Hicks Gate Roundabout
Preliminary Environmental Report

Prepared for

Bath and North East Somerset Council

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Contents

Section Page

Introduction 1-1
1.1 Introduction 1-1
1.2 Purpose of the Report 1-1
1.3 Data Sources 1-1
1.4 Structure of the Report 1-1

Site and Surrounding Area 2-3
2.1 Introduction 2-3
2.2 Physical Environment 2-4

Options and Consenting 3-5
3.1 Introduction 3-5
3.2 Options Under Consideration 3-5
3.3 Consenting 3-7

Air Quality 4-1
4.1 Legislation and Policy 4-1
4.2 Study Area 4-4
4.3 Baseline Environment 4-5
4.4 Design, Mitigation and Enhancement Measures 4-7
4.5 Preliminary Identification of Impacts 4-7

Cultural Heritage 5-1
5.1 Legislation and Policy 5-1
5.2 Study Area 5-3
5.3 Baseline Environment 5-3
5.4 Design, Mitigation and Enhancement Measures 5-8
5.5 Preliminary Identification of Potential Impacts 5-8

Landscape and Visual 6-1
6.1 Legislation and Policy 6-1
6.2 Study Area 6-4
6.3 Baseline Environment 6-4
6.4 Design, Mitigation and Enhancement Measures 6-5
6.5 Preliminary Identification of Potential Impacts 6-6

Ecology and Nature Conservation 7-1
7.1 Legislation and Policy 7-1
7.2 Study Area 7-3
7.3 Baseline 7-4
7.4 Design, Mitigation and Enhancement Measures 7-6
7.5 Preliminary Identification of Potential Impacts 7-7

Noise and Vibration 8-1
8.1 Legislation and Policy 8-1
8.2 Study Area 8-3

8.3 Baseline Environment 8-3
8.4 Design, Mitigation and Enhancement Measures 8-1
8.5 Preliminary Identification of Potential Impacts 8-1

People and Communities 9-1
9.1 Legislation and Policy 9-1
9.2 Study Area 9-2
9.3 Baseline Environment 9-2
9.4 Design, Mitigation and Enhancement Measures 9-6
9.5 Preliminary Identification of Potential Impacts 9-7

Water Resources 10-1
10.1 Legislative and policy framework 10-1
10.2 Study area 10-2
10.3 Baseline Environment 10-2
10.4 Design, Mitigation and Enhancement Measures 10-1
10.5 Preliminary Identification of Potential Impacts 10-1

Summary 11-1
11.1 Summary of Potential Environmental Impacts 11-1
11.2 Summary of Potential Environmental Opportunities 11-2
11.3 Early Appraisal Sifting Tool (EAST) 11-3

Appendix A: Options and Constraints Plans 11-1

Appendix B: Option Drawings 11-2

Acronyms and Abbreviations

AMAAA	The Ancient Monuments and Archaeological Areas Act
AONB	Area of Natural Outstanding Beauty
AQAP	Air Quality Action Plan
AQMA	Air Quality Management Area
AQS	Air Quality Strategy
ARN	Affected Road Network
BaNES	Bath and North East Somerset
BAP	Biodiversity Action Plan
CAZ	Clean Air Zone
CEMP	Construction Environmental Management Plan
CiFA	Chartered Institute for Archaeology
CROW	Countryside and Rights of Way
DBA	Desk Based Assessment
DCLG	Department for Communities and Local Government
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
DMRB	The Design Manual for Roads and Bridges
DM	Do minimum
DS	Do Something
EAST	Early Assessment and Sifting Tool
EC	European Commission
EIA	Environmental Impact Assessment
EcIA	Ecological Impact Assessment
ELC	European Landscape Convention
EPS	European Protected Species
END	Environmental Noise Directive
EU	European Union
FRA	Flood Risk Assessment
HMA	Housing Market Area
HRA	Habitats Regulation Assessment
IEEM	Institute of Ecology and Environmental Management
JLTP3	Joint Local Transport Plan 3

JNCC	Joint Nature Conservation Committee
km	kilometre
LAQM	Local Air Quality Management
LCA	Landscape Character Area
LNR	Local Nature Reserves
m	metres
MAGIC	Multi-Agency Geographic Information for the Countryside
NERC Act	The Natural Environment and Rural Communities Act 2006
NCA	National Character Area
NIA	Noise Important Areas
NIR	Noise Insulation Regulations
NMU	Non Motorised User
NNR	National Nature Reserve
NO_2	Nitrogen dioxide
NOx	A generic term for mono-nitrogen oxides NO and NO_2 (nitric oxide and nitrogen dioxide).
NPPF	National Planning Policy Framework
NPSE	Noise Policy Statement for England (NPSE)
O_3	Ozone
OAR	Options Assessment Report
OBC	Outline Business Case
PM_{10}	Particulate matter with a diameter of less than 10 microns
PRoW	Public Right of Way
Ramsar sites	Internationally Important Wetland sites
RBMP	River Basin Management Plans
RIGS	Regionally Important Geological Site
RoWIP	Rights of Way Improvement Plan
RSS	Regional Spatial Strategy
SAC	Special Areas of Conservation
SFRA	Strategic Flood Risk Assessment
SNCI	Sites of Nature Conservation Interest
SPA	Special Protection Area
SPG	Supplementary Planning Guidance
SPZs	Source Protection Zones
SSSI	Sites of Special Scientific Interest
SuDS	Sustainable Drainage Systems

SWRSS	South West Regional Spatial Strategy
TAG	Transport Analysis Guidance
UK	United Kingdom
UKBAP	UK Biodiversity Action Plan
WCA 1981	The Wildlife and Countryside Act 1981
WebTAG	Department for Transport's website for guidance on the conduct of transport studies
WEP	West of England Partnership
WFD	Water Framework Directive
WoE	West of England

SECTION 1

Introduction

1.1 Introduction

CH2M have been commissioned to prepare a business case to support capacity improvements at the junction between the A4174, A4 Keynsham By-Pass/ Bath Road and Durley Hill. This junction is known as 'Hicks Gate Roundabout'. This will be presented as an Options Assessment Report (OAR). Following assessment of options, an Outline Business Case (OBC) for the preferred scheme will be prepared.

To inform the OAR and OBC environmental data has been collected and is reported within this Preliminary Environmental Report.

1.2 Purpose of the Report

The purpose of this Report is to provide sufficient information on the proposed Hicks Gate Roundabout options and the environmental baseline to inform the OAR and subsequent OBC for the preferred scheme.

The level of data collected and presented has given due regards to the stage of the project - OBC and scope of works - minor highway works.

The level of work undertaken and presented in this Report is:

- To assist with the early identification of environmental impacts that may constrain options; or that will need to be addressed as part of the design process; and
- Where appropriate to inform the initial 'sifting of options', i.e. has been to reduce a long list of options to a short(er) list based on environmental constraints identified in the baseline. The baseline has been informed by readily available data.

1.3 Data Sources

All data gathered to inform this Report have been collected through a desk-based exercise. The following key data sources have been consulted:

- Data.gov.uk;
- Gov.uk;
- Environment Agency website (note that 'What's in your backyard' is now closed, but links to useful data sources are still provided);
- Historic England website;
- Natural England website;
- Bath and North East Somerset (BaNES) Council's website; and
- The Government's Multi-Agency Geographic Information for the Countryside (Magic) website

Where applicable, other data sources are detailed within each technical chapter of this Report.

1.4 Structure of the Report

The structure of the Report is as follows:

- **Chapter 1: Introduction** - Introduces the purpose and outlines the format of the Report.
- **Chapter 2: Site and Surroundings** - Provides a description of the 'Scheme' site and the wider surroundings.
- **Chapter 3: Scheme Proposals -** Provides information relating to the options currently under consideration.
- **Chapters 4 to 11: Technical Chapters** - Each provide a summary of key policy and legislation and describe the environmental baseline for each technical area. Each chapter also includes preliminary identification of potential environmental impacts. This has been provided to highlight potential impacts and to inform the development of the options.
- **Chapter 12: Summary -** This chapter provides information on the potential environmental impacts and opportunities associated with each of the options. It presents these as potential opportunities and constraints which require further consideration at the next stage of the project.

Site and Surrounding Area

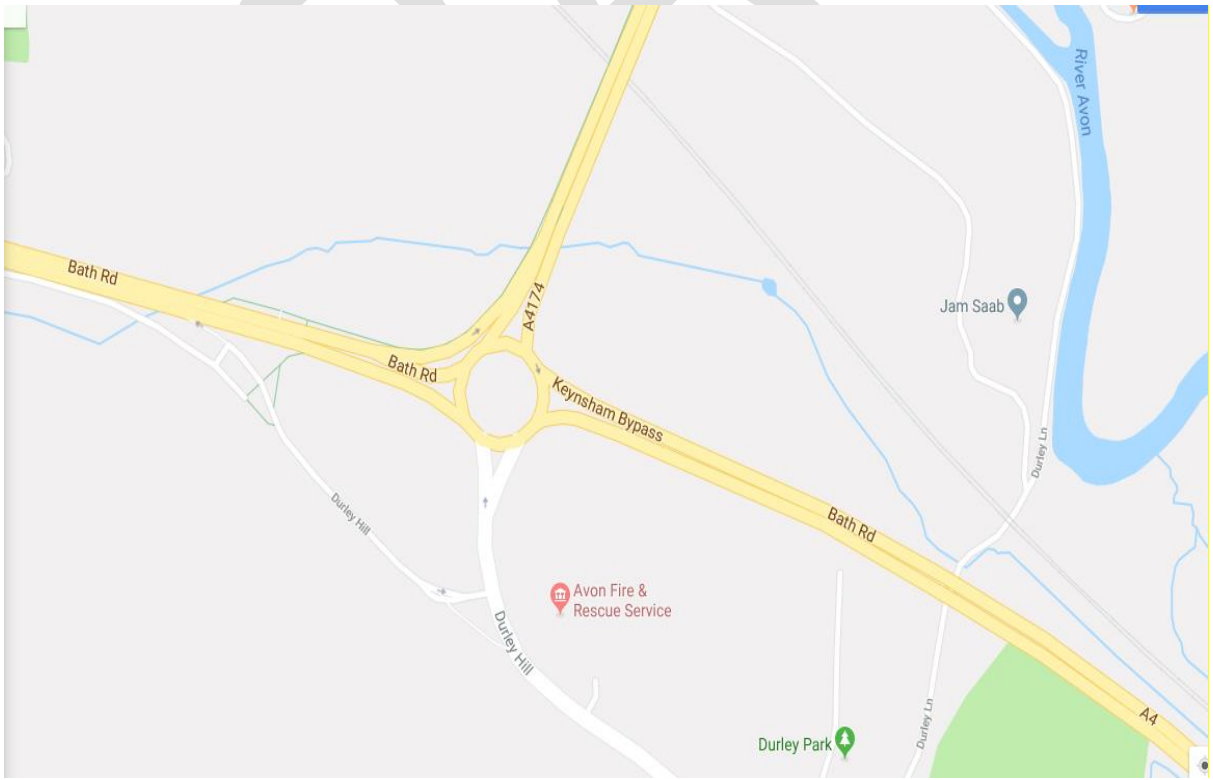
2.1 Introduction

Hicks Gate Roundabout is located in Bath and North East Somerset (BaNES). The roundabout is on the south eastern periphery of the urban area of Bristol, with Keynsham located approximately 1km to the south east and Brislington approximately 1.5km to the north west. Hicks Gate Fire Station lies to the south east of the roundabout, between Durley Hill and Keynsham Bypass (A4). Keynsham Motocross track lies directly to the north east, with the River Avon and Great Western Main Line railway also located to the north of the roundabout and the A4. Most of the land within a 0.5km radius of the roundabout can be described as greenfield/agricultural (refer to *Constraints Plan* in **Appendix A**).

A4, Bath Road forms the western arm of the roundabout and A4, Keynsham Bypass forms the eastern arm. On the western approach to the roundabout from A4, Bath Road there are three lanes and a bypass lane leading directly to the A4174 (which forms the northern arm of the roundabout). There are four lanes on the eastern approach to the roundabout from the A4, Keynsham Bypass. The exits from the roundabout onto both the eastern and western A4, Bath Road and Keynsham Bypass are dualled.

The northern arm of the roundabout is the A4174 and this has four lanes on the approach to the roundabout. The exit is dualled, but merges rapidly into a single lane that then connects with the bypass lane from the A4, Bath Road to the east. The southern arm of the roundabout is the A4175, Durley Hill which has three lanes on the approach to the roundabout and is dualled on exit, but also rapidly merges into a single carriageway.

Figure 2.1 – Site Location Plan



2.2 Physical Environment

2.2.1 Topography and Natural Area

Hicks Gate Roundabout lies within the National Character Area (NCA) known as Bristol, Avon Valleys and Ridges Natural Area (Number 118)[1]. This Natural Area includes the large urban expanse of Bristol, but is characterised by alternating ridges and broad valleys with some steep wooded slopes and open rolling farmland. The area supports parklands of conservation value, limited areas of calcareous grasslands and a number of significant water bodies including reservoirs and some wildlife-rich rivers and streams

Hicks Gate Roundabout is a soft landscaped roundabout with multiple lanes on approach and exit. The land to the west rises as it approaches the roundabout and falls away to the east. The land to the south falls steeply towards the roundabout and land to the north gently rises away.

2.2.2 Land Use and Landscape

Hicks Gate Roundabout is located within the designated green belt (as defined within the Local Plans), an important planning designation to protect the countryside from inappropriate development.

Current land use of the area comprises highway infrastructure at the roundabout. Land uses within 500m of the roundabout include: agriculture, transport (roads, railway, carpark for Durley Park), industry (Durley Park House -Government offices), recreation (Keynsham Motocross Track), community services (Hicks Gate Fire Station), residential/ retail (Hicks Gate Farm and shop) and vacant private property (GVC building on Durley Hill appears vacant based on Google Earth).

2.2.3 Biodiversity

The existing roundabout has an area of grass, shrubs and trees in the centre. There are also areas of trees and vegetation on all sides of the roundabout.

No field surveys have been undertaken, however a review of available online information has indicated the areas surrounding the Hicks Gate Roundabout have the potential to support species of flora and fauna protected by European and National legislation. There are two Nationally designated Sites of Special Scientific Interest (SSSI) 'Bickley SSSI' and 'Cleeve Woods SSSI', and two Local Nature Reserves (LNRs) 'Stock Wood Open Space LNR' and 'Avon Valley Woodland LNR' within 2km of the Hicks Gate Roundabout.

2.2.4 Water Resources

The River Avon, a designated Main River[2], passes through the northern edge of the Study Area. A tributary to the River Avon passes under the A4174 approximately 140m to the north of Hicks Gate Roundabout; this tributary flows in a westerly direction.

Land to the north east, south east and south west of Hicks Gate Roundabout lie predominantly within Flood Zone 1 (having less than 1 in 1,000-year annual probability of flooding). However, there are areas to the north west that lie within Flood Zone 3 (having less than 1 in 100-year annual probability of flooding), these areas include parts of the northern and western arms of the roundabout.

[1] http://publications.naturalengland.org.uk/publication/4646942?map=true&category=587130

[2] 'Main rivers' are usually larger rivers and streams. The Environment Agency is responsible for maintenance, improvement or construction work on main rivers to manage flood risk.
https://environment.maps.arcgis.com/apps/webappviewer/index.html?id=17cd53dfc524433980cc333726a56386

Options and Consenting

3.1 Introduction

Hicks Gate Roundabout is a major junction in the A4 highway network south west of Bristol. The roundabout is forecast to operate over capacity in the peak periods by the year 2036; leading to increased levels of congestion, with more queueing and delay on the associated network. A scheme is therefore required to improve capacity at this junction to meet future traffic projections.

