such as the traffic-free cycle route between Headley Lane and Bishopsworth road and between the A4174 and Hengrove Way so as to create a more coherent and accessible cycle network. The Scheme would provide a direct link to the Long Ashton Park and Ride, allowing easy access to the town centre with secure areas for bicycles to be left. This would encourage local residents from areas such as Bishopsworth and Highridge to use the Scheme as an artery for direct access to the town centre and local amenities, without being reliant on the car.

6.3.2 The Scheme would also facilitate longer excursions into the surrounding countryside such as the Ashton Court Country Park. The provision of a more direct route would reduce journey times so encourage more of the public to use it. The added safety features of the Cycleway such as a separate lane away from the traffic flow and potential street lighting would make this option more viable for a greater section of the public.

6.3.3 In addition, the Scheme would increase Physical Fitness by the implementation of a Pedestrian route which would enhance connectivity between the urban areas of South Bristol by providing a direct, formalised route. This would encourage people to make short distance journeys to access facilities in nearby urban districts.

6.3.4 It is also anticipated that the public would use the pedestrian way to access the nearest bus stop for the Bus Rapid Transit aspect of the Scheme, which would connect the southern outer regions of the Bristol urban area with a route into the town centre.

6.4 Overall Assessment Score

6.4.1 The score for the Physical Fitness Sub-Objective has been assessed as Moderate Beneficial. This is based on the assumption that less than 500 people would benefit from the Scheme on a daily basis (refer to Appendix C.5).

7. Journey Ambience

7.1 Introduction

7.1.1 The Scheme has been appraised using the principles of WebTAG unit 3.3.13 Journey Ambience.

7.1.2 The Journey Ambience sub-objective focuses on all modes of transport, including public transport as well as private vehicles. The sub-objective concentrates on measures under the control of network providers and operators that improve en-route journey quality or journey ambience. It focuses on three main factors:

- Traveller Care – concerned with the cleanliness, general environment, facilities and information available to passengers;
- Travellers' Views – concerned with the views afforded to travellers using the scheme; and;
- Travellers' Stress – concerned with the effects the Scheme may have on traveller frustration, route uncertainty and fear of potential accidents.

7.2 Baseline conditions

7.2.1 At present, the local road network experience high levels of congestion at peak times, affecting road users ability to progress. This is particularly true for the residential areas of Hartcliffe, Withywood, Highridge and Hengrove, resulting in traveller frustration, fear of potential accidents and poor journey reliability, all of which contribute to a high level of traveller stress. In addition, the view currently afforded from local routes is restricted as roads pass through built up and residential areas.

7.3 Impacts

7.3.1 The Scheme would result in a decrease in travellers' stress by creating a less congested route around Bristol, thus decreasing congestion and journey times and therefore travellers' frustration. A coherent road structure with gentle bends would further help to reduce frustration. The route would be well signposted with clear road markings and cats' eyes, as per current standards, and so route uncertainty would be minimal.

7.3.2 The Scheme would see an improvement in traveller care. There are no new plans for lay-bys, toilets and service stations, yet well signposted bus stops and bus shelters would be provided to protect passengers during adverse weather conditions. Real time information systems would keep passengers informed of the quality of the service provided. Bus shelters would be of high quality, with lighting and seating for the comfort of the passengers. The new buses would be clean and pleasant to ride in and the new pedestrian and cycle way would facilitate a well-marked route for the public to use.

7.3.3 Travellers' views would be slightly benefited as a result of the Scheme as the route would pass from residential areas into more open terrain where they would be afforded intermittent views of the surrounding countryside.

7.4 Overall Assessment Score

7.4.1 The overall assessment score for the Journey Ambience Sub Objective has been appraised as Moderate Beneficial. This is based on the assumption that between 500 and 10,000 people would benefit from the scheme on a daily basis. Impacts on Travellers' Views, Care and Stress are all assessed as either better or neutral (refer to Appendix C.6).

8. Noise

8.1 Introduction

8.1.1 The Scheme has been appraised following guidance within the Noise Sub-objective of the DfT Transport Analysis Guidance (WebTAG Unit 3.3.2). The appraisal follows the methodology for plans.

8.1.2 This assessment following WebTAG guidance comprises two steps. The first is to establish the change in the number of people annoyed by noise levels with and without the scheme. The second step is to determine the net present value, a monetary value based on the willingness to pay to avoid transport related noise.

8.2 Baseline conditions

8.2.1 The study area has been identified as roads where noise levels are expected to change by at least 1 dB comparing with and without Scheme scenarios in the opening year and the area within 600m of the scheme centreline.

8.2.2 Within the study area existing ambient noise levels vary depending on the distance of the listening position from the nearest main road. The primary routes in the area include the A38 and A370 and the A4174, Bristol Ring Road.

8.2.3 Other noise sources in the area include Bristol International Airport, approximately 5 miles to the south-west of the scheme, and the Bristol to Weston-Super-Mare railway.

8.3 Impacts

8.3.1 To assess the associated impacts on noise levels in the area it was necessary to calculate noise from the existing road network and the proposed scheme. Noise from existing and proposed roads was calculated following the DoT Technical Memorandum Calculation of Road Traffic Noise (CRTN, 1988). Noise from the bus-only section of the proposed scheme was calculated using an adapted method based on the Calculation of Railway Noise (CRN, 1995) with measurements of bus pass-by events.

8.3.2 Noise levels were calculated using overall traffic flow, composition and vehicle speed forecasts supplied by Atkins for the four following scenarios:

- With the scheme in the opening year (2018) and in the design year (2033).
- Without scheme in the same two years.

8.3.3 Noise levels have been calculated at noise sensitive properties within 600m of the scheme centreline at positions based on Ordnance Survey Address Point data. Noise levels were calculated using proprietary noise modelling software. A three-dimensional noise model was created and noise levels have been calculated that take into account ground topology, source to receiver distance, any screening effect of nearby buildings or landforms, and the relative heights of source and receiver.

8.3.4 For impacts in the wider area (greater than 600m from the Scheme) noise levels have been determined at front-line properties adjacent to roads where changes in traffic would result in a noise level change of at least 1 dB. Noise levels have been calculated from traffic data on that specific road only, and are assumed to apply to all front-line properties. These properties have been included in the WebTAG Worksheet.

8.3.5 The WebTAG Worksheet in Appendix C.9 shows the number of people annoyed by noise and the net present value of the scheme.

8.3.6 Predicted noise impacts in the opening year are as follows:

- There are increases in noise at properties at the south end of the cul-de-sacs off Goulston Road, and at the north end of the cul-de-sacs off Gatehouse Avenue.
- There are increases in noise at properties adjacent to King George's Road and the southern section of Highridge Green.
- There are increases in noise at properties on the western side of Ashton Drive.
- There are decreases in noise at properties immediately adjacent to Gatehouse Avenue
- There are decreases in noise at properties immediately adjacent to the northern section of Highridge Green.
- There are decreases in noise at properties in Barrow Gurney.
- There are decreases in noise at properties in Long Ashton, in Highridge and Bedminster. Down adjacent to the A38 and near Church Road and Grange Road in Bishopsworth.

8.3.7 In summary, a relatively small number of properties are predicted to experience a large noise disbenefit, through the introduction of a new noise source, and a relatively large number of properties are predicted to experience a small noise benefit. The overall assessment score shows a net benefit both in terms of the net present value of noise of the Scheme and change in population annoyed by noise.

8.4 Mitigation

8.4.1 The WebTAG appraisal of the preferred route does not include any noise mitigation measures in determining the change in people annoyed and the net present value of the scheme. The appraisal therefore takes a worst case approach for areas where increases in noise are predicted.

8.4.2 The need for mitigation is likely to be determined during an Environmental Impact Assessment of the scheme. At this stage mitigation measures would be designed to minimise the adverse noise impacts of the scheme.

8.4.3 Possible methods of mitigating the noise impact should be provided in the following order where possible:

- Adjustment of the horizontal alignment of the proposed road so a greater distance exists between the road and sensitive receptors;

- Adjustment of the vertical alignment of the proposed road so sensitive receptors are more screened from road traffic noise. Preferential use of cuttings instead of embankments would be beneficial;
- Reduction of traffic speed or flow through traffic calming measures;
- Use of a noise reducing road surface material to reduce tyre/road noise at source; and,
- Design of specific noise mitigation measures e.g. acoustic barriers, earth bunds.

8.5 Overall Assessment Score

8.5.1 The WebTAG Worksheet in Appendix C.7 shows the number of people annoyed by noise and the net present value of the scheme. The Worksheet is summarised below. The overall assessment score shows a net benefit both in terms of the net present value of noise of the Scheme and change in population annoyed by noise.

Table 8-1: Summary of Noise Assessment Scores

Net Present Value of Noise of Proposal (60 Year Period)	Estimated Population Annoyed (Do-Minimum)	Estimated Population Annoyed (Do-Something)	Net Noise Annoyance Change in 15th Year After Opening
+£1,542,051 *positive value reflects a net benefit (i.e. noise reduction)	2415	2359	-56 (no. of people)

9. Air Quality

9.1 Introduction

9.1.1 The Scheme has been assessed using WebTAG guidance 3.3.3 which incorporates the use of the Design Manual for Roads and Bridges (DMRB) to assess the local air quality impacts. This chapter therefore assesses potential local air quality impacts associated with the Preferred Route Option, proposed south of the City of Bristol.

9.1.2 To assess the associated impacts on local air quality, a determination of relevant links, predicted to experience a significant change in traffic flow as a result of the Scheme, as well as the identification of all residential properties within 200 metres (m) of these links have been used. The study area, includes 270 road links, which incorporates the main routes into Bristol and the residential areas of Bishopsworth and Hengrove. Derivation of pollutant concentrations are calculated based on overall traffic flow, fleet composition and vehicle speed, supplied by Atkins.

9.2 Baseline conditions

9.2.1 The Scheme lies within the administrative boundaries of Bristol City Council and North Somerset. Bristol City Council has declared an Air Quality Management Area (AQMA) covering the city centre and parts of the main radial roads (including the M32). The Scheme itself does not lie within the boundaries of the Bristol City Council AQMA, however it is within approximately 2 km of the section of the AQMA which extends down the A38 near Bedminster. The AQMA has been declared for nitrogen dioxide (NO_2) (annual and daily mean objectives) and particulate matter having an aerodynamic diameter of 10 microns or less (PM_{10}) (daily mean objective). North Somerset have not declared any AQMAs within its administrative boundary.

9.3 Impacts

9.3.1 The Do-Minimum and Do-Something scenarios were assessed for 2018 (Opening Year) and 2032 (Design Year – Opening Year +15 years). The WebTAG model currently only assesses to 2025, with respect to projected pollutant emissions and therefore has been used for the design year in this assessment.

9.3.2 The Scheme would predominantly travel through semi-open farmland with a few houses close to the route, however the density of housing increases greatly towards the southern extent where it passes through Bishopsworth and Hengrove. The areas of greatest concern would be King Georges Road and the undeveloped corridor between Queen's Road and Hengrove Way, which is an area of dense housing which will experience a significant increase in HDVs. The proposed highway route and Bus Rapid Transit (BRT) route between A38 and A370 would travel through open farmland with few houses close to the proposed route.

9.3.3 This assessment also highlights that there would be significant increase in pollutant concentrations within the Bristol AQMA. In addition, the significant increases predicted as a result of the Scheme, all would be associated with the new route and associated changes to adjoining junctions.

9.3.4 Negative scores indicate that there would be an overall improvement in air quality with the Scheme in place within the Opening Year for both pollutants. This improvement remains

unchanged within the Design Year. The variations in population exposure for both assessment years, as summarised within Tables 9.1, are predicted to be extremely small. The impact of the Scheme is therefore considered likely to be of negligible significance.

9.3.5 Assessment of the Aston Court Special Site of Scientific Interest (SSSI) may be required to assess the Clarkencombe Wood for potential Air Quality impacts arising from potential nitrogen deposition.

9.4 Mitigation

9.4.1 It is recommended that the 'Greater London Authority and London Councils Best Practice Guidance - The Control of Dust and Emissions from Construction and Demolition' 2006 be used to mitigate against potential impacts during the construction phase. Although the Scheme is located outside of London, this guidance provides a comprehensive overview of Best Practicable Means (BPM) mitigation measures, relating it to levels of risk. The appointed Contractor should use information from the London Best Practice Guidance to produce a Construction Environmental Management Plan (CEMP) to reduce the overall impact from construction activities.

Potential operational mitigation measures to further local air quality as a result of the Scheme could include:

- Ensure that the buses are regularly maintained to reduce increased emission episodes from vehicles and improve the efficiency of the vehicles.
- Ensure that the bus fleet used is maintained to at least 'Euro V' standard.

9.5 Overall Assessment Score

9.5.1 A summary of the assessment of Local Air Quality is presented within Table 9.1 below. Refer to Appendix C.8 for further details. The overall assessment score for Local Air Quality is assessed as Negligible.

Table 9-1: Summary of Nitrogen Dioxide and Particulate Matter Assessment Scores and Change to Population Exposure for the Scheme within the Opening Year and Design Year

Pollutant	Opening Year (2018)		Design Year (2033)	
	Assessment Score	Change in Population Exposure (in µg m^{-3})	Assessment Score	Change in Population Exposure (in µg m^{-3})
Nitrogen Dioxide	-1770	-0.07	-1559	-0.08
Particulate Matter	-461	-0.02	-287	-0.01

10. Greenhouse Gas

10.1 Introduction

10.1.1 The Scheme has been assessed using the WebTAG Greenhouse Gas Sub-Objective Guidance (Unit 3.3.5) which incorporates the use of the TUBA, COBA or the DMRB 11.3.1 spreadsheet to assess the impacts of a scheme on greenhouse gases. In this case TUBA output has been used to estimate carbon emissions for the years 2018 to 2030 and emissions extrapolated thereafter to extend estimates of the change in carbon emissions across the whole 60 year appraisal period. The TAG Greenhouse Gas spreadsheet has been used in the calculation of net present value of carbon emissions for the relevant assessment years.

10.1.2 The Climate Change Act 2008 incorporates a legally binding target to reduce the UK's greenhouse gas emissions to at least 80% below 1990 levels by 2050, to be achieved through action at home and abroad. To drive progress towards this target, the Act introduces five year "carbon budgets", which define the emissions pathway to the 2050 target by limiting the total greenhouse gas emissions allowed in each five year period, beginning in 2008.

10.1.3 Each sector must play its part in taking action to achieve these budgets. It is therefore important that the impacts of proposed transport interventions on greenhouse gas emissions - whether they are increased or decreased - are incorporated within the cost benefit analysis in a consistent and transparent way.

10.2 Baseline Conditions

10.2.1 At the present time the level of carbon dioxide (CO_2) emissions from transport in the UK is large, and is growing both in absolute terms and as a proportion of total emissions. The Air Quality Expert Group (2007) report, *Air Quality and Climate Change - A UK Perspective*, stated that emissions of CO_2 from the transport sector are expected to increase by 18% in the period 2002-2020 (a rate of 1% per year). However, CO_2 emissions reductions are expected to reduce going forwards as savings are delivered by Government commitments and improvements in vehicle technology and fuels.

10.2.2 The shadow price of carbon has been calculated for a 60 year period. However, the latter years have been extrapolated from the design year calculations, as technologies for predicting traffic flows and vehicle emission factors to this timescale have yet to be developed.

10.2.3 The Do-Minimum and Do-Something scenarios were also considered in terms of change in carbon emitted for 2018 (Opening Year) and 2033 (Design Year) within this assessment.

10.2.4 All road links within the study area have been considered, in line with the TUBA assessment.

10.3 Impacts

10.3.1 In 2018, the Preferred Option for the Scheme would result in an overall reduction in carbon emissions between the Do-Minimum and Do-Something scenarios. A decrease of 78 tonnes of carbon is predicted in the Opening Year as a result of changes to the speed of vehicles and reductions in travel times. The shadow price of the increase in carbon emissions over a 60 year

period from the Opening Year to 2077 is shown within Table 10.1. There is calculated to be a decrease of 19,264 tonnes of carbon over this period.

10.4 Mitigation

10.4.1 Potential mitigation measures to further reduce greenhouse emissions to the atmosphere as a result of the Scheme could include:

- Ensure that the buses are regularly maintained to reduce increased emission episodes from vehicles and improve the efficiency of the vehicles.
- Ensure that the bus fleet used is maintained to at least 'Euro V' standard.

10.5 Overall Assessment Score

10.5.1 Table 10-1 summarises the assessment scores predicted for the Preferred Route for the Scheme. A positive value here represents a net benefit (i.e. carbon emissions reduction). The overall assessment score is therefore shown to be Positive for the Preferred Route.

Table 10-1: Shadow price of Carbon

Cost of Carbon (Net Present Value)			Total Change in Carbon Emissions over 60 Years (tonnes)
Lower Estimate *	Central Estimate *	Upper Estimate *	
£686,879	£763,199	£915,839	-19,264

10.5.2 Table 10-2 summarises the change in carbon emissions in the opening and design years for the Preferred Route Option.

Table 10-2: Opening Year and Design Year Percentage Changes to Carbon

Opening Year (2018)		Design Year (2033)	
Change in Carbon (tonnes of C)	Percentage Change	Change in Carbon (tonnes of C)	Percentage Change
-78	0.01%	-353	0.01%

10.5.3 For comparison purposes, statistics published by Defra (2008) in its document *Local and Regional CO_2 Emissions Estimates for 2005-2006*, estimated that total CO_2 emissions for the City of Bristol and North Somerset (i.e. the 'region') were 3,861 ktonnes in 2006, which is equivalent to 1,053 ktonnes of carbon.

11. Conclusion

11.1 This report presents the NATA assessment for Environment Impact. The Scheme has been appraised using the principles contained in the DfT's website for guidance on the conduct of transport studies (WebTAG).

11.2 The impact on Landscape and Townscape elements as a result of the Scheme have been appraised as **Moderate Adverse**. Despite the presence of existing local A roads, this relatively open landscape currently considered as typical rural urban fringe would be further fragmented and degraded with the addition of the Scheme. In addition, the strong 19th and 20th century suburban townscape would be likely to be adversely affected by the proposals, with changes to the scale, density and appearance of the area as a result of the Scheme. The proposals would be a prominent feature within the townscape affecting both character and visual amenity within the local area.

11.3 For Biodiversity features, the Scheme would potentially result in a **Slight Adverse** impact. This is due to direct habitat loss to locally designated sites. In addition, there would potentially be impacts to nationally and internationally protected species including badgers, reptiles, breeding birds, otter, great crested newts and bats. Appropriate mitigation would reduce potential adverse impacts and should include an ecological watching brief with works undertaken under appropriate licences. Compensatory habitat as mitigation should be considered where the Scheme is likely to directly impact designated sites.

11.4 There would be no direct effects to any designated heritage assets as a result of the Scheme. However, there may be some minor changes to the setting of Castle Farm Grade II Listed Building at operation, and construction could result in physical loss of the potential archaeological resource. Construction would also result in changes to the form, pattern and character of a section of the historic landscape which is of low value. As such, and with mitigation using best practice methodologies, the impact of the Scheme upon the Historical Heritage resource is considered to be **Slight Adverse.**

11.5 Overall, the impact of the Scheme upon the water environment is also assessed as **Slight Adverse.** The Scheme would cross several water courses which would require culverting/bridging. This may result in disruption/alterations to surface water flows and quality. In addition, the discharge of road drainage to surface water bodies may also adversely impact quality. The Scheme would pass through several EA designated flood zones and the underlying soils predominantly have impeded drainage so that additional runoff may exacerbate flooding in these areas. Groundwater quality may also be adversely impacted through the infiltration of road runoff, and from potential leachates from several landfills that the Scheme would cross.