The objectives of the Scheme are to:

- Reduce levels of congestion;
- Improve journey time reliability;
- Reduce vehicular emissions; and
- Improve pedestrian and cyclist routes.

3.2 Options Under Consideration

In the initial option generation and sifting exercise, six potential options were developed. These included both at-grade improvement and; or grade-separated designs. The concept design drawings developed for the long-list options are included in Appendix B and are as follows:

- Option 1 - At-grade circulatory carriageway (gyratory), with traffic signal controlled displaced right turn cut-through link. This is based on the scheme developed by CH2M in 2015. This option does not consider the inclusion of a A4-A4175 Link Road;
- Option 2 - At-grade circulatory carriageway enlargement (gyratory), with cut-through link (Variant 1);
- Option 3 - At-grade circulatory carriageway enlargement (gyratory), with cut-through link (Variant 2);
- Option 4 – Replacement of roundabout with traffic signal-controlled crossroads;
- Option 5 - Grade-separation on the east-west A4 axis (Fly-over); and
- Option 6 - Grade-separation between the A4174 Ring Road and the Link Road/A4175 Durley Hill.

All the options consider how the Hicks Gate Roundabout improvements could be linked with the proposed A4-A37 Link Road. The Scheme option drawings (included in Appendix B) show the proposed northern end of the alignment of the A4-A37 Link Road. This link could be dual or single carriageway and would tie-in with the Durley Hill using a roundabout and the spur connection to Hicks Gate.

The proposed designs have been developed to a level of detail such that their ability to meet the scheme objectives can be assessed, and to enable appraisal under Transport Analysis Guidance (TAG).

3.2.1 Option 1: Displaced link connection between the A4 and A4174

This option provides a displaced link connection between the A4 Keynsham Bypass and the A4174 to the north east of the roundabout. The link is provided to remove right turning traffic from the westbound A4 from the roundabout, thus removing the current impedance to this movement.

The infrastructure changes include:

- A left filter link for traffic routing between the A4174 and the eastbound A4 and new signalled junctions on the A4 Bypass and A4174 arms in the vicinity of the roundabout.
- A right turn 'feed' from the west bound carriageway of the A4 (west of the roundabout) to the new link. The new 'feed' is single lane, however, two lanes are provided within the link itself in the direction of the A4174 to allow more queuing capacity.

Refer to Drawing 674726.CA.51.002.

3.2.2 Option 2: Extension of the existing roundabout to the south east

This option extends the roundabout to the south east to create a larger gyratory configuration but retains the existing roundabout to provide a 'cut-through' to cater for the movement between the A4, Keynsham Bypass and the A4174.

A segregated left turn lane on the A4 Bath Road approach is retained (other traffic exiting to the A4174 are required to merge). The flared four lane section of the A4174 approach would be extended, and a segregated left turn lane added. All movements onto the roundabout are signal controlled.

Refer to Drawing 674726.CA.51.003.

3.2.3 Option 3: Extension of the existing roundabout to the south east with revised 'cut through'

This option is similar to Option 2 in that it extends the roundabout to the south east to create a larger gyratory configuration, however it does not retain the existing roundabout in its entirety. The south west of the existing roundabout is amended to enable the new 'cut-through' link to also cater for the movements from the A4175 to the A4174 and the A4. The right turn movement from the A4 to the A4174 is required to route via the main roundabout.

Refer to Drawing 674726.CA.51.004.

3.2.4 Option 4: Replacement of the existing part signalled roundabout with a large signal-controlled cross-road.

Option 4 removes the existing Hicks Gate Roundabout and replaces it with a large signal-controlled cross-road. Controlled crossing points would be provided for pedestrians and cyclists; and the existing pedestrian/cycle route between the A4175, Durley Hill and the A4174 (which makes use of the existing Toucan crossing on the A4 Bath Road to the west) are to be retained. However, this could alternatively be accommodated by adding crossing facilities to the Bath Road arm of the roundabout, with a further controlled crossing provided on the segregated left filter lane. As part of the layout, a segregated left turn lane is provided on the A4174 Ring Road approach.

Refer to Drawing 674726.CA.51.005.

3.2.5 Option 5: Grade-separation of straight-ahead movements between the A4 Keynsham Bypass and the A4 Bath Road

Option 5 retains the existing roundabout and includes the addition of a grade-separated straight-ahead movements between the A4, Keynsham Bypass and the A4, Bath Road (east-west axis). Structural retaining walls are provided in lieu of earthworks to reduce the 'footbridge' of the interchange. The existing 'staggered' Toucan crossing on the A4 Bath Road to the west would be lost and it is assumed a replacement crossing would be provided on the west side of the roundabout.

Refer to Drawing 674726.CA.51.006.

3.2.6 Option 6: Grade-separation of straight-ahead movements between the A4174 and the A4175.

Option 6 retains the existing roundabout, and includes the addition of a grade-separated straight-ahead movements between the A4174 and the A4175 (north-south axis). The GWML railway bridge approximately 200 metres to the north of Hicks Gate Roundabout provides a constraint to the grade-separation and therefore it is considered likely that there would be a requirement to lower the existing roundabout to achieve a suitable gradient and the required headroom clearance at the bridge.

Refer to Drawing 674726.CA.51.007.

3.3 Consenting

3.3.1 Permitted Development

Part 9 of the Town and Country Planning (General Permitted Development) (England) Order (GDPO) 2015 sets out the permitted development rights for 'Development relating to roads' for highway authorities. It states:

"Class A – development by highways authorities

Permitted development

A. The carrying out by a highway authority—

a) on land within the boundaries of a road, of any works required for the maintenance or improvement of the road, where such works involve development by virtue of section 55(2)(b)(g) of the Act; or

b) on land outside but adjoining the boundary of an existing highway of works required for or incidental to the maintenance or improvement of the highway.

Class B – development by the Secretary of State or a strategic highways company under the Highways Act 1980

Permitted development

B. The carrying out by the Secretary of State or a strategic highways company of works in exercise of the functions of the Secretary of State or the company under the Highways Act 1980(a), or works in connection with, or incidental to, the exercise of those functions".

All Options under consideration at Hicks Gate Roundabout involve works on land both within and adjacent to (and adjoining) the existing highway boundary. They are not considered necessary for the maintenance of the Roundabout but may be considered necessary for improvements to the highway network.

3.3.2 Environmental Impact Assessment

The basis for the Environmental Impact Assessment (EIA) legislation in England is the European Union (EU) Directive 2011/92/EU, as amended by 2014/52/EU. This Directive is transposed into UK law in various EIA Regulations.

As this stage of the options development, giving regards to the extent of the scheme, which is not located in a sensitive location as defined by the EIA regulations, we consider proposals are unlikely to constitute 'EIA development' under the Environmental Impact Assessment (Miscellaneous Amendments Relating to Harbours, Highways and Transport) Regulations 2017 hereafter referred to as the 'EIA Regulations.'). However, following selection of a preferred option, and consideration of the works areas associated with that option, (including any land temporarily required for construction), it is recommended that this position be confirmed - if necessary through preparation of a formal request for an EIA screening opinion under the EIA Regulations.

3.3.3 Habitats Regulation Assessment

The basis for Habitats Regulation Assessment (HRA) in England is the EU Directive 92/43/EEC on the conservation of habitats and of wild flora and fauna (known as the 'Habitats Directive'). This Directive, together with Directive 2009/147/EC on the conservation of wild birds (the 'Birds Directive') establishes a network of internationally important sites designated for their ecological status. The Conservation of Habitats and Species Regulations 2017 (the 'Habitats Regulations') implement the Habitats Directive and the Birds Directive in the UK.

The Habitats Regulations incorporate all Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) into the definition of 'European Sites' and, consequently, the protection afforded to European Sites under the Habitats Directive apply to SPAs designated under the Birds Directive.

A variety of species of wildlife, referred to as European Protected Species (EPS) receive protection under the Habitats Regulations. These species include: otters, bats (all species), badgers, great crested newts and dormice.

At this stage of the options development, we consider that the proposals are unlikely to result in a likely significant effect to any European designated site or its qualifying features.

3.3.4 Conclusion

All Options require works on land both within and adjacent to (and adjoining) the existing highway boundary. They are not considered necessary for the maintenance of the Roundabout but may be considered necessary for improvements to the highway network. On this basis it is recommended that discussions with BaNES planning department are undertaken to confirm whether they consider the preferred option (once selected) falls within the permitted development rights of the Council as Highway Authority (providing there are no significant adverse effects upon the environment); or whether works require planning permission under the Town and Country Planning Act,

SECTION 4

Air Quality

4.1 Legislation and Policy

4.1.1 National Legislation

4.1.1.1 National Air Quality Strategy

The European Union (EU) has established common, health and ecosystem based ambient concentration Limit Values for main pollutants in the European Directive on ambient air quality and cleaner air for Europe (2008/50/EC) (the Air Quality Directive). Limit Values are set for individual pollutants and are made up of a concentration value, an averaging time over which it is to be measured, the number of exceedances allowed per year, if any, and a date by which it must be achieved. Target Values are set out in the same way as Limit Values, and are to be attained where possible, taking all necessary measures not entailing disproportionate costs.

The UK government is responsible to the European Commission (EC) for ensuring that it complies with the provisions of the EU Directives. Part IV of the Environment Act 1995 provides that the UK Government will produce a national Air Quality Strategy (AQS), which contains standards, objectives and measures for improving ambient air quality. The current AQS for England, Scotland, Wales and Northern Ireland (Defra, 2007) provides the policy framework for air quality management and assessment in the UK. The Environment Act 1995 also requires local authorities to review the quality of air within their area and provide an assessment as to whether any prescribed air quality standards or objectives are being achieved or are likely to be achieved within the period prescribed by regulations. Where it is anticipated that an air quality objective will not be met, it is a requirement of the Act that an Air Quality Management Area (AQMA) be declared. Where an AQMA is declared, the local authority is obliged to produce an Air Quality Action Plan in pursuit of the achievement of the air quality objectives.

The UK air quality objectives are consistent with EU Limit values. The UK government is responsible to the EC for ensuring that it complies with the provisions of the EU Directives. The air quality objectives of most relevance to the Scheme (all options) are shown in Table 4.1.

Table 4.1: Air Quality Objectives

Pollutant	EU Limit Value/ UK Objective	Averaging Period
Human Health		
Nitrogen Dioxide (NO_2)	200 µg m^{-3}, not to be exceeded more than 18 times a year	1-Hour Mean
	40 µg m^{-3}	Annual Mean
Particulate Matter (PM_{10})	50 µg m^{-3}, not to be exceeded more than 35 times a year	24-Hour Mean
	40 µg m^{-3}	Annual Mean
Particulate Matter ($PM_{2.5}$)	25 µg m^{-3}	Annual Mean
Ecological Sites		
Nitrogen Oxides (NO_x)	30 µg m^{-3}	Annual Mean

4.1.1.2 Defra Air Quality Plan

In April 2015, ClientEarth, a non-government organisation (NGO), took the UK government to the UK Supreme Court for illegal air pollution. Defra's action plan showed that compliance would not be achieved until 2025 for some zones within the UK. The Supreme Court ordered the UK government to produce new plans to meet legal limits in the shortest time possible. This was followed by the publication of a new action plan by Defra in December 2015 which forecasted compliance by 2020 for five cities, and by 2025 for London. The plan stated that each of the cities identified will be mandated to introduce a Clean Air Zone (CAZ) for specified classes of vehicles and European Vehicle Emission Standards (Euro Standards) by 2020 or sooner.

In 2016, ClientEarth took the UK government back to the Supreme Court over their inadequate plan and again the UK government was ordered to draw up a new action plan. In July 2017, Defra published the UK Government's Air Quality Plan for nitrogen dioxide (Defra, 2017), setting out a detailed plan to reduce roadside NO_2 concentrations.

4.1.1.3 Climate Change Strategy

Human activities are 95% certain[3] to be causing climate change, by enhancing the warming of the greenhouse effect (i.e. retaining more of the sun's heat in the atmosphere), by the increased emissions of Greenhouse Gases (GHGs). The most significant GHG emitted is CO_2. CO_2 equivalent ("CO2e") is a standard unit for measuring carbon footprint and refers to expressing the impacts of each GHG in terms of the amount of CO_2 that would create the same amount of warming.

The United Nations Framework Convention on Climate Change sets protocols to reduce the emissions of GHGs. The Kyoto Protocol set limits on GHG emissions to 2012, with a second commitment period to end 2020 (which includes the EU, and thus the UK) to reduce emissions[4]. The Kyoto Protocol provides for the establishment of mechanisms such as the EU Emission Trading Scheme, which caps the emissions of certain industrial sectors (including power generation and cement and steel production). The Doha Amendment to the Kyoto Protocol provides for transition arrangements to 2020. At the Paris Treaty (December 2015), 195 nations agreed to the first ever global climate deal to limit global warming to 2° C. The deal is expected to come into force in 2020.

The Climate Change Act 2008 establishes a framework for the UK to achieve its long-term goals of reducing GHG emissions by at least 80% from 1990 levels by 2050 and to ensure that steps are taken towards adapting to the impact of climate change. An interim target of 34% reduction from 1990 levels by 2020 has also been agreed. The reductions are in the context of government policy to increase economic activity as measured by gross domestic product (GDP) growth.

The Carbon Plan[5] sets out the Government's plans for achieving the GHG emissions reductions committed to in the Climate Change Act and the first four carbon budgets. Low carbon transport is an essential part of the Carbon Plan. The Plan states that rail travel will become substantially decarbonised through increasing electrification and the use of more efficient trains and lower carbon fuels.

In 2011 (the latest figures available), the UK's progress against its Climate Change Act targets was a reduction of 29.1% (i.e. 549 Megatonnes CO_2e abbreviated to $MtCO_2e$) from 1990 levels excluding the

[3] IPCC Working Group 1, (2013), *Summary for Policy Makers*; http://www.climatechange2013.org/images/uploads/WGIAR5-SPM_Approved

[4] UNFCCC *Appendix I - Quantified economy-wide emissions targets for 2020*; http://unfccc.int/meetings/copenhagen_dec_2009/items/5264.php

[5] HM Government, (2011), *The Carbon Plan: Delivering our Low Carbon Future*, https://www.gov.uk/government/publications/the-carbon-plan-reducing-greenhouse-gas-emissions--2;

effects of emissions trading [4, 5]. In terms of overall UK emissions, transport accounted for 135 $MtCO_2e$ (25%) and rail for 4 $MtCO_2e$ (less than 1%).

Carbon budgets were introduced as part of the Climate Change Act 2008. The first four, five-year budgets have been set in law from 2008 to 2027. The budgets are split into traded and non-traded carbon. A limit on UK carbon emissions is imposed for each five-year period. The budgets are prepared by the Committee on Climate Change ("CoCC"), which was set up under the Climate Change Act as an independent evidence-base advisory body to the UK Government and Parliament. The Third Carbon Budget (2010) was accepted by Parliament and covers the period 2018 to 2022, which includes the proposed opening year for the Scheme in 2021. The key recommendations for the budget include:

- The need for the UK to be on a pathway to at least an 80% cut in GHG below 1990 levels by 2050, with maximum 2050 emissions of 160 MtCO2e; and
- By 2025, annual UK emissions should be reduced to around 390 MtCO2e (a 50% reduction relative to baseline levels).

4.1.2 National Planning Policy

4.1.2.1 National Planning Policy Framework (NPPF) (Revised July 2018)

Chapter 9 -*Promoting Sustainable Growth* of the NPPF identifies that transport issues issues should be considered from the earliest stages of plan-making and development proposals. Paragraph 103 states: "*Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions, and improve air quality and public health. However, opportunities to maximise sustainable transport solutions will vary between urban and rural areas, and this should be taken into account in both plan-making and decision-making."* recognising that the needs of more rural areas differ to urban areas.

Paragraph 181 of the NPPF states:

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

4.1.3 Local Policy

4.1.3.1 Joint Local Transport Plan 3 (JLTP3)

The Joint Local Transport Plan 3 (JLTP3) (West of England Partnership, 2011) covers the period 2011 to 2026. One of the aims of the JLTP3 is to improve air quality in AQMAs and ensure that air quality in other areas remains better than UK and EU standards. The Plan also focuses on raising the awareness of air quality and promoting more sustainable modes of transport.

4.1.3.2 Air Quality Management

Local authorities have no legal requirement to meet air quality objectives but are expected to do so to meet statutory EU Directives. The Local Air Quality Management (LAQM) process, as set out in Part IV of the Environment Act (1995) and the AQS places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether air quality objectives are being achieved or not.

BaNES does not currently have a local air quality strategy in place, nor is there one associated with the JLTP3. An area-based Air Quality Strategy was published for the four West of England local authorities (South Gloucestershire, Bristol City, Bath and North-East Somerset and North Somerset) in 2003 and was reviewed in 2005.

4.1.3.3 Bath and North East Somerset Core Strategy, Part 1 of the Local Plan, Adopted July 2014

Chapter 6 of the BaNES Core Strategy document details the Core Policies. The spatial strategies set out in the chapter cover the different areas of the District. Core Policy (CP)6 Environmental Quality of the Core Strategy is concerned with protection of environment, it seeks to ensure BaNES's environmental quality is fostered both for existing and future generations.

4.2 Study Area

To inform the Options development, data have been collected within a 'Study Area'. The Study Area has considered the stage of work and setting of the area; and is considered to be sufficient and appropriate.

In setting the Study Area, consideration has been given to the guidance included within the DMRB Volume 11, Section 3, Part 1 'Air Quality' (HA 207/07) (Highways Agency, 2007)[6], the likely physical extent of works and any associated traffic links predicted to be affected by the introduction of the proposed options.

Local air quality is characterised by pollutants with short term, immediate impacts, although many of these pollutants have the potential to travel over long distances, and can have an impact on a regional, national or international scale (HA207/07). The DMRB criteria used to determine the extent of the local air quality assessment are defined as:

- Road alignment will change by 5m or more; or
- Daily traffic flows will change by 1,000 annual average daily traffic (AADT) flow or more; or
- Heavy duty vehicle (HDV) flows will change by 200 AADT or more; or
- Daily average speed will change by 10km/hr or more; or
- Peak hour speed will change by 20km/hr or more.

As a result of the long-range nature of the impact of some pollutants, consideration is given to the change in emissions resulting from the scheme on a regional level (HA207/07). The criteria used to determine the extent of the regional air quality, are defined as an affected road resulting in one of the following as a result of the proposed scheme:

- A change of more than 10% in AADT; or

[6] http://www.standardsforhighways.co.uk/ha/standards/dmrb/vol11/section3/ha20707.pdf

- A change of more than 10% HDVs; or
- A change in daily average speed of more than 20km/hr.

In order to determine potential air quality impacts on nearby receptors, the DMRB HA207/07 states that all existing and planned properties where people might experience a change in local air quality, within 200m of affected roads should be identified. Furthermore, international and national designated nature conservation sites within 200m of roads affected by the proposed scheme should also be identified.

For further stages of works, the Study Area will be refined based on an affected road network (ARN). The ARN is defined according to the methodology outlined in HA207/07. The Study Area for latter stages of assessment will therefore be dependent on changes in traffic flows as a result of the proposed scheme.

4.3 Baseline Environment

4.3.1 Receptors

Receptors or sensitive receptors have been defined according to the DMRB as a location where "*people might experience a change in local air quality, near affected roads*". This refers to locations of relevant exposure to the hourly and annual mean objective for NO_2, and the daily and annual mean objective for PM_{10} (presented in Table 4.1).

Sensitive receptors in the context of the annual objectives are locations where people will be present for prolonged periods and will include residential properties, schools, hospitals and care homes; this is particularly important for young and elderly populations. The objectives do not apply to occupational uses such as shops and offices; or uses such as hotels or medical centres where the public would not be expected to be present over a full year.

The land use within and surrounding the Study Area includes both commercial and residential land uses. There is a collection of buildings, which appear to include residential properties, located to the south of the A4 Bath Road approximately 440metres to the west of the Hicks Gate Roundabout. Whilst these properties are outside of the 200m radius Study Area for air quality, they are considered further as the study area is centred on Hicks Gate Roundabout and these receptors could be within 200m of the construction works, furthermore thy are likely to be within 200m of the ARN once this has been established.

There are no, hospitals, religious or education facilities within the Study Area.

Sensitive receptors include ecological habitats and species within designated nature conservation sites that contain features sensitive to air pollution. These include Special Areas of Conservation (SAC), Special Protection Areas (SPA), Sites of Special Scientific Interest (SSSI) and Ramsar sites, these sites should be considered where they are within 200m of the ARN. There are two nationally designated Sites of Special Scientific Interest (SSSI) within 2km of Hicks Gate Roundabout; *'Bickley SSSI'* and '*Cleeve Wood SSSI'*. Once the ARN has been modelled, a further review should be undertaken to identify whether these two SSSIs or any other sensitive receptors within the within 200m of the ARN.

4.3.2 Air Quality Management Areas

A review of the information held on the Defra Local Air Quality management (LAQM) website[7] has been conducted. There are no declared AQMAs within the Study Area.

BaNES has declared three AQMAs:

- Keynsham AQMA, which covers Keynsham High Street between Old Vicarage Green in the north and the Town Hall car park in the south. The AQMA has been declared for NO_2 and is situated approximately 1.4km to the east of the Hicks Gate Roundabout.
- Bath AQMA, which covers the major road network in Bath. The AQMA has been declared for NO_2 (one-hour mean and annual mean objectives). It is situated just under 10km to the east the Hicks Gate Roundabout at its closest point.
- Saltford AQMA, which extends along the Bath Road from its junction with Beech Road until 150m south of the Glen. The AQMA has been declared for NO_2 (annual mean objective). It is situated approximately 4.8km to the east of the Hicks Gate Roundabout at its closest point.

Bristol City Council has declared a single AQMA:

- Bristol City Centre AQMA, which covers the City centre and parts of the main radial roads (including the A37 and A38). The AQMA has been declared for NO_2 (one-hour mean and annual mean objectives) and PM_{10} (24-hour mean objective). At its closest point to the options, this AQMA lies approximately 1.5 km to the west of the Hicks Gate Roundabout on the A4 at Brislington.

Considering the distance from the Scheme, and the scale and nature of the Scheme is unlikely that any of the Options under consideration will have any disenable effect on any of the identified AQMAs. However, modelling would be required to further assess if changing traffic patterns increase or decrease exceedances in AQMAs in the wider area.

4.3.3 Air Quality Monitoring

A review of the 2017 Air Quality Annual Status Report (BaNES Council, June 2017)[8] hereafter referred to as 'The BaNES ASR' has been undertaken. The BaNES ASR details that continuous monitoring for NO_2 and PM_{10} and a $PM_{2.5}$ was undertaken at four sites in 2016. Non-automated monitoring was undertaken at 92 sites during 2016. Of these 92 sites, 27 had been added in 2016, four of which were in specific study areas and a further eight to respond to public requests and to check other key locations. According to the ASR, the source of air pollution in BaNES is overwhelmingly from traffic.

With regards to NO_2, the BaNES ASR states on pages 29 and 30 that results from existing sites using the local bias factor show that in 2016 the annual average objective was exceeded at 30 sites, 28 of which are within existing AQMAs. A further 11 sites recorded PM10 levels between 36-40 µg/m^3, nine of these sites were also within existing AQMAs. Monitoring at three sites within the Bath AQMA showed exceedances of PM10 above 60 µg/m^3.

[7] https://uk-air.defra.gov.uk/aqma/list

[8] 2017 Air Quality Annual Status Report (ASR) In fulfilment of part IV of the Environment Act 1995 Local Air Quality management, BaNES June 2017. Available on line at: http://www.bathnes.gov.uk/sites/default/files/sitedocuments/Environment/Pollution/bnes_asr_2017.pdf

4.4 Design, Mitigation and Enhancement Measures

4.4.1 Construction

A detailed construction programme, indicating the main types of activities to be carried out during the construction phase, will enable the consideration of project specific construction phase mitigation measures.

To mitigate against adverse air quality effects at sensitive receptors during the construction period, Best Practice Measures (BPM) should be adopted. Table 4.2 details standard construction phase mitigation measures that should be implemented as appropriate. A Construction Environmental Management Plan (CEMP) should be prepared and implemented by the appointed construction contractor. The CEMP should include a range of best practice construction phase dust mitigation measures where there is potential for adverse effects on sensitive receptors.

Table 4.2: Standard Construction Phase Mitigation Measures

Site Planning	Construction Traffic	Site Activities
• Machinery and dust causing activities should be located away from sensitive receptors where feasible. • Visual inspections should be regularly undertaken to determine whether there are any significant dust episodes resulting of the construction activities. • Adequate water supply should be made available on site for dust suppression, as and when required.	• All vehicles engines to be switched off when not in use (i.e. no idling of vehicles). • Effective vehicle cleaning and specific wheel-washing on leaving the site and damping down of haul routes, where there is a potential for carrying dust or mud off the site. • All loads entering and leaving the site to be covered. • On-road vehicles to comply to regulated emission standards. • Movement of construction traffic around the site should be minimised. • Impose and signpost maximum speed limits within the construction areas. • Regularly inspect haul routes for integrity and undertake repairs as appropriate.	• Ensure the disposal of any run-off from dust suppression activities, is in accordance with legal requirements. • Maintain all dust control equipment and record any maintenance activities. • Avoid double handling of material where possible. • Use water as a dust suppressant where required. • Ensure the mixing of cement, and other similar materials takes place in enclosed areas away from potential receptors. • Ensure slopes on any stockpiles are no steeper than the natural angle of repose of and maintain a smooth profile. • Stockpiles should be covered and located away from sensitive receptors where possible.

4.5 Preliminary Identification of Impacts

4.5.1 Construction

There is potential for adverse impacts from dust emissions to occur at sensitive receptors located in proximity to Hicks Gate Roundabout during the construction phase of the project.

Based upon professional judgement and experience on similar schemes, the construction programme for the Scheme is anticipated to be approximately 12 to 18 months. Based on the available information, the following types of activity potentially generate dust during the construction phase:

- Movement of vehicles;
- Enabling works (e.g. verge clearance);
- Earthworks;
- Excavation and installation of drains and communication ducts;
- Construction of retaining walls etc.;
- Surfacing works;
- Installation of verge furniture and planting vegetation; and
- Stock piling/ storage of materials.

There are few sensitive receptors within proximity to Hicks Gate Roundabout (i.e. the proposed construction works). The adoption of site-specific mitigation and standard mitigation measures, such as those details in Table 4.2, would minimise the risks of occurrence and severity of adverse dust effects and statutory nuisance issues

4.5.2 Operation

One of the overall aims of the Scheme is to minimise occurrence of congestion and to deal with projected increase in traffic. Any scheme that minimises occurrence of traffic congestion has the potential to deliver positive impacts on local air quality and therefore no mitigation is proposed. As a result, the options under consideration are not anticipated to result in any adverse impact on local air quality.

As Hicks Gate Roundabout is not within an existing AMMA, it is unlikely options will not create new exceedances in the study area but modelling will be required to assess whether changing traffic patterns increase or decrease exceedances in AQMAs within the wider area.

Cultural Heritage

5.1 Legislation and Policy

5.1.1 Legislation

There are several pieces of legislation relevant to the options:

- The Ancient Monuments and Archaeological Areas Act (AMAAA) sets out the statutory protection afforded to selected nationally important archaeological assets. The Act details the protection of scheduled sites and the need for written consent prior to carrying out any works that might be deemed to have an impact on their physical remains. The Act does not afford any protection to the settings of such assets.
- The Town and Country Planning Act (1971) as amended by the Planning (Listed Buildings and Conservation Areas Act) 1990 details the statutory protection afforded Listed Buildings. Section 66 states the special considerations affecting planning functions, including the consideration of planning permission for development affecting listed buildings or their settings by LPAs or the Secretary of State. The Act also requires LPAs to designate areas of 'special architectural or historic interest' as Conservation Areas with the aim of preserving and enhancing their character and appearance.
- The Enterprise and Regulatory Reform Act 2013. This deregulatory legislation allows greater authority to local authorities in respect of Listed Building Consent. It also allows greater definition of a Listed Building by allowing the exclusion of attached buildings and structures and those within the curtilage of the principal Listed Building from protection. It states that a certificate of immunity from listing may be applied for at any time. The Act also removed the requirement for Conservation Area Consent; instead planning permission will be required for 'relevant demolition', which includes unlisted buildings in conservation areas.

5.1.2 National Policy

5.1.2.1 National Planning Policy Framework (Revised July 2018)

The policies below from the NPPF state the approach to be used by Local Planning Authorities to determine planning applications in relation to cultural heritage and also Listed Building Consent applications. They apply to designated heritage assets, such as Listed Buildings and also to non-designated, but potentially significant, heritage assets such as buried archaeological remains and other historic structures. Policy relevant to this assessment includes:

Section 16 - Conserving and enhancing the historic environment

"189. In determining applications, local planning authorities should require an applicant to describe the significance of any heritage assets affected, including any contribution made by their setting. The level of detail should be proportionate to the assets' importance and no more than is sufficient to understand the potential impact of the proposal on their significance. As a minimum the relevant historic environment record should have been consulted and the heritage assets assessed using appropriate expertise where necessary. Where a site on which development is proposed includes, or has the potential to include,

heritage assets with archaeological interest, local planning authorities should require developers to submit an appropriate desk-based assessment and, where necessary, a field evaluation.

190. Local planning authorities should identify and assess the particular significance of any heritage asset that may be affected by a proposal (including by development affecting the setting of a heritage asset) taking account of the available evidence and any necessary expertise. They should take this into account when considering the impact of a proposal on a heritage asset, to avoid or minimise any conflict between the heritage asset's conservation and any aspect of the proposal.

192. In determining applications, local planning authorities should take account of: a) the desirability of sustaining and enhancing the significance of heritage assets and putting them to viable uses consistent with their conservation; b) the positive contribution that conservation of heritage assets can make to sustainable communities including their economic vitality; and c) the desirability of new development making a positive contribution to local character and distinctiveness.

193. When considering the impact of a proposed development on the significance of a designated heritage asset, great weight should be given to the asset's conservation (and the more important the asset, the greater the weight should be). This is irrespective of whether any potential harm amounts to substantial harm, total loss or less than substantial harm to its significance.

194. Any harm to, or loss of, the significance of a designated heritage asset (from its alteration or destruction, or from development within its setting), should require clear and convincing justification. Substantial harm to or loss of: a) grade II listed buildings, or grade II registered parks or gardens, should be exceptional; b) assets of the highest significance, notably scheduled monuments, protected wreck sites, registered battlefields, grade I and II listed buildings, grade I and II* registered parks and gardens, and World Heritage Sites, should be wholly exceptional.*

195. Where a proposed development will lead to substantial harm to (or total loss of significance of) a designated heritage asset, local planning authorities should refuse consent, unless it can be demonstrated that the substantial harm or total loss is necessary to achieve substantial public benefits that outweigh that harm or loss, or all of the following apply: a) the nature of the heritage asset prevents all reasonable uses of the site; and b) no viable use of the heritage asset itself can be found in the medium term through appropriate marketing that will enable its conservation; and c) conservation by grant-funding or some form of not for profit, charitable or public ownership is demonstrably not possible; and d) the harm or loss is outweighed by the benefit of bringing the site back into use.

196. Where a development proposal will lead to less than substantial harm to the significance of a designated heritage asset, this harm should be weighed against the public benefits of the proposal including, where appropriate, securing its optimum viable use.