11.6 The WebTAG appraisals undertaken here has concluded that the Scheme would result in a **Moderate Beneficial** impact for Physical Fitness and Journey Ambience. An increase in Physical Fitness is anticipated from the implementation of a cycleway and pedestrian route associated with the Scheme. The Scheme would also result in an improvement in journey quality by improvements in Traveller Care, Views and Stress. There would be significant improvements in Traveller Care by the provision of more facilities and cleaner services, and stress and route uncertainty are expected to diminish due to the integrated design of the Scheme.

11.6.1 For noise impacts, the WebTAG assessment shows that a relatively small number of properties are predicted to experience a large noise disbenefit through the introduction of a new noise source, and a relatively large number of properties are predicted to experience a small noise benefit. The overall assessment score shows a net benefit both in terms of the net present value of noise of the Scheme and change in population annoyed by noise.

11.6.2 The assessment undertaken here indicates that there would be an overall improvement in local air quality with the Scheme in place within the Opening Year for both nitrogen dioxide and particulate matter. This improvement would remain unchanged within the Design Year. The variations in population exposure however for both assessment years, are predicted to be extremely small. The impact of the Scheme is therefore considered likely to be of **Negligible** significance.

11.6.3 In 2018, the Preferred Option for the Scheme would result in an overall reduction in carbon emissions between the Do-Minimum and Do-Something scenarios. A decrease of 78 tonnes of carbon is predicted in the Opening Year as a result of changes to the speed of vehicles and reductions in travel times.

Appendices

Appendix A. Environmental Constraints Plan

Appendix B. Appraisal Summary Table (AST) for Environment – Preferred Option

Appraisal Summary Table

Option		Description	Problems	Present Value of Costs to Public Accounts £m
OBJECTIVE	**SUB-OBJECTIVE**	**QUALITATIVE IMPACTS**	**QUANTITATIVE ASSESSMENT**	**ASSESSMENT**
ENVIRONMENT	**Noise**	At a relatively small number of properties there is a large noise disbenefit by the introduction of a new noise source. This is outweighed by a small noise benefit at a relatively large number of houses.	Estimated Population Annoyed (Do-Minimum): 2415 (Do-Something): 2359	Net population win / lose: -56 NPV: +£1,542,051
	Local Air Quality	There would be an overall improvement in local air quality with the Scheme in place within the Opening Year for both nitrogen dioxide and particulate matter. This improvement would remain unchanged within the Design Year. The variations in population exposure however for both assessment years, are predicted to be extremely small.	Assessment scores: NO_2: Opening Year = -1770; Design Year = -1559 PM_{10}: Opening Year = -461; Design Year = -287	Change in population exposure: NO_2: Opening Year = -0.07; Design Year = -0.08 PM_{10}: Opening Year = -0.02; Design Year = -0.01
	Greenhouse Gases	The Preferred Option leads to a decrease in Carbon emissions compared to the Do-Minimum (without South Bristol Link). Emissions decrease over time due to changes in the speed of vehicles and reduced travel times.	2018 – decrease in emissions due to the Scheme of 0.01%	Change in tonnes of C: 2018 = tonnes 78
	Landscape	Despite the existing baseline conditions and presence of local A roads, this relatively open landscape currently considered as typical rural urban fringe would be further fragmented and degraded with the addition of the Scheme.	N/A	Moderate Adverse
	Townscape	The strong 19th and 20th century suburban townscape would be likely to be adversely affected by the proposals, with changes to the scale, density and appearance of the area as a result of the Scheme. The proposals would be a prominent feature within the townscape affecting both character and visual amenity within the local area.	N/A	Moderate Adverse
	Heritage of Historic Resources	No direct effects to any designated heritage assets. Some minor changes to the setting of Castle Farm Grade II Listed Building may result from operation. Construction could result in physical loss of the potential archaeological resource, which are unlikely to be of substantial quantity or of greater than local importance. Construction would also result in changes to the form, pattern and character of a section of the historic landscape which is of low value. Adequate mitigation to prevent and/or reduce the significance of the predicted effects can be specified using standard techniques.	N/A	Slight Adverse
	Biodiversity	Direct habitat loss from a number of locally designated sites and impacts to nationally and internationally protected species including badgers, reptiles, breeding birds, otter, great crested newts and bats likely. Appropriate mitigation would reduce potential adverse impacts. Compensatory habitat as mitigation should be considered where the Scheme is likely to directly impact designated sites.	N/A	Slight Adverse
	Water Environment	Would cross several water courses which would require culverting/bridging which may result in disruption/alterations to surface water flows and quality. Discharge of road drainage to surface water may also adversely impact quality. The Scheme would pass through several EA designated flood zones and the underlying soils predominantly have impeded drainage, so that additional runoff	N/A	Slight Adverse

		may exacerbate flooding in these areas. Potential impact to surface water flows and groundwater sustained habitats at construction. Groundwater quality may be adversely impacted through the infiltration of road runoff and from leachates from landfill.		
	Physical Fitness	Increase of Physical Fitness by encouraging pedestrian and cycle journeys both over and under 30 minutes from the implementation of a cycleway and pedestrian route. In addition, the provision of lighting along the route would create a safe atmosphere so would appeal to a larger section of the public.	N/A	Moderate Beneficial
	Journey Ambience	Improvement in journey quality by improvements in Traveller Care, Views and Stress. The appraisal assumes that between 500 and 10,000 people would benefit from the Scheme on a daily basis. Improvements in Traveller Care by the provision of more facilities and cleaner services, and stress and route uncertainty are expected to diminish due to integrated design.	N/A	Moderate Beneficial

Appendix C. Worksheets

C.1 Landscape and Townscape

C.1.1 Landscape

Features	Description	Scale it matters	Rarity	Importance	Substitutability	Impact	Additional Mitigation
Pattern	Medium scale open landscape of rural/urban fringe appearance characterised by river valley floor with small irregular field pattern. Varying degrees of enclosure induced by changes in land use.	Local	Common	Local	Variable depending on land availability; landform; settlement and associated infrastructure.	The proposed Scheme traverses fields altering the existing pattern within the landscape. Given elements of existing fragmentation, it is unlikely to cause a significant impact to the landscape pattern of the area. Slight Adverse impact.	
Tranquillity	Tranquillity varies within the area. The presence of the A370 reduces the levels of tranquillity in what would otherwise be a relative tranquil environment away from the urban fringe.	Local	Common	Local	Replicable although harder to substitute in areas of high tranquillity.	Although already slightly degraded by the surrounding road and railway networks, the sense of tranquillity is likely to degrade further as a result of the Scheme. Slight Adverse impact.	

Features	Description	Scale it matters	Rarity	Importance	Substitutability	Impact	Additional Mitigation
Cultural	Several Conservation Areas are found within a short distance of the proposed alignment. Long Ashton Conservation Area is located to the west of the Scheme, separated from the proposed alignment by the A370. This Conservation Area alone has 39 designated listed buildings. Bower Ashton Conservation Area is located to the north of the most northern point of the proposed Scheme. Yanley Conservation Area is also within 1km. Castle Farm situated close to the proposed alignment on the A38 is a designated listed building. A Scheduled Ancient Monument in the form of a 15th century chapel is situated in the village of Long Ashton.	Local	Locally common	Local	Given the age of individual cultural assets, substitution providing a similar intrinsic value to the local landscape would not be possible	The proposed Scheme would likely to be visible from designated Conservation Areas, Scheduled Ancient Monuments and Listed Buildings. However, this would be set in the context of the existing transport network of the nearby A370 and A38. Slight adverse impact.	Screening vegetation where possible. Sympathetic vertical alignment to keep visual intrusion to a minimum.

Features	Description	Scale it matters	Rarity	Importance	Substitutability	Impact	Additional Mitigation
Landcover	Local landscape is characterised by small irregular field patterns interspersed with small patches of woodland. The A38 and A370 are reasonably prominent. The presence of a large Park and Ride Facility is out of character with the wider landcover.	Local	Common	Local	Variable depending on land availability; landform; settlement and associated infrastructure.	Changes in landcover would be noticeable along this length of the Scheme. Changes to landcover would be in the context of other transport infrastructure in the area, notably the A38, A370 and large Park and Ride facility. Moderate adverse impact at worst.	

Features	Description	Scale it matters	Rarity	Importance	Substitutability	Impact	Additional Mitigation
Summary of character	The landscape is characterised by a low lying floodplain with rising land all around. Ashton Vale settlement to the east of the area forms the urban fringe. The small scale irregular field patterns are interspersed with patches of woodland and screening vegetation around the periphery of the Park and Ride. A reasonably extensive footpath network traverses the landscape, linking Bristol's southern fringe with smaller settlements of Long Ashton and Yanley. Although not over bearing the presence of the A38 and A370 are reasonably dominant within the landscape. Elements of Cultural heritage value are found within the study area of local importance.	Local	Locally common	Locally important	Variable.	Moderate adverse	

Reference Source(s): Site visit, Webtag Guidance 3.3.7, Bristol City Council Interactive mapping, Ashton Park Planning Application.

Qualitative comments: Despite the existing baseline conditions and presence of local A roads, this relatively open landscape currently considered as typical rural urban fringe would be further fragmented and degraded with the addition of the South Bristol Link Road. Given the surrounding land use and infrastructure, cultural heritage value and recreation value of the surrounding landscape, overall impacts upon landscape character and visual amenity are considered Moderate Adverse at most.