197. The effect of an application on the significance of a non-designated heritage asset should be taken into account in determining the application. In weighing applications that directly or indirectly affect non-designated heritage assets, a balanced judgement will be required having regard to the scale of any harm or loss and the significance of the heritage asset.

199. Local planning authorities should require developers to record and advance understanding of the significance of any heritage assets to be lost (wholly or in part) in a manner proportionate to their importance and the impact, and to make this evidence (and any archive generated) publicly accessible. However, the ability to record evidence of our past should not be a factor in deciding whether such loss should be permitted."

All options require land take in varying amounts, either permanently; or in the case of construction compounds and areas, temporarily. Where there is land take of previously undeveloped land, there is

the potential to affect buried and surface archaeological remains (earthworks) within the footprint of the works. If present, these currently unknown assets could be of national and schedule-able quality.

It is unlikely that there will be archaeological remains buried beneath areas of existing carriageway as the construction of the existing road is likely to have removed any archaeology, but this would need to be considered in any future assessment stages.

Giving regards to setting, it is considered possible that development of any of the options could impact on the setting of designated and non-designated heritage assets.

5.1.3 Local Policy

5.1.3.1 Bath and North East Somerset Core Strategy, Part 1 of the Local Plan (Adopted July 2014)

Core Policy (CP)6 Environmental Quality of the Core Strategy is concerned with protection of environment. Part 2 of the Policy is concerned with protection of the Historic Environment, it recognises the cultural and historic environment is important in the delivery of sustainable development and states: *". . . The Council will protect, conserve and seek opportunities to enhance the historic environment including the character and setting of designated and other heritage assets. . .*

Where development has a demonstrable public benefit, including mitigating and adapting to climate change, this benefit will be weighed against any harm to the significance of the heritage asset. . ."

5.2 Study Area

Data has been collected to determine the presence of non-designated assets within a study area defined by a zone of approximately 200m from Hicks Gate Roundabout.

A wider study area defined by a zone approximately 1km from Hicks Gate Roundabout has been used for consideration of impacts upon the setting for designated heritage assets only; comprising World Heritage Sites, Scheduled Monuments, Listed Buildings and Registered Historic Parks and Gardens. This study area has been informed by professional judgement and is considered sufficient in order to provide an essential historic and archaeological contextual background for the Scheme.

5.3 Baseline Environment

The Government's magic website magic.gov.uk and the Bristol Historic Environment Record (HER) Monuments dataset accessed online at:

- Know Your Place Bristol: http://maps.bristol.gov.uk/kyp/?edition=nsom; and
- Know Your Place BaNES: http://maps.bristol.gov.uk/kyp/?edition=banes

have been used to inform the baseline for this Chapter.

5.3.1 World Heritage Sites and Battle Fields

There are no World Heritage Sites or sites included on the Tentative List of Future Nominations for World Heritage Sites (July 2014) or Registered Battlefields within the Study Area.

5.3.2 Registered Parks and Gardens

There are no Registered Parks and Gardens within the Study Area.

5.3.3 Scheduled Monuments

There are no Scheduled Monuments within the Study Area. However, there is a Scheduled Monument located on the edge of the eastern edge of the Study Area (i.e. just beyond 1 km from the centre of the roundabout). This Scheduled Monument, '*Roman Settlement at Keynsham Hams, former Cadbury's Factory'* This Monument is located within playing fields bounded by Great Western Railway (south), River Avon (west and north) and former Cadbury's factory (west). The monument is *"remains of the core of the Roman town, identified as possibly being that of Traiectus, covering approximately 8ha, and with surrounding boundary ditches enclosing 18ha. The site is not visible at ground level but survives as buried features."*[9]

The Scheduled Monument is designated as *"archaeological evaluation and recording has demonstrated that this part of the settlement survives particularly well, retaining considerable evidence for occupation from the C1 AD to the C4 AD; * Rarity: as a particularly early Roman town, dating to the earliest phase of Romanisation in England and the West Country it is rare in a national context. . ."*[8]

The physical fabric of Scheduled Monuments is afforded protection by the AMAA 1979.

5.3.4 Conservation Areas

There are no conservation areas within 200m of the Hicks Gate Roundabout. However, the Avon Valley Conservation Area and Hanham Abbots Conservation Area both lie within 1km. Conservation Areas are afforded legal protection by the Planning (Listed Buildings and Conservation Areas) Act 1990.

5.3.4.1 The Avon Valley Conservation Area

The Avon Valley Conservation Area is located to the west of the Hicks Gate Roundabout, within Bristol City Council's administrative boundary. At its closest point, the boundary of the conservation area is approximately 400m from the centre of Hicks Gate Roundabout, just 100 m from the point where Durley Hill joins the A4, Bath Road western carriageway.

The Avon Valley Conservation Area consists of land immediately abutting the River Avon from New Brislington Bridge at Netham, up to the City boundary at Foxes Wood and the Brislington House Estate. The boundary of the Conservation Area is illustrated in Figure 5.1; full details of the designation can be found on Bristol City Council's website[10].

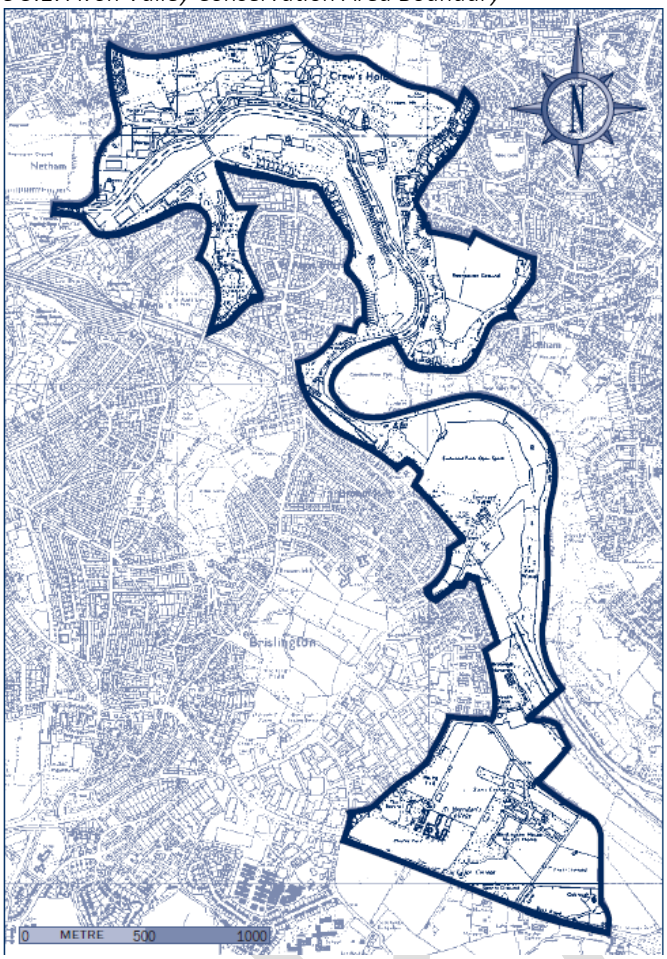
The conservation area was *selected for its "secluded riverside charm enhanced by an 18th Century settlement pattern"*[11].

9 Extract from monument listing detailed on: https://historicengland.org.uk/listing/the-list/list-entry/1416459

10 https://www.bristol.gov.uk/documents/20182/32819/24+-+Avon+Valley.pdf/

11 Section 24(2) https://www.bristol.gov.uk/documents/20182/32819/24+-+Avon+Valley.pdf/

Figure 5.1: Avon Valley Conservation Area Boundary



Source: https://www.bristol.gov.uk/documents/20182/32819/24+-+Avon+Valley.pdf/

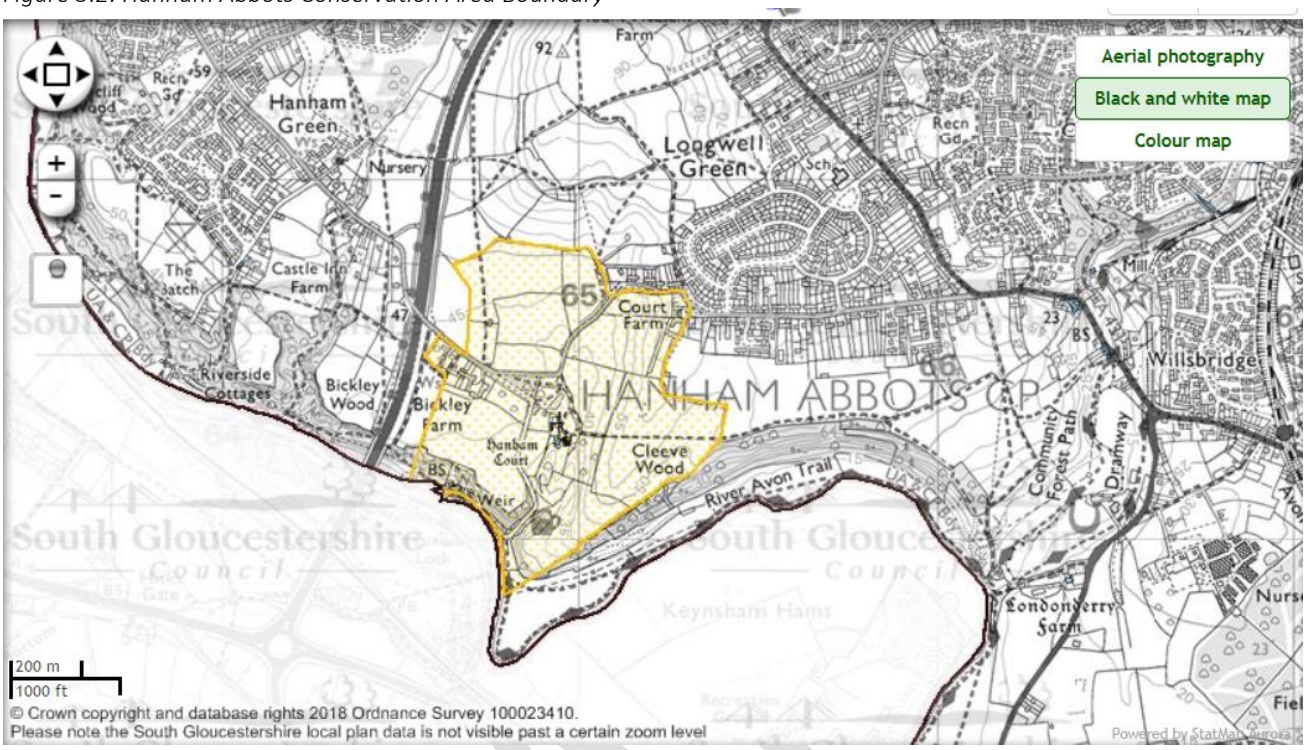
5.3.4.2 Hanham Abbots Conservation Area

The Hanham Abbots Conservation Area (refer to Figure 5.2) is located to the north east of the Hicks Gate Roundabout. At its closest point, the boundary of the conservation area is approximately 570m from the centre of Hicks Gate Roundabout, beyond the River Avon.

The designation seeks to protect the unspoiled rural character of St George's Church; and the group of buildings at Hanham Court, the buildings at Bickley Farm, Court Farm and along the River front at Hanham Mills. The area stretches from the foot of the Hanham Hills to the northern bank of the River Avon at Hanham Mills. The boundary of the Conservation Area is illustrated in Figure 5.2, further details on this Conservation Area can be found on the South Gloucestershire Council's website[12].

[12] http://www.southglos.gov.uk//documents/Hanham-Abbots-Conservation-Area.pdf

Figure 5.2: Hanham Abbots Conservation Area Boundary



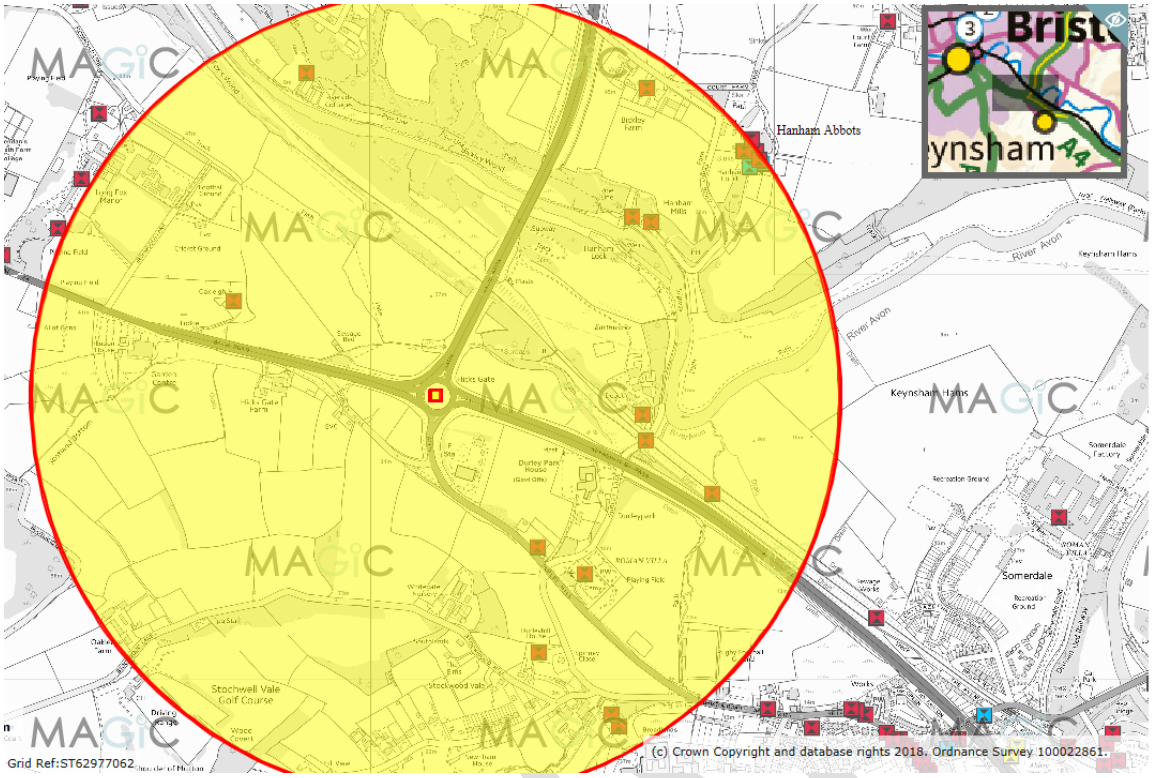
Source: http://map.n-somerset.gov.uk/southglos.html

5.3.5 Historic Buildings

There are 21 Listed Buildings within the Study Area. Three of which are Grade II* Listed and 18 Grade II Listed. The Grade II* Listed structures consist of a Parish Church, Tithe Barn and Hanham Court and are located to the north east of Hicks Gate Roundabout in Hanham Abbots. Listed Buildings within the Study Area are shown on Figure 5.3.

Listed Buildings and their settings, are afforded legal protection by the Planning (Listed Buildings and Conservation Areas) Act 1990.

Figure 5.3: Listed buildings within 1 km of Hicks Gate Roundabout



Source: http://magic.defra.gov.uk/MagicMap.aspx [Accessed 12.09.2018]

5.3.6 Non-designated Assets

The Desk Study has included a search of nearby planning applications, one of which was for the Hicks Gate Fire Station which is located immediately to the south east of the roundabout. An Archaeological Desk Based Assessment (DBA) was undertaken to inform the planning application for this development (An Archaeological Desk Based Assessment for the site of Parcel 2156, Durley Hill, Keynsham, Bath and North East Somerset, BS31 2AB[13]). This DBA highlights that the Fire Station is considered to be in an area of high archaeological potential; and identifies prehistoric finds and features have been identified within the Fire Station site; and prehistoric and Roman artefacts have been recovered from the neighbouring field. The DBA also highlights that the site is close to Durley Roman villa, which is on the periphery of what is thought to be the Romano-British 'town' of *Traiectus*. It also highlights that the Fire Station site lies within the estate lands of Keynsham Abbey and previously those of a high status Anglo-Saxon manor.