Summary assessment score: Moderate adverse

C.1.2 Townscape

Features	Description	Scale it matters	Rarity	Importance	Substitutability	Changes in do minimum	Impact	Additional Mitigation
Layout	South Bristol suburbs defined by strong urban edge. Wide ranging grain from fine to medium in residential areas and coarse grain around commercial properties.	Local	Common	Local	Replicable	No significant change	The existing urban grain is likely to become coarser as a result of the Scheme. This would however be set within the context of other A roads in the area. Slight Adverse impact.	Keep road infrastructure to a minimum. Follow existing road layout where possible.
Density and mix	Varying density and mix. Dominated by 1930s semi detached residential properties interspersed with modern infill. Small number of post 1980s flats and detached properties. Several green spaces of varying size provide a sense of openness.	Local	Common	Local	Replicable	No significant change	The general density and mix of the townscape is likely to remain unchanged. However, the small number of incidental green spaces which provide a sense of openness to an essentially suburban townscape would be lost/ degraded by the proposed Scheme. Moderate Adverse impact.	Efforts should be made to keep the proposed Scheme along existing carriageways wherever possible to avoid impacting upon the small number of open spaces within the area.

Features	Description	Scale it matters	Rarity	Importance	Substitutability	Changes in do minimum	Impact	Additional Mitigation
Scale	Medium scale urban environment	Local	Common	Local	Replicable	No significant change	The scale of the proposed Scheme may negatively impact the existing scale of the townscape in areas currently characterised by small to medium scale suburban residential streets. Moderate Adverse impact.	Keep width of scheme and associated infrastructure to a minimum, both in frequency and scale.
Appearance	Predominantly 1930s style properties, natural render, some painted render, tile roofs. Some newer properties also painted in similar muted tones. Other infill properties buff brick and part buff tile hung.	Local	Common	Local	Replicable	No significant change	New Scheme will have greater dominance within the landscape than existing road network. General appearance and style of settlement is likely to significantly change on streets directly affected by the Scheme. Moderate Adverse in worst case.	Use muted tones/ sympathetic materials where possible to tie in with vernacular style.

Features	Description	Scale it matters	Rarity	Importance	Substitutability	Changes in do minimum	Impact	Additional Mitigation
Human interaction	Residential streets have sufficient footways to allow for easy pedestrian movement. Several green spaces also provide areas for recreation. Majority of area in appropriate scale to facilitate human interaction.	Local	Common	Local	Replicable	No significant change	The presence of a larger road carrying increased traffic is likely to have a detrimental affect upon human interaction within the local townscape. It may be perceived as reducing the permeability of the townscape, hindering pedestrian and cyclist movement around the area. The impact upon High Ridge Common is likely to degrade the value of this recreational landscape. Moderate Adverse in worst case.	Ensure numerous crossing points along alignment and locate Scheme sympathetically wherever practicable to prevent severance.

Features	Description	Scale it matters	Rarity	Importance	Substitutability	Changes in do minimum	Impact	Additional Mitigation
Cultural	The city of Bristol has a strong cultural standing built around its industrial past. The Scheme would pass directly through Bishopstoke and Malgo Conservation Area which contains 4 listed buildings. The majority of buildings date from later in history mainly 19th and 20th Century residential expansion.	Local	Common	Local	Replicable in the most part	No significant change	Give the location of the Scheme within the conservation area, the cultural integrity of the area is considered Moderate Adverse at worst.	Keep road infrastructure to a minimum. Follow existing road layout where possible.
Land use	Predominantly residential property with commercial buildings/ garages. Winding network of residential roads with smaller number of B roads servicing the study area.	Local	Common	Local	Replicable	No significant change	The proposed Scheme would in the most part remain online of existing roads. Where this isn't the case there would be a change in land use as the road replaces incidental small scale green corridors. Slight adverse impact.	

Features	Description	Scale it matters	Rarity	Importance	Substitutability	Changes in do minimum	Impact	Additional Mitigation
Summary of character	The area affected by the proposed Scheme is strongly characterised by late 19th and 20th century suburban townscape and associated land use and infrastructure. It is set over rising topography encapsulated by a considerable ridge to the south of Bristol. A small number of older/ notable properties can be found within the area including three listed buildings.	Local	Common	Local importance	Replicable in the most part.	No significant change	Moderate Adverse	Sympathetic alignment and materials where possible. Screening vegetation where appropriate.

Reference Source(s): Site visit, Webtag guidance unit 3.3.8, Bristol City Council Interactive mapping, Ashton Park Planning Application.

Qualitative comments: The strong 19th and 20th century suburban townscape would be likely to be adversely affected by the proposals, with changes to the scale, density and appearance of the area as a result of the Scheme. The proposals would be a prominent feature within the townscape affecting both character and visual amenity within the local area.

Summary assessment score: Moderate adverse.

C.2 Heritage of Historic Resources

Part 1		Part 2			Part 3
Feature	**Description**	**Scale it Matters**	**Significance**	**Rarity**	**Impact**
Form	Archaeological resource – no Scheduled Monuments. Recorded resource comprises artefact based evidence for prehistoric activity with possibility of low-status Romano-British settlement. Artefacts, documentary references and excavated remains of later Saxon, medieval and post-medieval activity, mostly associated with settlement origins of Bishopsworth, Long Ashton and Yanley. Survival of medieval and post-medieval field boundaries, buildings, quarries and limekilns. Post-medieval settlement characterised by individual farms known from historic maps, many still surviving. Coal mining recorded in the area. Overall low potential for the presence/survival of additional substantial archaeological deposits of greater than local importance beyond bounds of historic settlement cores. Palaeoenvironmental deposits may be associated with watercourses. Bishopsworth and the Malago Valley Conservation Area, incorporates Highridge Common. One Listed Building in close proximity (c75m) proposed alignment where is crosses the A38. Castle Farm (LBS No. 33495) Grade II Listed Farmhouse of 19th century date.	Form matters at a local scale Form matters at a local scale Form matters at a local scale	Form of archaeological resource is of low significance. Form of the conservation area is of local significance; form of Listed Building is of high significance Form of the historic landscape is of low	Form of the resource is typical at a regional level. Over time loss resulting from development would make the resource rarer. Form of the resource is common at a local and regional is protected in local and national planning policy and legislation. Form of the resource is typical at a regional level. Over time loss resulting from development would make the resource rarer.	Physical impacts within design footprint during construction between chainage 0 and 3100 could result in loss of, or damage to form of potential archaeological resource (low value) and the form of the Historic Landscape (low to medium value) including part of the historic Highridge Common. No impacts to form of heritage resource between chainage 3100 and 5300. Impact to form of archaeology and historic landscape: **Slight Adverse** Impact to form of Built Heritage: **Neutral.**

Part 1		Part 2			Part 3
Feature	**Description**	**Scale it Matters**	**Significance**	**Rarity**	**Impact**
	Building currently occupied. Historic landscape character (HLC) divided between modern suburban development of Highridge, Bishopsworth and Hengrove and the agrarian landscape of broadly medieval/post-medieval origin between Highridge and Long Ashton. HLC degraded by quarrying, landfill and Long Ashton P&R.		significance		
Survival	Survival of archaeological deposits and palaeoenvironmental remains is variable along route. Likely to be poor within area of existing highway, presumed poor to moderate in undeveloped agrarian land. Areas of previous quarrying and landfill are archaeologically sterile. Survival of Listed buildings, built heritage and conservation area are good. Historic landscape resource survives moderately well between chainage 0-3100. No historic landscape resource within suburban areas along the remainder of the route.	Survival of archaeological resource matters on a local scale Survival of built heritage resource matters at a local scale Survival of historic landscape resource matters at a local scale	Survival of the archaeological resource is of low significance Survival of the built heritage resource is of low significance. Survival of the historic landscape resource is of low significance.	Overall the survival of the heritage resource is fairly common regionally.	Physical impacts within design footprint during construction between chainage 0 and 3100 could result in loss of, or damage to survival of potential archaeological resource (low value) and the survival of the Historic Landscape (low to medium value) including part of the historic Highridge Common. No impacts to survival of heritage resource between chainage 3100 and 5300. Impact to survival of archaeology and historic landscape: **Slight Adverse**

Part 1		Part 2			Part 3
Feature	**Description**	**Scale it Matters**	**Significance**	**Rarity**	**Impact**
					Impact to survival of Built Heritage: **Neutral.**
Condition	Condition of potential buried archaeological and palaeo-environmental remains varies along the route. Condition presumed to be very poor in areas of existing highway, quarrying and landfill. Elsewhere condition probable poor to moderate. Condition of built heritage including Listed Buildings is good. Condition of historic landscape is moderate.	Overall condition matters on a local scale	Overall condition is of low significance	Overall condition is common regionally	Physical impacts within design footprint during construction between chainage 0 and 3100 could result in change to condition of potential archaeological resource (low value) and the Historic Landscape (low to medium value) including part of the historic Highridge Common. No change to condition of heritage resource between chainage 3100 and 5300. Impact on condition of archaeology and historic landscape: **Slight Adverse** Impact on condition of Built Heritage: **Neutral.**
Complexity	Overall the resource is limited to evidence of settlement and farming with much of the evidence for continuous and contemporaneous activity. The relationships of the heritage resource	The complexity matters on a local scale.	The complexity is of low significance.	The complexity is typical of the region.	**Neutral** impact to complexity of the heritage resource.

Part 1		Part 2			Part 3
Feature	**Description**	**Scale it Matters**	**Significance**	**Rarity**	**Impact**
	within the study area and in the wider region are relatively simple.				
Context	Buried archaeological remains have no context Modern development within historic settlement cores has affected original context. Castle Farm Listed Building is situated c.35m from the A38. Rural areas maintain pastoral setting interspersed by roads and lanes. .	None Context of historic landscape and built heritage resource matters at a local scale	None The context of Listed Buildings is of high significance. The context of the remaining heritage resource is of low significance.	None Context is common regionally.	No impact to archaeological resource Slight change to the context of the historic landscape resulting from the addition of a transport route, including impacts to Highridge Common, a historic common. Slight change to the setting of Grade II Listed Building, Castle Farm resulting from operation of scheme in close proximity. Overall a **Slight Adverse** impact to the context of the historic landscape and built heritage resource.
Period	Prehistoric, Romano-British, late Saxon/-medieval to post medieval, Second World War, Modern	Local scale	low significance	Typical of the region	**Neutral**

Reference source(s): Bristol Historic Environment Record; North Somerset Historic Environment Record; English Heritage online data; Ashton Park Environmental Statement: Cultural Heritage (Land Trust Developments 2009).