Information on non-designated assets recorded by the BaNES Historic Environment Records (HER) and Bristol City HER within the Study Area should be obtained and assessed at the next stage of works.

[13] Available on line at: https://www.bathnes.gov.uk/publisher/docs/744684A4C73653008C9F19225B622DB1/Document-744684A4C73653008C9F19225B622DB1.pdf

5.3.7 Historic Landscape Characterisation

Information on the Historic Landscape Character of the Study Area should be obtained and assessed at the next stage of works.

5.3.8 Potential for previously unrecorded Archaeological Assets

Given the location of the Scheme, there is a potential for previously unrecorded archaeological assets to be present within the footprint of options, particularly in areas where land is not known to have been previously developed. The potential for encountering previously unknown archaeological assets should be assessed at the next stage of works.

5.4 Design, Mitigation and Enhancement Measures

Historic England (2015) guidelines for mitigation of the impact of a development on the setting of a heritage asset advise that in the first instance impacts should be mitigated for, either by relocation of the development or changes to its design. Where relocation of the development is not feasible, good design alone may be capable of reducing any harm.

Any options progressed should seek to avoid direct physical impacts to designated assets and minimise settings impacts. Consideration should be given to minimising the land take required beyond the existing highway boundary.

Further consideration and assessment of cultural heritage is needed to identify non-designated assets and archaeological potential.

5.5 Preliminary Identification of Potential Impacts

The Chartered Institute for Archaeology (CIfA) 'Standard and Guidance for Historic Environment Desk-based Assessment' (2014) considers that an assessment of the significance of heritage assets should identify the potential impact of proposed or predicted changes on the significance of the asset and the opportunities for reducing that impact.

Potential impacts associated with the proposed Hicks Gate Roundabout Scheme include:

- Potential disturbance to known and unknown buried archaeology (both designated and non-designated). Any groundworks involved (including topsoil stripping and excavations for drainage) have the potential to disturb or cause the loss of potential remains especially within areas of previously undeveloped land. The value of these assets, if present is unknown therefore taking a worst-case scenario, the significance of the effect is assumed to be 'moderate/large' adverse. However, through undertaking best practice construction techniques, any impacts to this heritage asset, should it be present, can likely be mitigated and resultant impacts considered not to be significant.
- Changes to the setting of designated assets (including the Avon Valley Conservation Area) as a result of lighting and acoustic intrusion due to plant; and as a result of increased traffic, both during construction and operational phases.
- Construction phase impacts are temporary and during operation, other than allowing a greater volume of traffic into the immediate and wider area, the operation of the newly configured Hicks Gate Roundabout, will not differ to how it currently operates. Any changes to the vertical alignment

of the junction could impact upon setting and should be considered further at the next stages of assessment.

Landscape and Visual

6.1 Legislation and Policy

The European Landscape Convention (ELC, 2000) provides a basis for closer co-operation on landscape issues across Europe and was ratified in the UK on the 21st November 2006 and became binding on 1st March 2007. The Convention highlights the need to recognise landscape in law, to develop landscape policies dedicated to the protection, management and creation of landscapes, and to establish procedures for the participation of the general public and other stakeholders in the creation and implementation of landscape policies. It also encourages the integration of landscape into all relevant areas of policy, including cultural, economic and social policies.

The ELC defines landscape as: *"An area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors"*. It recognises that landscape has important cultural, ecological, environmental and social dimensions and is a key element of achieving sustainable development.

The UK is recognised as already putting many of the principles of the ELC into practice. The importance of landscapes in contributing to local identity and in reflecting local cultural influences and ecological diversity is shown through the Joint Character Area Map of England (former Countryside Commission and English Nature, 1996), through the use of Landscape Character assessments and to inform Planning Policy.

6.1.1 Legislation

There are several pieces of legislation relevant to the options:

- Ancient Monuments and Archaeological Areas Act 1979 - Establishes the legal protection of Scheduled Monuments, including the 'setting' of these as material considerations in planning decisions, and nonpermitted damage to the monuments themselves as a criminal act.
- Planning (Listed Buildings and Conservation Areas) Act 1990 – Establishes the framework behind the listing of buildings and the ability of local planning authorities to establish Conservation Areas, which have specific planning controls to maintain and enhance a valued landscape character.
- Countryside and Rights of Way Act 2000 – Establishes the legal framework that oversees publicly accessible land (Open Access Land) and Public Rights of Way.
- Commons Act 2006 – Details controls and allowances for the protection and management of Commons and Village Greens.
- The Enterprise and Regulatory Reform Act 2013 – Introduces amendments to various Acts regarding heritage planning controls, including Conservation Areas and Listed Buildings.

6.1.2 National Policy

6.1.2.1 National Planning Policy Framework (Revised July 2018)

The NPPF represents the overarching document for National Planning Policy. Of particular relevance to the scheme are Paragraph 20:

"Strategic policies should set out an overall strategy for the pattern, scale and quality of development, and make sufficient provision for:

a) housing (including affordable housing), employment, retail, leisure and other commercial development;

b) infrastructure for transport, telecommunications, security, waste management, water supply, wastewater, flood risk and coastal change management, and the provision of minerals and energy (including heat);

c) community facilities (such as health, education and cultural infrastructure); and

d) conservation and enhancement of the natural, built and historic environment, including landscapes and green infrastructure, and planning measures to address climate change mitigation and adaptation".

And paragraph 141

"Once Green Belts have been defined, local planning authorities should plan positively to enhance their beneficial use, such as looking for opportunities to provide access; to provide opportunities for outdoor sport and recreation; to retain and enhance landscapes, visual amenity and biodiversity; or to improve damaged and derelict land."

6.1.3 Planning Guidance

The following list includes relevant Planning Practice Guidance that is of relevance to this chapter:

- Climate change (12 June 2014)
- Conserving and enhancing the historic environment (22 February 2018)
- Design (6 March 2014)
- Light pollution (6 March 2014
- Natural environment (21 January 2016)
- Open space, sports and recreation facilities, public rights of way and local green space (6 March 2014)
- Tree Preservation Orders and trees in conservation areas (6 March 2014)

6.1.4 Local Planning Documents

The local planning framework comprises a number of key adopted documents which form the statutory development plan for each authority, against which proposals seeking planning permission are assessed. These policy documents comprise saved policies from extant Local Plans as well as new emerging policy documents.

Hicks gate Roundabout falls within Bath and North East Somerset local authority area, the following sections describe the policy documents material to planning decisions in this area.

6.1.4.1 Bath and North East Somerset local authority area. Thus, the Bath and North East Somerset Core Strategy, Part 1 of the Local Plan (Adopted July 2014)

Part 3 of the Core Policy (CP) 6: Environmental Quality of the Core Strategy is concerned with protection of the Landscape, it recognises the distinctive character and quality of BaNES landscapes; and states that the landscape *"will be conserved or enhanced."*

CP 7: Green Infrastructure recognises the abundance of existing green assets within the County including open green spaces, street trees and woodland, other natural habitats. It acknowledges the Council's role in the provision, delivery and planning of Green Infrastructure through its role as local planning authority and direct provider of significant areas of open spaces.

Diagram 20 on page 153 shows the Illustrative Green Infrastructure Network of the County. This diagram identified the A37, A38 and B3130 as '*Strategic Green Infrastructure Corridors through rural areas'* and highlights areas.

6.1.4.2 Bath and North East Somerset Placemaking Plan, Adopted July 2017

The following policy extracts are relevant to the proposals for Hicks Gate Roundabout:

Policy NE2 Conserving and Enhancing the Landscape and Landscape Character:

"The District has a distinct character which is cherished by residents and visitors. Recognition of the special characteristics of cultural, social and environmental significance often referred to as 'the sense of place' or 'spirit of the place' is an important objective when considering development proposals. New development will be expected to reinforce the local landscape character and make a positive contribution to views." (p108)

Policy NE2A Landscapes: Landscape Setting of Settlement:

"The purpose of Policy NE2A is to ensure the protection of key landscapes and landform, landmarks and views / viewpoints which particularly contribute to the landscape setting of settlements."

"The list of characteristics contributing to landscape character included in Table 6 (of the report) *was used in identifying landscapes which are significant to settlements and their setting. Selected areas which have been assessed against and meet the criteria are shown on the Policies Map and will be afforded specific protection under the policy."*

"Landscape setting in the context of this policy is taken to include the surroundings of the settlement as well as undeveloped or well 'treed' areas which may be within the settlement and are important to the context of the developed areas." (p109)

Policy NE5 Ecological Networks

"Development proposals will be expected to demonstrate what contribution will be made to ecological networks as shown on the Policies Map through habitat creation, protection, enhancement, restoration and/or management." (p117)

Policy NE5 Trees and Woodland Conservation

"Development will only be permitted where…it seeks to avoid any adverse impact on trees and woodlands of wildlife, landscape, historic, amenity, productive or cultural value; and … it includes the appropriate retention and new planting of trees and woodlands;

… If it is demonstrated that an adverse impact on trees is unavoidable to allow for appropriate development, compensatory provision will be made in accordance with guidance in the Planning Obligations SPD (or successor publication) on replacement tree planting."

6.2 Study Area

The study area for landscape character and visual amenity baseline was established as a 1.5km offset from Hicks Gate Roundabout. The 1.5km distance is based on previous experience and is considered sufficient and appropriate given the stage of assessment and scale of works.

6.3 Baseline Environment

6.3.1 Landscape Character Areas

6.3.1.1 National Parks, Heritage Coasts, Special Landscape Areas and Areas of Outstanding Natural Beauty

There are no National Parks or Heritage Coasts within the Study Area; nor does the Study Area lie within an Area of Outstanding Natural Beauty (AONB).

6.3.1.2 National Character Areas

The options fall within Avon Valleys and Ridges (No. 118) National Character Area (NCA)[14]. This is an extensive NCA with Bristol City at its centre and surrounded by its smaller towns and rural areas.

The description of the area is:

"The Bristol, Avon Valleys and Ridges National Character Area (NCA) encompasses the City of Bristol with its historic port, and the surrounding area including the Chew and Yeo valleys, Keynsham, Clevedon, Portishead and parts of the Cotswolds and Mendip Hills Areas of Outstanding Natural Beauty (AONB). The area is characterised by alternating ridges and broad valleys, with some steep, wooded slopes and open rolling farmland. It is flanked by the Somerset Levels and Moors and the Mendip Hills to the south, the Cotswolds to the east and the Severn and Avon vales to the west, which largely separates it from the Severn Estuary except for a small stretch of coastline between Clevedon and Portishead. It has a complex geology, being rich in geomorphological features such as the dramatic Avon Gorge, and there are many designated exposures and rich fossil beds. The varied settlement pattern has been influenced by the geology and geomorphology and the expansion of the City of Bristol at its centre. The M5 motorway runs up the western edge and the M4 skirts across the north of Bristol, with Bristol Airport to the south. Although the urban area covering this NCA is significant at over 21 per cent, much of the surrounding rural landscape is farmed."[15]

[14] http://publications.naturalengland.org.uk/publication/4646942

[15] P3 National Character Area Profile, 118: Bristol, Avon and Ridges (Natural England, 2014) Available on line - http://publications.naturalengland.org.uk/publication/4646942?category=587130

6.3.1.3 Landscape Character Area

Hicks Gate Roundabout is located within the BaNES Landscape Character Area (LCA) 10 – Hicks Gate. The Rural Landscapes of Bath and North East Somerset - A Landscape Character Assessment[16] dThe Hicks Gate LCA covers approximately 1.8km^2 and consists of rising ground and a ridge above Stockwood Vale and the Avon Valley. It is heavily influenced by the built-up areas of Keynsham and Bristol and the A4 trunk road. The characteristics of this area are described as:

- "Lias Limestone on ridge line and Mercia Mudstones on the lower land
- Low ridge forms backbone to area with slopes down to the Avon Valley and Stockwood Vale
- Urban fringe elements such as golf course, 'horsiculture', and presence of litter
- A diverse and discordant landscape heavily influenced by busy roads and adjacent urban areas
- Small or medium sized fields of irregular shape surrounded by hedges of varying condition
- Hedges generally trimmed on higher ground and unclipped on lower slopes
- Open landscape with broad views to distant areas
- Very little woodland"[17]

6.4 Design, Mitigation and Enhancement Measures

Any felled trees should be replaced, where possible opportunities should be sought from introduction of new planting. New trees should be subject to a 5-year maintenance period that includes formative pruning to ensure the trees reach a full and balanced shape. This may include the management of adjacent retained trees.

Any planting proposed as part of the scheme should be subject to a 5-year maintenance period that includes weed removal, watering and replacement of failed individual plants. The planting scheme should be locally appropriate, using only native species in areas of natural regeneration, of an appropriate mix.

Introduction/ retention of pedestrian / cycle priority crossings create the potential opportunity to make small environmental improvements, using visually interesting materials. However, the materials used for these crossings should be suitably durable for the vehicle movements occurring at these locations. If the condition of these materials is reduced due to wear, any beneficial impact will be removed.

Construction works provide a potential opportunity to use higher quality materials for paving and street furniture.

[16] http://www.bathnes.gov.uk/services/environment/landscape/landscape-character-assessment

[17] http://www.bathnes.gov.uk/sites/default/files/rural_landscapes_-_chapter_7.pdf

6.5 Preliminary Identification of Potential Impacts

Potential impacts to landscape and visual receptors include both direct and indirect impacts. Impacts might be temporary during the construction period; and or permanent during operation of the new roundabout and associated infrastructure. Potential landscape and visual impacts include:

- Loss of trees and other vegetation
- Reduction in tranquillity and visual amenity in views in general
- Impacts on the setting of conservation areas, particularly.
- Disturbance to recreational activities such as walking – walkers would potentially experience changes in views and visual amenity, and tranquillity, especially during construction.

Ecology and Nature Conservation

7.1 Legislation and Policy

7.1.1 Legislation

Specific habitats and species receive legal protection in the UK under various pieces of legislation, including:

- **The Protection of Badgers Act (1992)**
  Under this legislation, it is a serious offence to kill, injure or take a badger, or to damage or interfere with a set, unless a licence is obtained from a statutory authority.
- **The Hedgerow Regulations (1997)**
  These Regulations make provision for the protection of important hedgerows in England and Wales.
- **The Countryside and Rights of Way Act (2000)**
  Section 74 of the Countryside and Rights of Way (CROW) Act 2000 places an obligation on government bodies to have regard to the conservation of biological diversity when exercising their functions. The Act affords varying degrees of protection to fauna including slowworms or grass snakes or water voles, and particular species of birds or flora.
- **The Natural Environment and Rural Communities (NERC) Act (2006)**
  Under the Natural Environment & Rural Communities (NERC) Act 2006 public authorities have a legal responsibility to conserve biodiversity. Section 40 states: *"Every public body must, in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity"*. Section 41 of the Act identifies species and habitats of principle importance for biological diversity. The list includes species that are both familiar and scarce in South Gloucestershire, e.g. hedgehog, common toad, greater horseshoe bat; as well as habitats, such as lowland deciduous woodland, hedges and orchards.
- **The Conservation of Habitats and Species Regulations 2017 (Habitat Regulations)**
  A variety of species of wildlife, referred to as European Protected Species (EPS), receive protection under the Habitats Regulations. These species include: otters, bats (all species), badgers, great crested newts and dormice.
- **Wildlife and Countryside Act (1981) (as amended)**
  The primary legislation which protects animals, plants and habitats in the UK. The act gives protection to native species (especially those at threat), controls the release of non-native species, enhances the protection of Sites of Special Scientific Interest (SSSI). Since the passing of the Wildlife and Countryside Act 1981 there have been various amendments to the text of the Act, most significantly through the CRoW Act 2000.

7.1.2 National Policy

7.1.2.1 National Planning Policy Framework (Revised July 2018)

The revised *National Planning Policy Framework* (NPPF) (Department for Communities and Local Government, 2018) was published on 24th July 2018 and supersedes the previous guidance. The document sets out the Government's planning policies for England and provides guidance on how these policies are expected to be applied and includes a chapter on biodiversity, '*Chapter 15 - Conserving and enhancing the natural environment'.* The NPPF 2018 introduces some changes for biodiversity and the natural environment, bringing the framework up to date and aligning it with Defra's 25-Year Environment Plan (published in January 2018). Some of the key elements are:

- *"Plans should: distinguish between the hierarchy of international, national and locally designated sites; allocate land with the least environmental or amenity value, where consistent with other policies in this Framework53; take a strategic approach to maintaining and enhancing networks of habitats and green infrastructure; and plan for the enhancement of natural capital at a catchment or landscape scale across local authority boundaries."* (paragraph 171).

- *"To protect and enhance biodiversity and geodiversity, plans should:*

a) *Identify, map and safeguard components of local wildlife-rich habitats and wider ecological networks, including the hierarchy of international, national and locally designated sites of importance for biodiversity; wildlife corridors and stepping stones that connect them; and areas identified by national and local partnerships for habitat management, enhancement, restoration or creation; and*

b) *promote the conservation, restoration and enhancement of priority habitats, ecological networks and the protection and recovery of priority species; and identify and pursue opportunities for securing measurable net gains for biodiversity."* (paragraph 174)

- *"When determining planning applications, local planning authorities should apply the following principles:*

a) if significant harm to biodiversity resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused;

b) development on land within or outside a Site of Special Scientific Interest, and which is likely to have an adverse effect on it (either individually or in combination with other developments), should not normally be permitted. The only exception is where the benefits of the development in the location proposed clearly outweigh both its likely impact on the features of the site that make it of special scientific interest, and any broader impacts on the national network of Sites of Special Scientific Interest;

c) development resulting in the loss or deterioration of irreplaceable habitats (such as ancient woodland and ancient or veteran trees) should be refused, unless there are wholly exceptional reasons58 and a suitable compensation strategy exists; and

d) *development whose primary objective is to conserve or enhance biodiversity should be supported; while opportunities to incorporate biodiversity improvements in and around developments should be encouraged, especially where this can secure measurable net gains for biodiversity."* (paragraph 175)

- *"The presumption in favour of sustainable development does not apply where development requiring appropriate assessment because of its potential impact on a habitats site is being planned or determined."* (paragraph 175)

7.1.3 Local Policy

7.1.3.1 Bath and North East Somerset Core Strategy, Part 1 of the Local Plan, (Adopted July 2014)

Core Policy (CP)6 *Environmental Quality* of the Core Strategy is concerned with protection of the environment. Part 4 of the Policy is specifically concerned with nature conservation. The policy states:

"*The quality, extent and robustness of protected sites and valued habitats will be enhanced, and networks of valued habitat will be restored or created, by measures which:*

a) Improve the quality and/or increase the size of current sites and valued habitat.

b) Enhance connections between, or join up, sites and valued habitats.

c) Create new sites and valued habitats.

d) Reduce the pressures on wildlife by improving the wider environment.

New Development will protect and enhance international, national and local sites and existing networks of valued habitats; facilitate migration and dispersal though the natural and built environment; and seek to reduce fragmentation of existing habitats.

The Council will promote the management, conservation, enhancement or restoration of environmental assets. Sustainable opportunities for improved access to and enjoyment of these assets will be promoted where it does not compromise the integrity of the asset."

Policy CP7 Green Infrastructure recognises the abundance of existing green assets within the County including open green spaces, street trees and woodland, other natural habitats. It acknowledges the Council's role in the provision, delivery and planning of Green Infrastructure through its role as local planning authority and direct provider of significant areas of open spaces. Paragraph 6.56 states *"A well-designed, managed and integrated network of GI provides a wide range of direct and indirect benefits to people and wildlife…"*

Policy CP13 *Infrastructure Provision* states *"…Infrastructure proposals should not cause harm to the integrity of European wildlife sites which cannot be mitigated."*

7.2 Study Area

To inform the Options development, a desk study was undertaken to obtain and review records of habitats and designated nature conservation sites within defined Study Areas drawn from Hicks Gate Roundabout as follows:

- International statutory designated sites – 2km radial Study Area
- National statutory designated sites – 2km radial Study Area
- Non-statutory designated sites, local statutory designated sites and protected / notable species – 1km radial Study Area.

These Study Areas were considered suitable to account for the zone of influence, which reflects the scale and type of the options. The Study Areas are also based on guidance on undertaking ecological

assessment provided in the DMRB[18] and it therefore considered to be sufficient and appropriate at this stage.

7.3 Baseline

7.3.1 Statutory Designated Sites

There are no internationally designated sites (Special Ares of Conservation (SACs), Special Protection Areas (SPAs), Ramsar sites) or National Nature Reserves, located within 2km of the options.

There are two nationally designated Sites of Special Scientific Interest (SSSI) within 2km of the proposed options; *'Bickley SSSI'* and '*Cleeve Wood SSSI'* (refer to Figure 7.1). Bickley SSSI is located approximately 0.6 km to the north of the Hicks Gate Roundabout and is designated for geological interest. It is therefore not considered further under Ecology and Nature Conservation, however is included within Chapter 9 of this report.

Cleeve Wood SSSI (NGR ST 656 702)
Cleeve Wood SSSI is located approximately 1.5-2 km to the north east of Hicks Gate Roundabout; and covers an area of 8.54 hectares. The site is designated for its biological interest.

"Cleeve Wood is situated on the steep south facing slopes of the River Avon valley near to the city of Bristol. Although much of the wood has been planted with non-native species it contains a very large population of an uncommon plant. The soil is of the Sherborne Association type, has developed over Jurassic limestone and clay and is a slowly permeable, calcareous, clay. The primary scientific interest of the wood is the particularly large population of Bath Asparagus Ornithogalum pyrenaicum which it supports. The Bath Asparagus in Cleeve Wood represents that is considered to be the largest and most stable population of this plant in this its centre of distribution. The wood is derived from the calcareous Ash-Wych Elm (southern variant) type but has been much planted with non-native species mainly Beech Fagus sylvatica and Sycamore Acer pseudoplatanus but with some Horse Chestnut Aesculus hippocastanum and Cypress trees Cupressus. In the more natural areas of the wood Ash Fraxinus excelsior is dominant with occasional Pedunculate Oak Quercus robur standards. In such places the shrub layer is dominated by Field Maple Acer campestre, Hawthorn Crataegus monogyna, Elder Sambucus nigra, Hazel Corylus avellana and young Wych Elm Ulmus glabra. The field layer in many areas is dominated by Ivy Hedera helix, especially on the disturbed slopes. Other common ground flora includes DogÕs Mercury Mercurialis perennis, Bluebell Hyacinthoides non-scriptus, Stinking Iris Iris foetidissima, Clematis Clematis vitalba and Slender False Brome Brachypodium sylvaticum."[19]

There are two Local Nature Reserves (LNR) within the Study Area (refer to Figure 7.1):

- Stock Wood Open Space LNR located approximately 1.1 km to the south west of Hicks Gate Roundabout (it is considered that this LNR could be within 1km of the construction works at its closest point). This LNR is designated as Urban Fringe and is described as *". . . old grassland and unploughed meadows on lime-rich clay soils. Cowslip, dyer's greenweed and bird's-foot trefoil*

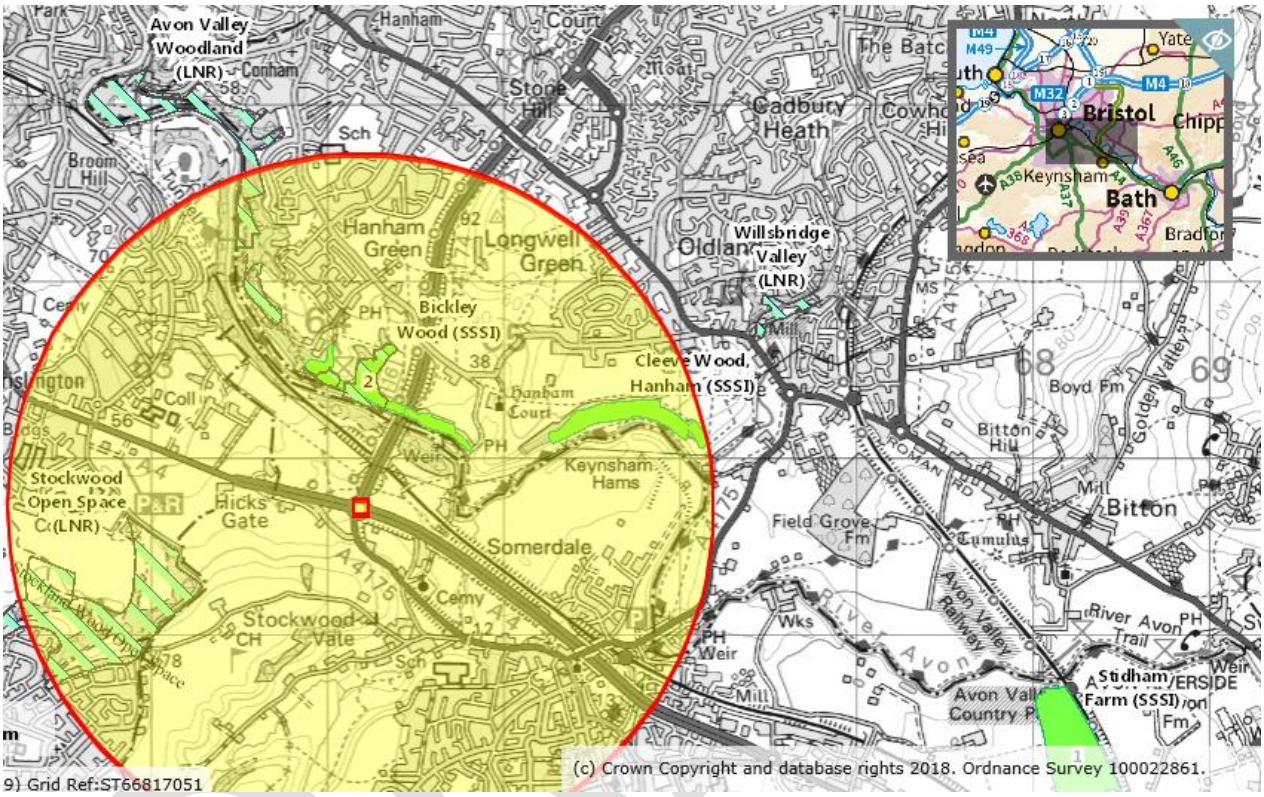
[18] DMRB (2003). Ecology and Nature Conservation. Volume 11, Section 3, Part 4. http://www.standardsforhighways.co.uk/dmrb/vol11/section3.htm

[19] https://designatedsites.naturalengland.org.uk/PDFsForWeb/Citation/1002574.pdf

provide splashes of yellow here in summer, and numerous butterflies include meadow brown, marbled white and large skipper."[20]*;*

- Avon Valley Woodland LNR is located approximately 0.6 km to the north of Hicks Gate Roundabout at its closest point. This LNRs "*maturing broadleaved woodlands are home to a variety of wildlife. Habitats include oak woodland, willow scrub and pasture*." [21]

Figure 7.1: Nature Conservation Designations



Source: https://magic.defra.gov.uk/MagicMap.aspx [Accessed 18.09.2018]

7.3.2 Non-Statutory Designated Sites

There a number of Sites of Nature Conservation Interest (SNCIs) within the 1km Study Area, the closest of which is East Wood and Keynsham Humpy Tumps complex, located approximately 100m to the north and east of the Hicks Gate Roundabout. Other SNCIs within the Study Area include: The River Avon in the north and Stockwood Vale Woods, Charlton Bottom and Queen Charlton watercourse in the south.

[20] https://designatedsites.naturalengland.org.uk/SiteLNRDetail.aspx?SiteCode=L1009170&SiteName=STOCKWOOD OPEN SPACE&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=

[21] https://designatedsites.naturalengland.org.uk/SiteLNRDetail.aspx?SiteCode=L1084806&SiteName=Avon Valley Woodland &countyCode=&responsiblePerson=&SeaArea=&IFCAArea=

7.3.3 Protected and Notable Species

A search using the National Biodiversity Network Gateway[22] has revealed species recorded within the Study Area and thus with the potential to be affected by the options. These include:

- Three types of amphibians including Smooth Newt (*Lissotriton vulgaris*), Common Toad (*Bufo bufo*), Common Frog (Rana temporaria).
- 84 species of bird including Kingfisher (*Alcedo atthis*), Sky Lark (*Alauda arvensis*) and Barn Owl (*Tyto alba*).
- One type of reptile, Adders (*Vipera berus*).
- 14 types of mammal including Badgers (*Meles meles*), Otter (*Lutra lutra*), West European hedgehog (*Erinaceus europaeus*).

No records of bats have been identified within a 1km radial search area of Hicks Gate Roundabout; however, this does not exclude their potential presence in the area.

7.4 Design, Mitigation and Enhancement Measures

In developing a preferred option, the following mitigation measures should be considered:

- The new roundabout, road alignment and any widening of existing roads will be designed to affect the minimum necessary area of habitat outside the existing kerb lines (this includes consideration of construction methodologies and locations of compounds).
- Habitat protection measures such as fencing and signage will be used to prevent accidental direct adverse impacts to nearby habitats.
- Surface water run-off attenuation and treatment features will be installed to avoid increase in discharge to watercourses, and to ensure that any accidental discharge would not compromise the conservation value of any nearby waterbody or the species that live within it.
- General construction environmental best practice and pollution prevention measures (similar to the now redacted Environment Agency Pollution Prevention Guidelines) will be implemented. This could include, but are not limited to, the use of drip trays and spill kits when refuelling vehicles.

Following the finalisation of a preferred scheme option, specialist species and habitat surveys may be required to confirm presence or likely absence of protected and or notable species and habitats. These surveys are likely to be required to inform further environmental assessment of potential for impacts to arise; and or Environmental Action Plan and ideally should be implemented at least a year in advance of construction to allow the subsequent necessary mitigation and compensation to be identified, as well as opportunities for enhancement.

The following hierarchical approach to mitigation should be adopted – this approach is supported by guidance in the DMRB and national planning policy:

1. Measures to avoid adverse ecological impacts (for example the re-siting of construction compounds, or adjustments in road alignment, etc.) should be exhausted.
2. Where an adverse impact cannot be avoided, options to ameliorate or reduce an adverse impact should be implemented (e.g. these options might include: erection of barriers or bunds to

[22] https://records.nbnatlas.org/explore/your-area#51.42517512291782|-2.5166880635986217|14|ALL_SPECIES

reduce noise and vibration; use of Sustainable Drainage Systems (SuDS) to regulate water flows).

3. As a last resort, measures that compensate for the loss of the particular ecological resource that is affected should be considered. For example, like-for-like replacement of lost habitats. Compensation approaches may include enhancement of existing habitats by improved management and long-term monitoring.