Qualitative comments: No direct effects to any designated heritage assets. Some minor changes to the setting of Castle Farm Grade II Listed Building may result from operation. Construction of the Scheme could result in physical loss of the potential archaeological resource, which are unlikely to be of substantial quantity or of greater than local importance. Construction would also result in changes to the form, pattern and character of a section of the historic landscape which is of low value. These effects would only be relevant to the construction of the new carriageway between Highridge Common and Long Ashton Park and Ride. No effects to the heritage resource are identified in areas of online improvements. Adequate mitigation to prevent and/or reduce the significance of the predicted effects can be specified using standard techniques.

Summary assessment score: **Slight Adverse**

C.3 Biodiversity

Area	Description of feature / attribute	Scale (at which attribute matters)	Importance (of attribute)	Trend (in relation to target)	Biodiversity and earth heritage value	Magnitude of impact	Assessment score
International Designations							
North Somerset & Mendip Bats SAC Approximately 8km south west	This site in south-west England is selected on the basis of the size of population represented (3% of the UK greater horseshoe bat population) and its good conservation of structure and function, having both maternity and hibernation sites. This site contains an exceptionally good range of the sites used by the population, comprising two maternity sites in lowland north Somerset and a variety of cave and mine hibernation sites in the Mendip Hills. The caves also provide a range of important hibernation sites for lesser horseshoe bat.	International	Very High	Declining	Very High	Major Negative: **Site coherence or ecological structure and function**: The Scheme has the potential to adversely affect the primary species for the designation of the European Site, affecting either its coherence or ecological structure and function. **Habitat or species fragmentation**: The Scheme has the potential to fragment connective corridors potentially reducing species dispersal and colonisation abilities and impacting the coherence of the sites ecological structure and function and its resilience to impacts such as climate change or pollution. **Habitat loss:** Unlikely to be a direct reduction of the total area of the SAC due to the distance from the Scheme.	Moderate Adverse

Area	Description of feature / attribute	Scale (at which attribute matters)	Importance (of attribute)	Trend (in relation to target)	Biodiversity and earth heritage value	Magnitude of impact	Assessment score
						Aquatic Environment: The Scheme crosses Longmoor Brook, Ashton Brook and Colliter's Brook. With appropriate mitigation there would be no impacts on hydrology as a result of the proposed Scheme. **Air Quality:** Unlikely to have an impact to the SAC due to the distance from the works.	
Avon Gorge Woodland Special Area of Conservation (SAC) situated approximately 1800m north of the proposed Scheme.	A woodland important because of the high concentration of small-leaved lime Tilia cordata and rare whitebeams Sorbus spp., (including two unique to the Avon Gorge *S. bristoliensis* and *S. wilmottiana*), and other uncommon plants, such as green hellebore *Helleborus viridis*. Other characteristic species include soft shield-fern *Polystichum setiferum* and hart's-tongue *Phyllitis scolopendrium*. Species-rich transitions to scrub and grasslands are associated with the woodland. Small groves of yew *Taxus baccata* also occur on some of the stonier situations (source JNCC http://www.jncc.gov.uk).	International	Very High	Declining	Very High	Minor Negative: **Site coherence or ecological structure and function**: The Scheme has the potential to adversely affect a European Site, affecting either its coherence or ecological structure and function. It is unlikely, however, given the distance from the SAC and its designatory criteria that this impact would be significant. As such, the magnitude of the impact is regarded to be minor negative. **Habitat loss, habitat or species fragmentation:** Unlikely to be a direct reduction of the total area of the SAC due to the distance from Scheme.	Slight Adverse

Area	Description of feature / attribute	Scale (at which attribute matters)	Importance (of attribute)	Trend (in relation to target)	Biodiversity and earth heritage value	Magnitude of impact	Assessment score
						Aquatic environment: The Scheme crosses Longmoor Brook, Ashton Brook and Colliter's Brook. With appropriate mitigation there would be no impacts on hydrology as a result of the proposed Scheme.	
Ashton Court SSSI Situated approximately 300m north of the proposed Scheme.	Ashton Court is important for its rich saproxylic invertebrate fauna including many species which are nationally scarce (source Natural England www.natural-england.org.uk).	National	High	Declining (UKBAP).	High	Minor negative: **Site coherence or ecological structure and function;** Unlikely to be a direct effect due to the distance from the Scheme. However, there is the potential of increased disturbance throughout all the life stages of the proposed scheme but significance reduced through appropriate mitigation. **Habitat or species fragmentation**: The scheme has the potential to fragment connective corridors to the site, potentially reducing species dispersal and colonisation abilities and impacting the sites resilience to impacts such as climate change or pollution. **Habitat loss:** Unlikely to be a	Slight Adverse.

Area	Description of feature / attribute	Scale (at which attribute matters)	Importance (of attribute)	Trend (in relation to target)	Biodiversity and earth heritage value	Magnitude of impact	Assessment score
						direct reduction of the total area of the SSSI due to the distance from the Scheme. **Aquatic Environment**: The Scheme crosses Longmoor Brook, Ashton Brook and Colliter's Brook. With appropriate mitigation there should be no impacts on hydrology as a result of the proposed Scheme	
Local and Regional Designations							
High Ridge Common SINC Within works footprint	An area of unenclosed common land hosting neutral/calcareous/grassland. Flanked by areas of mature trees and marsh land The site is recognised to be of local importance hosting significant populations of locally uncommon plant and invertebrate species. The site is managed informally as a village green (source Bristol Environmental Records Centre).	Local	Medium at a local scale	Declining (UKBAP).	Medium	Intermediate negative: **Coherence and ecological structure and function:** The Scheme has the potential to have an intermediate negative impact on the SINC, affecting both its coherence and ecological structure and function though the loss, degradation of habitat, potential contamination through the introduction of aggregate and pollutants of the soil structure, potential disturbance throughout all the life stages of the proposed Scheme and potential for increased public pressure on the other areas of the SINC not	Moderate Adverse

Area	Description of feature / attribute	Scale (at which attribute matters)	Importance (of attribute)	Trend (in relation to target)	Biodiversity and earth heritage value	Magnitude of impact	Assessment score
						utilised for the works footprint. **Habitat Loss**: The Scheme would bisect the SINC, and therefore, the Scheme would be likely to result in the direct permanent loss of a significant proportion of this feature. Mitigation in the form of replacement planting and habitat management would reduce the level of impact from major negative to minor negative. **Habitat Fragmentation**: The Scheme has the potential to fragment connective corridors potentially reducing species dispersal and colonisation abilities and impacting the coherence of the sites ecological structure and function, as well as its resilience to impacts such as climate change or pollution. **Aquatic Environment:** With appropriate mitigation there would be no impacts on hydrology as a result of the proposed Scheme.	

Area	Description of feature / attribute	Scale (at which attribute matters)	Importance (of attribute)	Trend (in relation to target)	Biodiversity and earth heritage value	Magnitude of impact	Assessment score
Colliters Brook SINC SINC within works footprint	Brook flanked by mature oak and willow woodland with a good diversity of herbs (source Bristol Environmental Records Centre).	Local	Medium	No trend identified	Medium	Intermediate negative: The SINC would potentially experience disturbance throughout all the life stages of the proposed Scheme. See High Ridge Common SINC above.	Moderate Adverse
South Bank Meadow, Yanley SINC Adjacent	UK Priority habitat for calcareous grassland (source Bristol Environmental Records Centre).	Local	None	Declining UKBAP	None No longer exists having been lost to the Yanley Landfill development	N/A	N/A
Ashton Vale Fields SINC Adjacent	An area of improved neutral grassland pasture subject to scrub invasion at its nothwestern fringes. Oak trees also line the eastern end of the site. Source Bristol Environmental Records Centre.	Local	Medium	Declining	Medium	Minor negative: **Coherence and ecological structure and function:** The works have the potential to affect the coherence and ecological structure and function of the SINC. This may be though the degradation of habitat, Potential disturbance throughout all the life stages of the proposed Scheme, but significance reduced through appropriate mitigation. Potential for increased public pressure on the other areas of the SINC not utilised for the works footprint. Potential contamination	Slight Adverse

Area	Description of feature / attribute	Scale (at which attribute matters)	Importance (of attribute)	Trend (in relation to target)	Biodiversity and earth heritage value	Magnitude of impact	Assessment score
						through the introduction of aggregate and pollutants of the soil structure. **Habitat Fragmentation**: The Scheme has the potential to fragment connective corridors potentially reducing species dispersal and colonisation abilities and impacting the coherence of the sites ecological structure and function, as well as its resilience to impacts such as climate change or pollution. **Habitat Loss**: The Scheme would not result in the loss of any habitat within the SINC. **Aquatic Environment:** With appropriate mitigation there would be no impacts on hydrology as a result of the proposed Scheme.	
Hanginghill Wood SINC Adjacent	Mixed deciduous ancient and semi natural woodland located on a steep south east valley slope above Collters brook. The site is also covered by a tree preservation order. Source Bristol Environmental Records Centre.	Local	Medium	Declining UKBAP	Medium	Minor negative: See Ashton Vale Fields SINC above	Slight Adverse

Area	Description of feature / attribute	Scale (at which attribute matters)	Importance (of attribute)	Trend (in relation to target)	Biodiversity and earth heritage value	Magnitude of impact	Assessment score
Malago Valley SINC: 800m North **Airport Road SINC:** 900m east **Valley View Fields SINC:** 800m south west. **Dundryhill Grasslands SINC:** 700m south **Hawkfield Meadows SINC:** 600m south **Pigeon House Stream and adjacent meadows SINC:** Adjacent **Crox Bottom SINC:** Adjacent. **Hengrove Park:** 40m **Long Ashton Golf Course SINC:** 800m North East **Dawsons Walk and Lye Brook:** 500m North **Bower Ashton Mineral Railway**	No data available.	Local	Medium	Unknown	Medium	All SINCs: minor negative Given the distance of these features it is unlikely that the proposed Scheme would result in any more than a minor negative impact, other than a cumulative loss of connective corridors or colonisation habitat within the surrounding landscape.	Slight Adverse

Area	Description of feature / attribute	Scale (at which attribute matters)	Importance (of attribute)	Trend (in relation to target)	Biodiversity and earth heritage value	Magnitude of impact	Assessment score
Disused: 500m north							
Arable fields and Improved grassland	The majority of the site is either within arable fields or improved grassland with little benefit to biodiversity.	Local	Low	Increasing	Low	Negligible: **Habitat loss:** The loss of habitat is of low value and the loss of such habitat is negligible.	Neutral
Species Rich Semi-Improved grassland	Species rich semi-improved grassland of the MG1e and MG10b National Vegetation Classification.	Local	Medium	Declining	Medium	Minor negative: **Habitat loss:** There is the potential to result in either the loss and/or degradation of grassland features resulting in a minor negative impact to these features.	Slight Adverse
Hedgerows	Numerous hedgerows four of which are Important under the Hedgerows Regulations 1997 and one species rich and a further one that is of moderate importance to the overall bat assemblage.	Regional	Medium	Declining	Medium	Major negative: **Habitat Loss and Fragmentation:** Numerous hedges will be bisected as a result of the Scheme. All Important Hedgerows would have to be removed in line with the Hedgerows Regulations 1997, and where flight lines of bats are effected mitigation should be implemented.	Moderate Adverse

Area	Description of feature / attribute	Scale (at which attribute matters)	Importance (of attribute)	Trend (in relation to target)	Biodiversity and earth heritage value	Magnitude of impact	Assessment score
Trees	Four trees with high potential for roosting bats will be removed as a result of the scheme.	Local	Medium	Declining	Medium	Minor negative: **Habitat loss**: potential roosting habitat for bats may be destroyed. Surveys should be undertaken and any roosts required to be removed must be removed under an EPS licence.	Slight Adverse
Running Water	The scheme crosses Longmoor Brook, Ashton Brook and Colliter's Brook.	Local	Medium	Declining	Medium	Minor negative: **Habitat Loss and Fragmentation:** There is the potential to result in either the loss, degradation and fragmentation of brook features resulting in a minor negative impact to these features.	Slight Adverse
Ponds	There are several ponds in the areas around Colliter's and Longmoor Brooks. There is also a lake and pond just to the east of the Hengrove end of the route. Great crested newts are known to be within 725m of the route at Yanley Farm.	Regional	High	Declining	Medium	Minor negative: **Habitat loss:** There is the potential to result in either the loss or degradation of pond features resulting in a major negative impact to these features.	Slight Adverse
Internationally Protected Species	The footprint for the proposed Scheme is known to support species of European Importance including bats, otters and great crested newts.	International	Very High	Declining	High	Major negative: The Scheme has the potential to result in a major negative impact to European Protected Species	Slight adverse. All works would be required to be undertaken under a NE EPS licence

Area	Description of feature / attribute	Scale (at which attribute matters)	Importance (of attribute)	Trend (in relation to target)	Biodiversity and earth heritage value	Magnitude of impact	Assessment score
						(EPS) through the loss or disturbance of habitat used by EPS. Environmental walkovers and species specific surveys would be required and should EPS be present on site, all works would be carried out under a Natural England (NE) licence for each species concerned. The method statement for each licence would set out clear and accepted working practices and mitigation to accommodate the presence of EPS. Therefore, the magnitude of impact would reduce from major negative to minor negative for all EPS.	where an impact on EPS is likely.
Nationally Protected Species	The footprint is known to support species of National Importance species, including badgers, reptiles and nesting birds and a variety of UK Biodiversity Action Plan (BAP) species.	National	High	Declining	High/ Medium	Major negative: The Scheme has the potential to result in major negative impacts to Protected or BAP Species through the loss or disturbance of habitat used by that species. However, BAP species would require suitable mitigation to ameliorate this loss, and therefore the magnitude of impact would be reduced from major negative to minor negative.	Slight Adverse

Reference Source(s):

- MAGIC interactive map http://www.magic.gov.uk/website/magic/ Last accessed February 2008;
- JNCC;
- UK Biodiversity Action Plan;
- Natural England;
- Source Bristol Environmental Records Centre;
- South Bristol Link Options Appraisal (Mott MacDonald, 2008); and,
- Ashton Park Environmental Statement (Baker Shepherd Gillespie, 2009).

Qualitative comments: The Scheme would potentially result in a Moderate Adverse impact on biodiversity features due to direct habitat loss from a number of locally designated sites and impacts to nationally and internationally protected species including badgers, reptiles, breeding birds, otter, great crested newts and bats. Appropriate mitigation would reduce potential adverse impacts and should include an ecological watching brief with works undertaken under appropriate licences. Compensatory habitat as mitigation should be considered where the Scheme is likely to directly impact designated sites.

Summary Assessment Score: Slight Adverse

C.4 Water Environment

Description of study area / Summary of potential impacts	Feature	Attribute Services	Quality	Scale	Rarity	Substitutability	Importance	Magnitude	Significance
Potential Impacts include: **Surface Waters** Any drainage discharged to surface water bodies may decrease surface water quality through both diffuse pollution and accidental spillage. Several surface water bodies in the area are designated as 'at risk' on the draft RBMP. The proposed link crosses several water courses which will require culverting/ bridging which would result in disruption/alterations to surface water flows and potential water quality impacts. Any groundwater drawdown as a result of the scheme has the potential to impact surface water flows. Biodiversity may be adversely impacted, although the water courses in the area are generally highly modified. **Flooding** The proposed Scheme would cross several areas of Environment Agency designated flood zones. The creation of additional hardstanding and the creation of increased speeds and quantities of surface water runoff have the potential to exacerbate flooding in these areas. In addition, the underlying soils predominantly have impeded drainage and are seasonally wet in the north, meaning the use of infiltration drainage/SUDS may be problematic. **Groundwaters** From road construction it is likely that subsoil cover would be removed and the shallow superficial aquifer excavated. This can lead to a drawdown in groundwater levels in areas of cuttings and excavations which has the potential to impact seasonally wet habitats. Any drainage discharged via	**Watercourses** (East to Northwest): • Pigeonhouse Stream – would be culverted beneath the existing road south of Imperial Park. • The Malago – would be culverted beneath the Scheme road in Bishopsworth. • Drains and a tributary of Colliter's Brook – present in central area, west of Yew Tree Farm. • The Scheme would follow the tributary of Colliter's Brook via Stones Landfill Culvert and then the line of Colliter's Brook underneath the railway. Drains are present along the railway. • Proposed BRT route to the P&R would follow the line of the New Colliter's Brook Armco Culvert Overflow and potentially part of the Colliter's Brook Relief Channel. • The Scheme to A370 would cross Longmoor Brook and drains alongside to A370. **Floodplain** (East to Northwest): • Low flood risk (<1/200 chance each year) where Pigeonhouse Stream passes under the existing road. • Moderate flood risk (<1/200-1/75 chance each year) where	Biodiversity	There is no data available on biological water quality for water courses in the area. A SSSI is present at Ashton Court Estate, to the northwest of the project. However, it does not link to watercourses in the area of the project. Colliter's Brook and The Malago are included on the Environment Agency's Draft River Basin Management Plan (RBMP) for Rivers as part of the Severn River Basin District. The ecological & chemical quality of these streams have not yet been assessed but they both have a 'highly modified' hydromorphological status and are designated as "at risk"/"probably at risk" respectively.	Local	Low	Limited	Low	Minor	Insignificant
		Recreation	There is little use of Colliter's Brook or Longmoor Brook for recreation, as they pass through commercial/industrial and landfill areas. The Malago and Pigeonhouse Stream also have limited recreational uses although both have Public Rights of Way which run parallel to them downstream of the Scheme.	Local	Low	Limited	Low	Negligible	Insignificant
		Value to economy	Colliter's Brook passes through Ashton Vale Trading Estate, and close to landfill works at Yanley and other Landfill sites. These industrial sites may discharge to the stream.	Local	Low	Limited	Low	Negligible	Insignificant
		Conveyance of flow	All water courses detailed to the left would receive surface water runoff from the South Bristol area. The Scheme would cross all of the water courses detailed to the left. Culverting or bridging of these water courses would be required.	Local	Low	Limited	Low	Minor	Insignificant
		Conveyance of flood flows	The Scheme would cross several areas designated as zones of flood risk by the Environment Agency. The chance of flooding in these areas varies from low (<1/200 chance each year) to moderate (<1/200-1/75 chance each year) in the southern and central sections, up to significant (>1/75 chance each year) at the northernmost section.	Local	Medium	Limited	Medium	Moderate	Low Significance