7.5 Preliminary Identification of Potential Impacts

Potential impacts to ecological receptors include both direct and indirect impacts. Impacts might be temporary during the construction period; and or permanent during operation of the new roundabout configuration. Potential ecological impacts include:

- Direct and indirect impacts to protected habitats.
- Indirect impacts to protected and notable species through the loss of habitat (limited potential due to scale of works) and direct potential harm to individuals.
  - Badgers - Possible damage to setts if present. Harm to individuals (increased risk of vehicle strike, particularly during operation) and permanent loss of foraging habitat.
  - Bats - Loss of trees which could have potential to support roosting bats; and loss of foraging and commuting bat habitat. Potential disturbance due to lighting both during construction and operation.
  - Breeding birds and Schedule 1 birds – Disturbance during breeding season, loss of habitat and potential to harm to individuals.
  - Great crested newt - Loss of terrestrial habitat and risk of killing; and potential harm to individuals.
  - Reptiles - Loss of potential habitat and potential harm to individuals
  - Hedgehog - Loss of habitat and potential harm to individuals including increased risk of vehicle strike, during operation.

With the implementation of appropriate mitigation, impacts to ecological receptors are likely to be not significant. However, this should be confirmed through the undertaking of appropriate field survey(s).

Noise and Vibration

8.1 Legislation and Policy

8.1.1 European Legislation

8.1.1.1 Environmental Noise Directive and the Environmental Noise (England) Regulations 2006 as amended

The Environmental Noise Directive 2002/49/EC (END) sets out a programme of noise mapping and noise action planning, aimed at: *"Preventing or reducing on a prioritised basis noise exposure and preserving environmental noise quality where currently good."*

This European Directive was transposed into law by the Environmental Noise (England) Regulations 2006. END required Member States to produce noise maps of major sources and to develop action plans to address the management of noise issues and effects including noise reduction if necessary, in the context of government policy on sustainable development. The agglomeration of Bristol was included within the noise mapping exercise. On 15 March 2010, The Secretary of State for Environment, Food and Rural Affairs formally adopted Noise Action Plans for 23 agglomerations (large urban areas), major roads, and major railways in England, this included an Action Plan for Bristol.

The Action Plan for Bristol provides statistics on affected areas within Bristol and details possible general noise mitigation measures that could be implemented to reduce ambient noise levels. The Action Plan does not contain any commitment to address the noise in any area.

The Action Plans are intended to apply in particular to the most 'important areas' identified by the noise maps. Therefore, a set of Important Areas (also known as Noise Important Areas or NIAs) have been identified for each of the Noise Action Plans. NIA's with respect to noise from major roads are where the 1% of the population that are affected by the highest noise levels from major roads are located, according to the results of the strategic noise mapping.

8.1.2 National, Regional and Local policy

8.1.2.1 The Noise Insulation Regulations 1975 (as amended 1988)

The Noise Insulation Regulations 1975 (the 'NIR regulations') as amended in 1988, are intended to protect residents subject to increases in traffic noise at or above a specified level arising directly from the use of new or altered roads, by making available grants for noise insulation work to be carried out on their homes. Potential noise insulation work that can be carried out includes secondary glazing, supplementary ventilation and, where appropriate, Venetian blinds and double or insulated doors. Insulation may also be installed as protection against noise arising from construction. In such cases, the offer is discretionary and can only be made when the local authority considers that the enjoyment of the property will be seriously affected for a substantial period by noise from the construction work.

8.1.2.2 National Planning Policy Framework (Revised July 2018)

With respect to noise the NPPF states that National Planning Policy Framework (NPPF) paragraph 170 states that:

"Planning policies and decisions should contribute to and enhance the natural and local environment by . . .

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions. . .”

Paragraph 180 has some guidance specific to the consideration of noise, it states:

“Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development and avoid noise giving rise to significant adverse impacts on health and the quality of life;

b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason. . .

8.1.2.3 Planning Policy Guidance – Noise (PPG-Noise)

The NPPF was supplemented in 2014 by the on-line Planning Practice Guidance – Noise (PPG-Noise) which is published by the Department for Communities and Local Government (DCLG, 2014). However, unlike the NPPF, this is not a material consideration in planning decisions. PPG-Noise advises on how planning can manage potential noise impacts in new development. It lists various acoustic and non-acoustic factors that could influence a decision on whether noise will be a concern for a project. These include the source and absolute level of noise, the time of day it occurs, and the number and frequency and pattern of noise events.

8.1.2.4 Noise Policy Statement for England (NPSE) 2010

Any new development or works must take into consideration the Government’s policy on noise. This is set out in the NPSE, which was published by the Department for Environment Food and Rural Affairs in March 2010 (Defra, 2010).

The NPSE contains the high-level vision of promoting good health and good quality of life (well-being) through the effective management of noise. It is supported by three aims which are to be achieved through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development. These aims are to:

- Avoid significant adverse impacts on health and quality of life;
- Mitigate and minimise adverse impacts on health and quality of life; and
- Where possible, contribute to the improvement of health and quality of life.

8.1.2.5 Bath and North East Somerset Core Strategy, Part 1 of the Local Plan, Adopted July 2014

Chapter 6 of the BaNES Core Strategy document details the Core Policies. The spatial strategies set out in the chapter cover the different areas of the District. Whilst there is not specific mention of noise, Core Policy (CP)6 *Environmental Quality* is concerned with protection of environment.

8.2 Study Area

Data have been collected within a Study Area of approximately 300m from the Hicks Gate Roundabout. Given the stage of assessment and the scope of proposed works, this study area is considered sufficient.

8.3 Baseline Environment

A desk-based review of land use around Hicks Gate Roundabout has been undertaken using the following sources of information:

- Google Mapping - to identify possible sensitive receptors.
- Strategic noise maps produced by Defra in 2013 - to appreciate the noise climate and to identify possible sensitive receptors.

The land use surrounding the Hicks Gate Roundabout can generally be described as agricultural.

Within the Study Area there are the following receptors: a fire station (south east of the Roundabout), motocross track (north east and north west of the Roundabout) and a what appear to be office buildings (south west of the Roundabout) noted as 'GVC' – this building appears vacant based on a review on Google mapping.

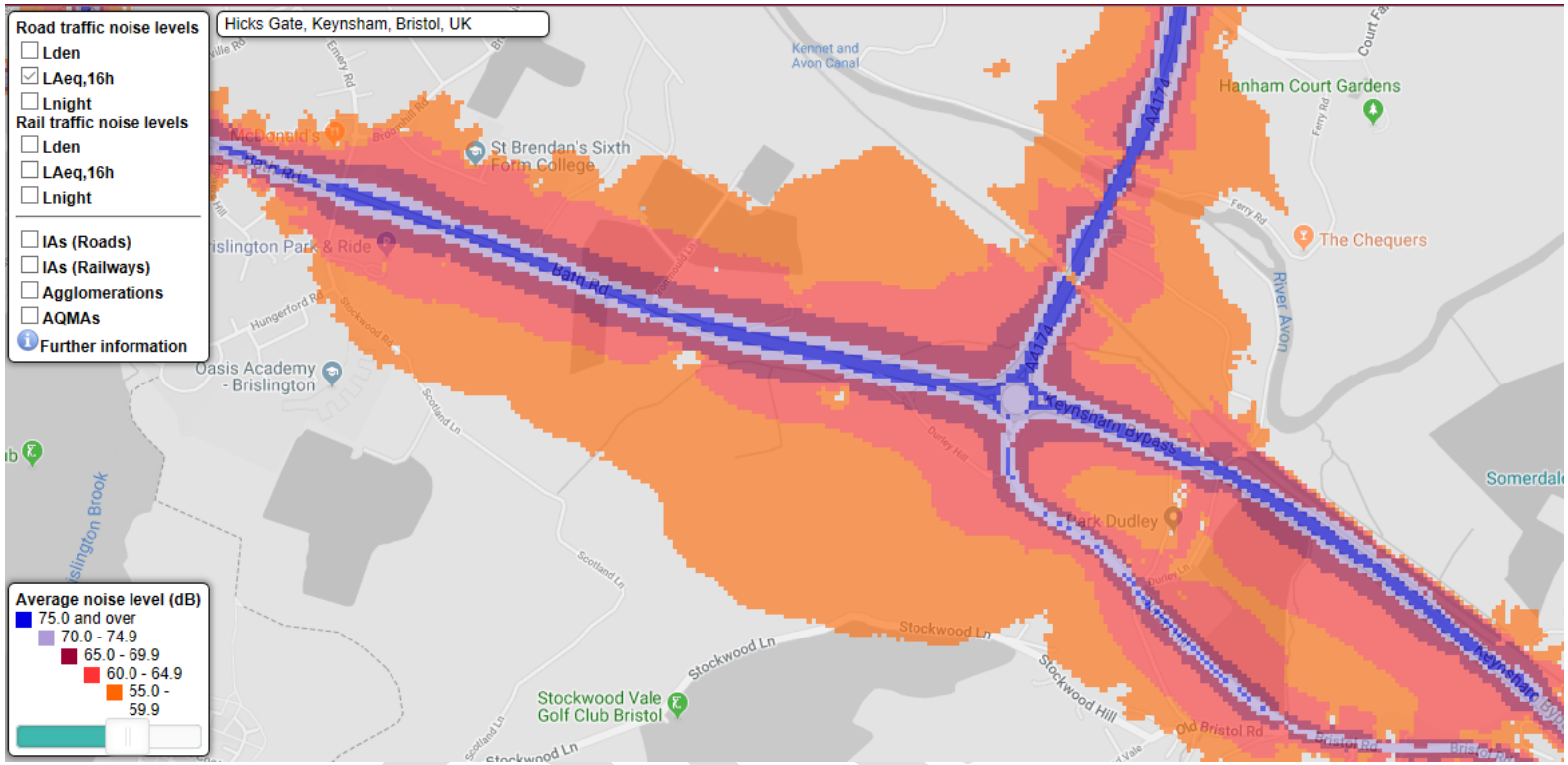
There is also a collection of buildings, which appear to include some residential properties located to the south of the A4, Bath Road approximately 440m to the west of the Hicks Gate Roundabout. Whilst these properties are outside of the 300m radius Study Area, they are considered further as they could be with 300m of works depending on the option selection.

There are no, hospitals, religious; or education facilities within the Study Area.

The noise mapping undertaken by Defra (refer to Figure 8.1) indicates that the noise level from traffic using the Hicks Gate Roundabout would be above 60 dB(A) $L_{Aeq,16h}$.

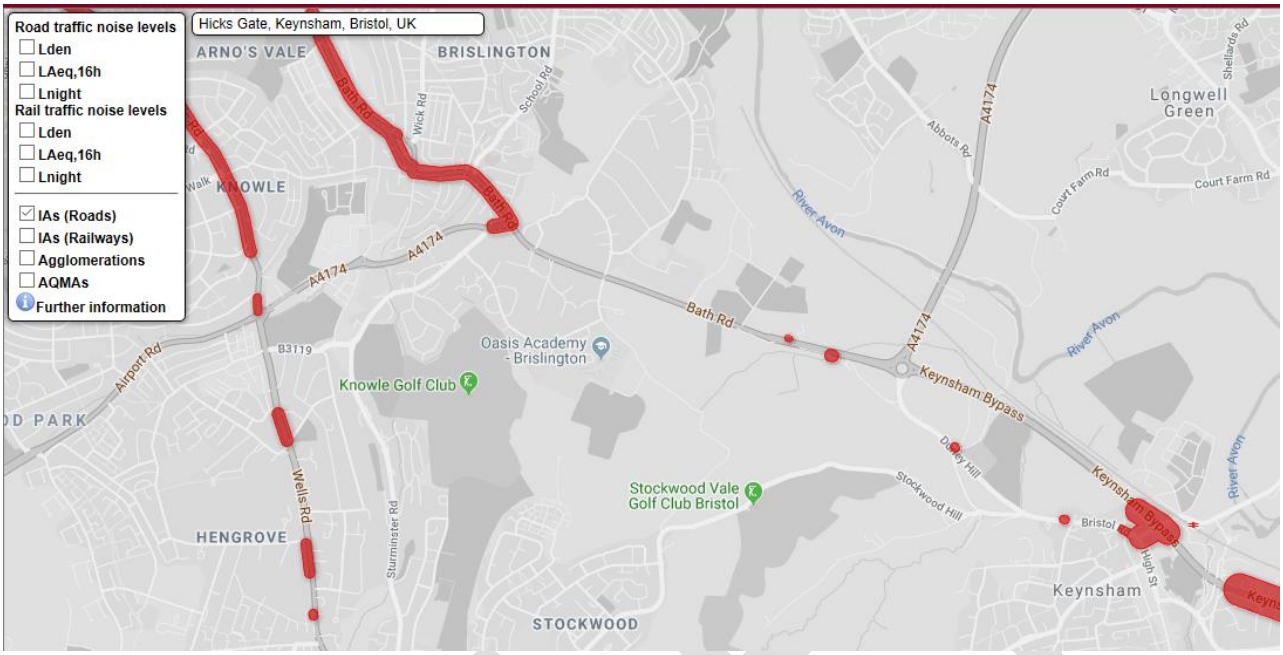
Following a sift process undertaken by Defra, several locations have been identified as Noise Important Areas (NIAs). NIAs in close proximity to the Hicks Gate Roundabout are shown in Figure 8.2; the closest are located to the west on the A4 Bath Road, approximately 440m to the west of the roundabout. There is a further NIA located approximately 640m to the west of the roundabout, which appears to relate to a small group of houses on the A4, Bath Road.

Figure 8.1: Defra's strategic-level noise maps for the area around the Hicks Gate Roundabout.



Source: http://www.extrium.co.uk/noiseviewer.html [accessed 18.09.2018]

Figure 8.2: Defra's strategic-level noise maps for the area around the Hicks Gate Roundabout.



Source: http://www.extrium.co.uk/noiseviewer.html [accessed 18.09.18]

8.4 Design, Mitigation and Enhancement Measures

Any option should meet the aims of the NPSE, and the first of these aims is to avoid significant adverse impacts on health and quality of life.

A significant impact in policy terms would be a noise level above a certain threshold, and this would be avoided through the provision of mitigation. An adverse environmental impact, being a change in noise being more than a certain value, which should also be mitigated.

Mitigation would first need to start at scheme design by avoiding sensitive receptors. Where there is no option but to build close to these, then mitigation could be provided by means of low noise surfacing and/or the provision of noise barrier. As a last resort, noise insulation can be considered.

8.5 Preliminary Identification of Potential Impacts

Any construction activity has the potential to adversely impact nearby noise sensitive receptors. The effects from construction would depend not only on the absolute noise level but also the duration of the works. Construction activities may generate vibration through drilling, piling and; or the use of vibratory rollers.

During the operational phase, the potential noise and vibration impacts would largely arise from changes in traffic flows on the highway network and changes to the existing carriageway alignment (resulting in changes in distances between receptors and the carriageway). All options therefore have the potential to impact upon existing noise sensitive areas including residential properties.

Potential adverse effects during construction should be minimised through the implementation of a Construction Environmental Management Plan (CEMP), the use of best practicable means and good practice. In addition, the contractor should liaise with BaNES and any affected householders to inform them about the works.

Potential mitigation measures might include, but would not be limited to:

- Low Noise Surface (LNS) on the proposed resurfaced road sections should be considered, although it is recognised that this would not be as effective as on a 'motorway' because the traffic speeds expected along the route corridor are lower (i.e. 1.0 dB noise reduction at speeds below 75 km/h and up to 3.5 dB at speeds above 75 km/h).
- Erection of noise barriers or embankments to screen road traffic noise from sensitive receptors.

People and Communities

9.1 Legislation and Policy

9.1.1 National Policy

9.1.1.1 National Planning Policy Framework (NPPF) (Revised July 2018)

The NPPF recognises that the purpose of the planning system is to strive towards sustainable development, which can be achieved when economic, social and environmental gains are sought jointly. At the heart of the NPPF is a presumption in favour of sustainable development where the proposal accords with the Local Development Plan.

9.1.1.2 The Countryside and Rights of Way Act (CROW) Act 2000

The CROW Act (HM Government, 2000) regulates all Public Rights of Way (PRoW) and ensures access to them. It requires local highway authorities to publish a Rights of Way Improvement Plan (RoWIP), which should be reviewed every ten years. The Act also obliges the highway authority to recognise the needs of the mobility impaired when undertaking improvements. The scheme will therefore need to consider those who currently use the footpaths in the surrounding area during the design process.