Description of study area / Summary of potential impacts	Feature	Attribute Services	Quality	Scale	Rarity	Substitutability	Importance	Magnitude	Significance
infiltration may decrease groundwater quality through both diffuse pollution and accidental spillage. The construction of additional hardstanding could result in a reduction in aquifer recharge. The proposed Scheme would also cross several landfills – the disturbance of landfill material has the potential to generate/release contaminated leachates to underlying groundwaters.	the Malago would pass under the proposed Scheme. • Moderate flood risk south of the railway relating to Colliter's Brook (east of Yanley Landfill) and low flood risk north of the railway relating to Colliter's Brook and the New Colliter's Brook Armco Culvert Overflow. • Low flood risk where the proposed Scheme would cross the Longmoor Brook to the north. Moderate to Significant flood risk (>1/75 chance each year) relating to Colliter's Brook and Longmoor Brook in the vicinity of the Park and Ride. **Groundwater** Stillwaters (Lakes and Ponds)	Water Supply	The Scheme would mainly pass over non-aquifer rock, though it crosses a minor aquifer with soil of a High (Urban), or 'HU' classification at the connection to the Hengrove Way. The HU classification is given for urban soil where the information is based on fewer observations than elsewhere, so a high vulnerability level is assumed. The Scheme would also cross minor aquifers with Intermediate 1 classified soil at Yanley, and close to the A370. There is also a small area of minor aquifer with soil of a low leaching potential near to the A370. The Scheme would be about 2 kilometres from a Source Protection Zone (Inner Zone). Groundwater in the area is included on the RBMP for Groundwater as part of the Severn River Basin District. According to the Soilscape Maps, the majority of soils in the area are loamey or clayey with impeded drainage – particularly to the north of the railway line where seasonally wet pastures are indicated.	Local	Low	Limited	Low	Minor	Insignificant
		Transportation and dilution of waste products	The Scheme would cross several historic and current landfill areas which accepted a variety of household, commercial, industrial and special waste. (East to Northwest): • The 'Hartcliffe Way' landfill is present partially extending across the eastern most end of the existing road. • The 'Castle Farm'/'Stones' and 'Yew Tree Farm'/'Yanley' landfills would be crossed in the central section, west of Yew Tree Farm. • The proposed Scheme would pass along the edge of the 'Yanley Lane' landfill south of the railway. To the north of the railway, the 'South Liberty Lane Brickworks' landfill is present immediately to the east. • To the far north, adjacent to the A370, the proposed Scheme would cross the 'Viridor Long Ashton' landfill. The proposed BRT route would pass in close proximity to the 'Land at Parsonage Farm' landfill before crossing the 'Ashton Gate Landfill' at the P&R. These landfills accepted a variety of wastes including inert, household, commercial, industrial and special. Any disturbance of landfill material could result in contaminant release to groundwater.	Local	Low	Limited	Medium	Moderate	Low Significance

Description of study area / Summary of potential impacts	Feature	Attribute Services	Quality	Scale	Rarity	Substitutability	Importance	Magnitude	Significance
		Biodiversity	The proposed Scheme and BRT would pass in close proximity to several small ponds, although it is not believed any would be directly impacted. There is no link to the SSSI at Ashton Court Estate. Some are related to the waste industries while others are natural. The largest body of water is adjacent to Imperial Park along the Pigeonhouse Stream.	Local	Low	Limited	Low	Negligible	Insignificant
		Recreation	None of the water bodies are large enough to be used for recreational purposes.	Local	Low	Limited	Low	Negligible	Insignificant

Reference Sources: EA Website, OS Maps, NRA Groundwater Vulnerability Maps, MAGIC website, Scheme drawings.

Qualitative Comments: The Scheme would cross several water courses which would require culverting/bridging, and may result in disruption/alterations to surface water flows and quality. The discharge of road drainage to surface water bodies may also adversely impact on water quality. Biodiversity is unlikely to be significantly impacted, as water courses in the area are generally highly modified. The Scheme would pass through several EA designated flood zones and the underlying soils predominantly have impeded drainage. Therefore, additional runoff may exacerbate flooding in these areas. The removal of subsoil and shallow aquifer excavation during road construction can lead to groundwater drawdown which has the potential to impact surface water flows and groundwater sustained habitats such as seasonally wet pastures. The construction of additional hardstanding may also reduce aquifer recharge. Groundwater quality may be adversely impacted through the infiltration of road runoff. In addition, the proposed link crosses several landfills – the disturbance of landfill material has the potential to generate/release contaminated leachates to underlying groundwaters.

Summary Assessment Score: Slight Adverse Impact

C.5 Physical Fitness

Activity Duration per day	Change in Number of People	
	Pedestrians	Cyclists
Less than 30 minutes	Increase The Pedestrian way running through the urban areas of Bishopsworth and Highridge would enable residents to make shorter, direct journeys to local amenities and other residential areas, with the provision of a formalised route possibly encouraging use. The introduction of the BRT and bus lane sections along the route may encourage people to use public transport rather than the car for short journeys, with Physical Fitness being increased by the short walk from the residential areas to the nearest bus-stop. The direct link of the Scheme to the Long Ashton Park and Ride would again encourage the public to use public transport to travel into the town centre rather than the car, which would encourage walking from the bus-stops to the centre.	Increase The new Cycleway would provide a link between already existing cycleways in the area thus providing a more developed network, thus a more efficient method of transport around the area by bicycle. This would also link up more residential areas such as Bishopsworth and Highridge so facilitating journeys between such areas. The Cycleway would provide a more direct link between facilities thus encouraging more people to cycle as journey times would be reduced. The fully separated Cycleway from the lanes of traffic along the Scheme would add an element of safety to cycling thus encouraging more people to use the route. Provisions would be made at the Park and Ride facility for bikes to be left safely, thus encouraging more people to use public transport to access the town centre.
Greater than 30 minutes	Increase The Pedestrian way would provide a direct link from urban areas in South Bristol to the surrounding countryside, in particular the Ashton Court Country Park, thus encouraging excursions. It would provide a direct link, so travel time would be shorter, thereby encouraging use. The formalised route may encourage use by the public as opposed to the existing informal green walkway which currently exists.	Increase The Cycleway would provide a direct link from the urban areas of South Bristol to the surrounding countryside, in particular the Ashton Court County Park thus encouraging long distance excursions. The formalised and separated route from the traffic carriageway may encourage use. The Scheme would provide access to other cycleways in the area to provide a more integrated route for the pubic to use to access more distant areas safely by bicycle. The Cycleway would allow more direct access to more distant facilities such as the Long Ashton football ground.

Reference Source(s): WebTAG assessment guidance sub-objective 3.3.12

Qualitative comments: The option would result in an increase of Physical Fitness by encouraging pedestrian and cycle journeys both over and under 30 minutes. The implementation of a cycleway and pedestrian route would have a significant impact on the number of pedestrians and cyclists in the area as there is currently little provision for them. The residential areas are currently linked by informal routes and green walkways, but the provision of a direct, formalised route would encourage use. In addition, the provision of lighting along the route would create a safe atmosphere so would appeal to a larger section of the public.

Summary assessment score: Moderate Beneficial

C.6 Journey Ambience

Factor	Sub-factor	Better	Neutral	Worse
Traveller Care	Cleanliness	Provision of new buses as part of the BRT. The buses would be new, with a high standard of internal and external cleanliness.		
	Facilities	Footways and cycleways included as part of the Scheme. Pedestrian and cyclist crossing provided at all standard signalised junctions.		
	Information	Next stop information provided on all buses. Real time information systems would be provided at all bus stops. Timetables and network maps would be provided in public places and made available over the internet.	General travel information such as hazard signs provided, to current highways standards.	
	Environment	The smoothness of the ride would increase due to the new surface of the road. The environment of the residential areas would benefit from the removal of traffic to the new route. Noise level would fall.	Noise levels would be high for pedestrians due to the proximity of the road. In peak times buses may be overcrowded and the road congested.	
Travellers' Views	-	The western section of the route would pass through open terrain affording views of the surrounding countryside. The new views provided would be beneficial for travellers.	The eastern section of the route would pass through the urban areas of Bishopsworth and Hartcliffe, and so views would not change from those currently afforded.	
Traveller Stress	Frustration	The Scheme would result in a high quality, integrated road network with gentle bends, making for a more enjoyable driver experience and reducing frustration. The road would be constructed to current standards and as such would be superior in perceived smoothness and performance characteristics. Passengers would be kept informed of bus arrival times by real time information systems.		

Factor	Sub-factor	Better	Neutral	Worse
	Fear of potential accidents	Congestion would be reduced in residential areas, resulting in reduced risk of accidents. Junctions would be designed to current safety standards, and the width of the road would keep lanes of traffic at a safe distance from each other.	Roads would be constructed to current standards with clear road-markings. Lanes of traffic would be kept separated from pedestrians and the cycle way.	
	Route uncertainty	There would be clear markings on the roads as per current standards and junctions would be well signposted.		

Reference Source(s): Webtag guidance Journey Ambience sub-objective 3.3.13

Qualitative comments: The Scheme would result in an improvement in journey quality by improvements in Traveller Care, Views and Stress. The appraisal assumes that between 500 and 10,000 people would benefit from the Scheme on a daily basis. There would be significant improvements in Traveller Care by the provision of more facilities and cleaner services, and stress and route uncertainty are expected to diminish due to the integrated design of the Scheme.

Summary assessment score: The score for the Journey Ambience sub-objective has been assessed as **Moderate Beneficial**.

C.7 Noise

APPRAISAL - NOISE POLLUTION

Proposal Opening Year:	2018
Average Household Size:	2.36
Project (Road or Rail):	Road

No. of households experiencing 'Do Minimum' & 'Do Something' noise levels (given in $dB_{L_{A10}}$) in Opening Year

Do Minimum \ Do Something	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
<45	0	25	1	0	0	0	0	0	0	0	0	0	0	0
45-47.9	0	447	207	0	1	0	0	0	0	0	0	0	0	0
48-50.9	0	10	1437	393	66	14	8	2	0	0	0	0	0	0
51-53.9	0	0	50	1909	235	24	5	2	0	0	0	0	0	0
54-56.9	0	0	0	71	896	54	74	3	0	0	0	0	0	0
57-59.9	0	0	0	5	200	550	123	13	0	0	0	0	0	0
60-62.9	0	0	0	0	0	353	330	76	0	0	0	0	0	0
63-65.9	0	0	0	0	0	1	201	373	9	0	0	0	0	0
66-68.9	0	0	0	0	0	0	0	78	166	0	0	0	0	0
69-71.9	0	0	0	0	0	0	0	0	14	27	0	0	0	0
72-74.9	0	0	0	0	0	0	0	0	0	5	2	0	0	0
75-77.9	0	0	0	0	0	0	0	0	0	0	5	0	0	0
78-80.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81+	0	0	0	0	0	0	0	0	0	0	0	0	0	0

No. of households experiencing 'Do Minimum' & 'Do Something' noise levels (given in $dB_{L_{A10}}$) in 15th Year After Opening

Do Minimum \ Do Something	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
<45	0	1	0	0	0	0	0	0	0	0	0	0	0	0
45-47.9	1	247	111	0	0	0	0	0	0	0	0	0	0	0
48-50.9	0	189	1121	210	47	11	7	0	0	0	0	0	0	0
51-53.9	0	0	358	1185	144	32	9	5	0	0	0	0	0	0
54-56.9	0	0	5	313	802	35	13	2	0	0	0	0	0	0
57-59.9	0	0	0	20	133	536	120	76	0	0	0	0	0	0
60-62.9	0	0	0	0	24	76	726	88	0	0	0	0	0	0
63-65.9	0	0	0	0	0	8	398	390	18	0	0	0	0	0
66-68.9	0	0	0	0	0	0	7	74	241	0	0	0	0	0
69-71.9	0	0	0	0	0	0	0	0	9	47	0	0	0	0
72-74.9	0	0	0	0	0	0	0	0	0	4	7	0	0	0
75-77.9	0	0	0	0	0	0	0	0	0	0	6	0	0	0
78-80.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81+	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Net Present Value of Noise of Proposal (60 Year Period)	£1,542,050.98	*positive value reflects a net benefit (i.e. noise reduction)
Estimated Population Annoyed (Do-Minimum):	2414.4	
Estimated Population Annoyed (Do-Something):	2358.7	
Net Noise Annoyance Change in 15th Year After Opening (no. of people):	-56	*positive value reflects an increase in people annoyed by noise

Traffic Data sources: Atkins Traffic Model for South Bristol

Population data Sources: Household sizes assumed to be national average. House counts were determined using Ordnance Survey Address-Point data

Assumptions: To account for noise changes for routes further than 600m from the Scheme centreline that were predicted to experience a change greater than 1dB, all sensitive properties within 25m were assumed to experience the changes predicted fromtraffic data on that link alone at a reference distance of 25m.

Assessment scores:

- Net present value of noise proposal at £1,542,051
- Net annoyance change in 15th year = -56

Qualitative comments: At a relatively small number of properties there is a large noise disbenefit by the introduction of a new noise source. This is outweighed by a small noise benefit at a relatively large number of houses.

C.8 Air Quality

Nitrogen Dioxide WebTag Summary 2018 (Opening Year)

NO_2, SUMMARY OF ROUTES: The aggregated table	0–50m (i)	50-100m (ii)	100-150m (iii)	150-200m (iv)	0-200m (v=i+ii+iii+iv)
Total properties across all routes (min)	6557	6200	6126	5176	24059
Total properties across all routes (some)	6557	6200	6126	5176	24059
Do-minimum NO_2 assessment across all routes	176427	171875	177259	151627	Total assessment NO_2 (I): 677187
Do-something NO_2 assessment across all routes	175354	171445	177056	151562	Total assessment NO_2 (II): 675417
NET TOTAL ASSESSMENT FOR NO_2, all routes (II-I)					-1770
Number of properties with an improvement					11647
Number of properties with no change					5538
Number of properties with a deterioration					6874

Reference Sources:

- DMRB 11.3.1;
- WebTag 3.3.3; and,
- Traffic Data Calculations provided by Atkins.

Quantitative Measures: The Scheme is expected to provide an improvement in air quality at 11647 properties, with an additional 6874 properties predicted to experience deterioration in air quality. The remaining 5538 are predicted to remain unchanged.

Assessment Scores: -1770 (Do-Something Assessment Score – Do-Minimum Assessment Score)

Qualitative Measures: The change to air quality will vary depending on the location, congestion, time of day and speed of the traffic. The scores indicate that there will be an overall improvement in air quality with the Scheme in place, with the overall population exposure predicted to reduce by 0.07 µg m^{-3}. As a result, NO_2 concentrations within the Opening Year are predicted to be of negligible significance.

Particulate Matter WebTag Summary 2018 (Opening Year)

PM_{10}, SUMMARY OF ROUTES: The aggregated table	0–50m (i)	50-100m (ii)	100-150m (iii)	150-200m (iv)	0-200m (v=i+ii+iii+iv)
Total properties across all routes (min)	6557	6200	6126	5176	24059
Total properties across all routes (some)	6557	6200	6126	5176	24059
Do-minimum PM_{10} assessment across all routes	98357	92379	92147	77987	Total assessment PM_{10} (I): 360870
Do-something PM_{10} assessment across all routes	98052	92280	92105	77973	Total assessment PM_{10} (II): 360409
NET TOTAL ASSESSMENT FOR PM_{10}, all routes (II-I)					-461
Number of properties with an improvement					11647
Number of properties with no change					5538
Number of properties with a deterioration					6874

Reference Sources:

- DMRB 11.3.1;
- WebTag 3.3.3; and,
- Traffic Data Calculations provided by Atkins.

Quantitative Measures: The Scheme is expected to provide an improvement in air quality at 11647 properties, with an additional 6874 properties predicted to experience deterioration in air quality. The remaining 5538 are predicted to remain unchanged.

Assessment Scores: -461 (Do-Something Assessment Score – Do-Minimum Assessment Score)

Qualitative Measures: The change to air quality will vary depending on the location, congestion, time of day and speed of the traffic. The scores indicate that there will be an overall improvement in air quality with the Scheme in place, with the overall population exposure predicted to reduce by 0.02 µg m^{-3}. As a result, PM_{10} concentrations within the Opening Year are predicted to be of negligible significance.

Nitrogen Dioxide WebTag Summary 2033 (Design Year)

NO_2, SUMMARY OF ROUTES: The aggregated table	0–50m (i)	50-100m (ii)	100-150m (iii)	150-200m (iv)	0-200m (v=i+ii+iii+iv)
Total properties across all routes (min)	5572	5044	4746	3976	19338
Total properties across all routes (some)	5572	5044	4746	3976	19338
Do-minimum NO_2 assessment across all routes	151270	133773	128157	109820	Total assessment NO_2 (I): 523020
Do-something NO_2 assessment across all routes	150645	133507	128034	109275	Total assessment NO_2 (II): 521461
NET TOTAL ASSESSMENT FOR NO_2, all routes (II-I)					-1559
Number of properties with an improvement					10795
Number of properties with no change					2162
Number of properties with a deterioration					6381

Reference Sources:

- DMRB 11.3.1;
- WebTag 3.3.3; and,
- Traffic Data Calculations provided by Atkins.

Quantitative Measures: The Scheme is expected to provide an improvement in air quality at 10795 properties, with an additional 6381 properties predicted to experience deterioration in air quality. The remaining 2162 are predicted to remain unchanged.

Assessment Scores: -1559 (Do-Something Assessment Score – Do-Minimum Assessment Score)

Qualitative Measures: The change to air quality will vary depending on the location, congestion, time of day and speed of the traffic. The scores indicate that there will be an overall improvement in air quality with the Scheme in place, with the overall population exposure predicted to reduce by 0.08 µg m^{-3}. As a result, NO_2 concentrations within the Design Year are predicted to be of negligible significance.

Particulate Matter WebTag Summary 2033 (Design Year)

PM_{10}, SUMMARY OF ROUTES: The aggregated table	0–50m (i)	50-100m (ii)	100-150m (iii)	150-200m (iv)	0-200m (v=i+ii+iii+iv)
Total properties across all routes (min)	5572	5044	4746	3976	19338
Total properties across all routes (some)	5572	5044	4746	3976	19338
Do-minimum PM_{10} assessment across all routes	100137	89890	85003	71600	Total assessment PM_{10} (I): 346630
Do-something PM_{10} assessment across all routes	99949	89828	84973	71591	Total assessment PM_{10} (II): 346342
NET TOTAL ASSESSMENT FOR PM_{10}, all routes (II-I)					-287
Number of properties with an improvement					9664
Number of properties with no change					2162
Number of properties with a deterioration					7512

Reference Sources:

- DMRB 11.3.1;
- WebTag 3.3.3; and,
- Traffic Data Calculations provided by Atkins.

Quantitative Measures: The Scheme is expected to provide an improvement in air quality at 9664 properties, with an additional 7512 properties predicted to experience deterioration in air quality. The remaining 7512 are predicted to remain unchanged.

Assessment Scores: -287 (Do-Something Assessment Score – Do-Minimum Assessment Score)

Qualitative Measures: The change to air quality will vary depending on the location, congestion, time of day and speed of the traffic. The scores indicate that there will be an overall improvement in air quality with the Scheme in place, with the overall population exposure predicted to reduce by 0.01 µg m^{-3}. As a result, PM_{10} concentrations within the Design Year are predicted to be of negligible significance.

C.9 Greenhouse Gas

APPRAISAL- Greenhouse Gases

Proposal Name:	**South Bristol Link: Preferred Option**
Current Year of Appraisal:	2010
Proposal Opening year:	2018
Project (Road/Rail or Road and Rail):	

Overall Assessment Score:

Net Present Value of Carbon Emissions of Proposal (£):	763,199
(60 Year Period)	*positive value reflects a **net benefit** (i.e. carbon emissions reduction)

Quantitative Assessment:

Change in Carbon Emissions over 60 year appraisal period (tonnes): (between 'with scheme' and 'without scheme' scenarios)	-19,264
Change in Carbon Emissions in Opening year (tonnes): (between 'with scheme' and 'without scheme' scenarios)	-78

Sensitivity Analysis:

Description:

Upper Estimate Net Present Value of Carbon Emissions of Proposal (£):	915,839
Lower Estimate Net Present Value of Carbon Emissions of Proposal (£):	686,879

Notes: * Positive value reflects a net benefit (i.e. carbon emissions reduction)

Qualitative comments: Emissions are expected to decrease in the future years as a result of the scheme.

Data Sources: TUBA output data (Atkins) and WebTAG Greenhouse Gas spreadsheet

Assessment Scores: (positive/neutral/negative): Positive