9.1.2 Local Policy

9.1.2.1 The West of England Joint Spatial Plan (2017)

Bath and North-East Somerset, Bristol City, North Somerset, and South Gloucestershire (the four West of England Councils), are working together to produce a West of England Joint Spatial Plan (JSP) which will set out a prospectus for sustainable growth to help the region meet its housing and transport needs for the next 20 years, to 2036.

The JSP identifies two Housing Market Areas (HMA) that operate across the West of England. One focussed on the wider Bristol HMA, which includes Weston-Super-Mare as a sub housing market area, and the other focussed on Bath. *"The JSP will provide the framework to deliver up to 105,500*[23] *net additional new homes between 2016 and 2036, of which around 32,200 (30%) should be Affordable Housing."*[24]

The JSP will not replace existing Local Plans, however, it will be a material consideration in decision-making. When adopted, the JSP will provide the new higher-level strategic planning framework for the four West of England Councils to 2036.

9.1.2.2 Bath and North East Somerset Core Strategy, Part 1 of the Local Plan, Adopted July 2014

Policy CP8 *Green Belt* of the Core Strategy and the Core Strategy Key Diagram set out the general context of the Green Belt. Paragraph 6.61 states "*…Green Belts are designated primarily in order to prevent urban sprawl by keeping land permanently open…*" Paragraph 6.63 states "*…In accordance with the NPPF Green Belt boundaries will only be altered in exceptional circumstances*."

[23] Opinion Research Services (2016) West of England Housing Target: The basis for the Housing Requirement in the Joint Spatial Plan

[24] West of England joint Spatial Plan Habitats Regulations Assessment (November 2017)

Table 8 on page 155 sets out the purpose of including land in the Green Belt and sets objectives for use of land within the green Belt. Included in the purposes of the Green Belt are:

"…To check the unrestricted sprawl of Bath and Bristol.

To prevent the merging of Bristol, Keynsham, Saltford and Bath…

To preserve the individual character, identity and setting of Keynsham and the villages and hamlets within the Green Belt…"

9.2 Study Area

To inform the options development and preliminary assessment of options, data have been collected within the 'Study Area'. The Study Area for consideration is an approximate 500m radial distance from the Hicks Gate Roundabout.

This Study Area has been defined giving regard to type of works and likely impacts associated with each of the element of works. It is considered to be sufficient and appropriate given the current stage of assessment.

9.3 Baseline Environment

9.3.1 Introduction

The 'People and Communities' chapter covers a wide range of topics including:

- Private assets (residential, commercial and industrial)
- Community facilities
- Tourism and recreation facilities
- Community land[25]
- Land Use
- Changes in access and community severance
- Transport Systems
- Local economy
- Social profile
- Health profile

Some of these topics are considered in other parts of the Options Assessment Report (OAR), including: local economy, social profile and health profile. This chapter only includes baseline data for those topics not covered by others in the OAR, namely private assets, community facilities, tourism and recreation facilities, community, land use; and access/severance.

[25] Community land being any area of public open space and other facilities such as schools, hospitals, libraries and recreation facilities which are used by the local community for a range of social services, recreation and health and well-being.

The following sources of information have been used:

- Local development plans described in section 9.1
- Rowmaps (http://www.rowmaps.com/)
- BaNES website (http://www.bathnes.gov.uk/))
- SGC's website (http://www.southglos.gov.uk/)
- Rights of Way maps (www.rowmaps.com)

9.3.2 Private Assets (residential, commercial and industrial)

Areas of land around the Hicks Gate Roundabout are understood to be in private ownership.

Within the Study Area there are the following assets:

- a motocross track (north east and north west of the Roundabout);
- office buildings (south west of the Roundabout);
- small businesses to the north east of Hicks Gate Roundabout (accessed off Durley Lane);
- office buildings at Durley Park (including Devonport House) to the south east; and
- numerous individual and semi-isolated residential properties, the majority of which are located adjacent to the existing road infrastructure.

There is also a fire station (directly to the south east of the Roundabout), it is not known at the time of preparing this report whether this land is in private ownership. There does not appear to be any industrial land within the Study Area.

9.3.3 Community Facilities and Land

There are several community facilities within the Study Area. Key facilities include:

- Hicks Gate Fire Station which is located directly to the south east of Hicks Gate Roundabout;
- The Keynsham Motocross Track which is on land directly to the north east of Hicks Gate Roundabout; and
- Bath Road Allotments on land to the south of the A4 Bath Road to the west of Hicks Gate Roundabout

9.3.4 Land Use

Land uses within 500m of the study area include: agricultural, transport (roads, railway, carpark for Durley Park), offices (Durley Park House -Government offices), recreational (Keynsham Motocross Track), community services (Hicks Gate Fire Station), residential/ retail (Hicks Gate Farm and shop) and vacant (GVC building on Durley Hill appears vacant based on google earth).

Hicks Gate Roundabout lies within the Green Belt area between Keynsham and the eastern edge of Bristol. To the north of the junction there is a belt of woodland adjacent to the Great Western Main Line (GWML).

There are a number of designated cultural heritage and ecological sites within the Study Area (refer to sections 5.4 and 7.4 for details).

Bickley Wood SSSI, designated for its geological interest, is located approximately 0.6 km to the north of Hicks Gate Roundabout; and covers an area of 9.2 hectares. The site is described as

"This is the most extensive exposure of Carboniferous Downend Group strata in the Bristol Coalfield. Cross-bedded sandstones are predominant in the section, but there are some shale bands with fossil plants and bivalves, which indicate a late Westphalian C age. They are of interest in that they represent a marked change in conditions with coarser sediment coming into the area, due mainly to the uplift of mountains to the south; a change that can be correlated with similar lithological changes found near the base of the Pennant Measures of South Wales. This is thus an important site for understanding the geological development of southern Britain during the late Carboniferous."[26]

The Natural England Agricultural Land Classification Map for the South West Region[27] has been reviewed to consider the Agricultural Land Classification (ALC) of the Study Area. this mapping appears to show the majority of the Study Area, to be Grade 2 (very good quality). Given the scale of the mapping this classification should not be relied upon and further survey work may be required.

9.3.5 Changes in access and community severance

According to the Institute of Environmental Assessment (IEA) guidelines, severance is *"the perceived division that can occur within a community when it becomes separated by a major traffic artery. The term is used to describe a complex series of factors that separate people from places and other people. Severance may result from the difficulty of crossing a heavily trafficked road or a physical barrier created by the road itself. It can also relate to quite minor traffic flows if they impede pedestrian access to essential facilities. Severance effects could equally be applied to residents, motorists or pedestrians."*[28]

It is important that any option taken forward do not sever the existing links that communities have; nor does it severe a potential link created in the future.

9.3.6 Transport Systems

This topic considers potential impacts on 'non-motorised users' (NMU) who include walkers, cyclists and equestrians and potential for impacts on Public Rights of Way (PRoW).

Review of Google Earth and local knowledge has identified the existing facilities for pedestrians and cyclists in the vicinity of Hicks Gate service the main 'desire lines' for movement between Keynsham (A4175), the A4 Bath Road and the A4174 Ring Road. There is an existing shared use pedestrian/cycle path on the west side of the A4174 Ring Road between the Hicks Gate Roundabout and the Kingsfield Roundabout at Longwell Green. This shared use route passes the north west of the Hicks Gate Roundabout to a toucan crossing point on the A4 Bath Road to the west of the roundabout. The route crosses the A4 and connects with Durley Hill.

On Durley Hill, the southern approach road to the Roundabout, there is an existing narrow footway which extends just beyond the access junction to the Hicks Gate Fire Station. There is an uncontrolled crossing point with a refuge island providing access to Durley Hill. Cyclists from Keynsham are required to ride on the carriageway as far as the Fire Station access, but at this point there a cycle slip-lane linking to Durley Hill.

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[26] https://designatedsites.naturalengland.org.uk/PDFsForWeb/Citation/1000535.pdf

[27] Available on line at: http://publications.naturalengland.org.uk/publication/144017?category=5954148537204736

[28] Institute of Environmental Assessment,1993. Guidelines for the Assessment of Road Traffic. Institute of Environmental Assessment

At the western end of Durley Hill, the pedestrian/cycle route uses the access lane to Hicks Gate Farm before re-joining the existing shared used footway on the south side of the A4 Bath Road. There is a continuous footway on the north side of the A4, Bath Road, but shared use is limited to a length of 90 metres just west of the toucan crossing on the approach to Hicks Gate Roundabout.

There is currently no controlled crossing provision for pedestrians/cyclists at the Hicks Gate Roundabout, even though the junction is partially signal controlled.

There are a pair of bus stops (one heading in each direction) on the A4 approximately 500m to the east of Hicks gate Roundabout. There is also a bus stop approximately 500m to the south east of the roundabout at Keynsham Cemetery.

A search using the rights of way mapping available at: www.rowmaps.com has been used to identify footpaths (not associated with the carriageway) within the study area, these are show on Figures 9.1. As is shown in this figure, there are a number of PRoWs within the study area, and some link directly into the Hicks Gate Roundabout.

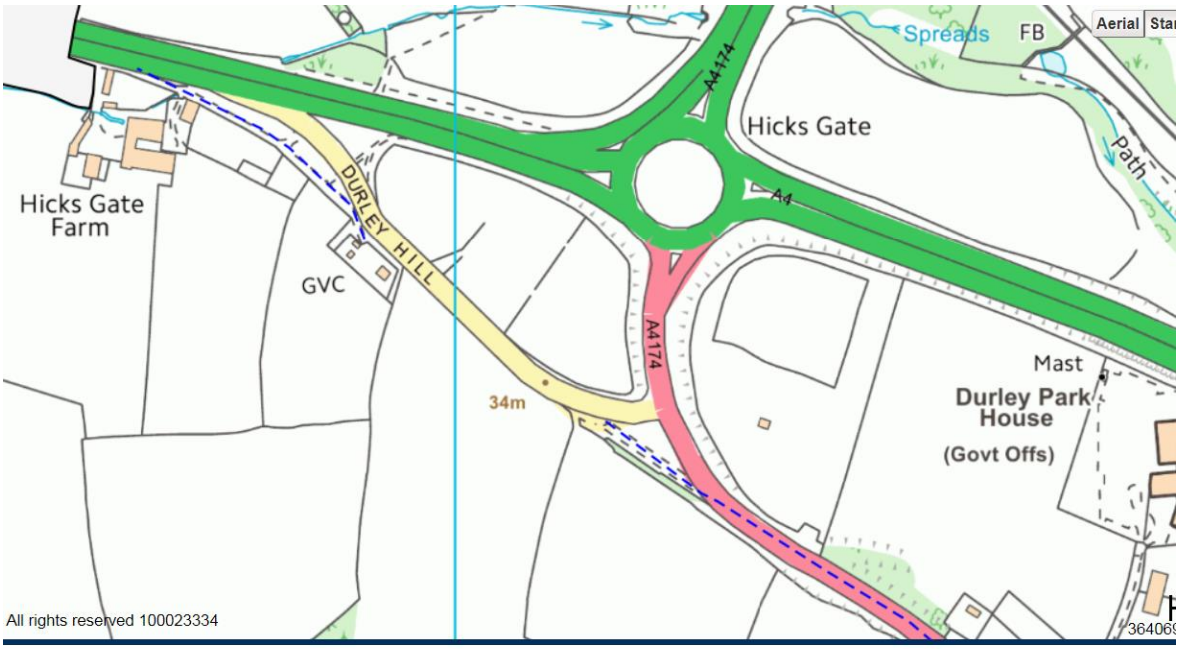
There is only one section of joint cycle/footpath which runs in parallel with the arms of the roundabout. This runs from the western to northern arm. Note that this does not appear on the map presented in Figure 9.1 but is evident on Google Earth.

Figure 9.1:Rights of Way near the Hicks Gate Roundabout based on rowmaps data (Red lines indicate public footpaths)

Source: www.rowmaps.com ***[accessed 19.09.2018]***

There is a cycle route allocated under policy ST2A *Recreation Routes* of the Bath and North East Somerset Core Strategy which passes to the south of Hicks Gate Roundabout routed along Durley Hill to a link to the A4, this is shown in a blue dashed line on Figure 9.2.

Figure 9.2: Section of local Sustrans cycle route at the Hicks Gate Roundabout



Source: https://isharemaps.bathnes.gov.uk/atmycouncil.aspx?MapSource=BathNES%2fPlanning&StartEasting=365900&StartNorthing=160900&StartZoom=60000&o=1 [accessed 27.09.201]

9.4 Design, Mitigation and Enhancement Measures

Public consultation would help to inform the design team on any community issues that might not otherwise be noted.

Careful consideration of any construction compound location will be required to minimise distance between any compound and the working area, in order to minimise disturbance to receptors along the route. Consideration will also be required to the size of compound(s) to ensure minimal land take.

Construction methods will seek to minimise the generation of noise and dust; and will be appropriately fenced off to restrict access to site personnel only and to ensure the safety of the general public.

Access to private properties should be retained wherever possible throughout the construction works.

During construction works, there are likely to be delays and possible requirements for appropriate traffic management which shall include early warnings to drivers that the works are taking place and signposted diversion routes. Temporary pathway diversions will also be signposted for NMUs where required.

Any works where the ground is broken provides potential for the creation of new migratory pathways for contaminants during construction. Chemicals that are destructive to concrete (e.g. sulphates and acids) have the potential to constrain the design of the Scheme. However, it is assumed that laboratory data (gathered following completion of intrusive investigation) will be available detailed design to characterise the concentrations of these substances should they be present in soil and groundwater and that suitable construction materials resistant to any such substances will be used.

A detailed construction programme, indicating the main types of activities to be carried out during the course of the construction phase, and a Construction Environmental Management Plan (CEMP) will be

prepared to support the implementation of mitigation measures and minimise the risk to surrounding receptors.

9.5 Preliminary Identification of Potential Impacts

Given the nature and location of the potential works at the roundabout, the potential for impacts of the scheme on '*People and Communities*' receptors is likely to be limited providing best practice construction measures are implemented.

Not all impacts will be adverse, a proportion may be beneficial such as those associated with improving road safety and reducing congestion. Options which have less interaction with people and communities, such as those involving less land take are likely to give rise to fewer effects than works requiring greater work outside the highway boundary.

As shown in Figure 9.1, there are a number of PRoWs within the study area, however none link directly into the Hicks Gate Roundabout; and thus, it is considered unlikely there is potential for any permanent impacts (direct or indirect) to the local PRoW network, providing standard best practice is followed.

During construction of the scheme, there may be temporary disruption to NMU journeys and a reduction in amenity. However, long term, improved NMU facilities for cyclists and pedestrians will potentially improve connectivity and amenity providing a permanent beneficial effect and reducing potential severance that could be caused by increasing traffic volumes.

All options have the potential to impact on access to individual properties, careful consideration of these receptors will be required during the design development. Special attention should be given to ensuring no disruption to the Fire Station.

With the implementation of best practice and standard mitigation, the effect of the scheme on construction workers and end users is likely to be neutral in both during construction and on completion of the scheme.

Water Resources

10.1 Legislative and policy framework

Water resources are managed and protected under UK legislation and regulations consistent with European Community (EC) Directives. The main legal framework is set by the following instruments:

- **Water Framework Directive (2000/60/EC) and the Water Environment (Water Framework Directive) (England and Wales) Regulations (SI 3242/2003) -** The Water Framework Directive established a common framework for European Union member states to achieve good qualitative and quantitative status of all waterbodies (including marine waters up to one nautical mile from shore) by 2015. It prescribed steps to reach the common goal rather than adopting the more traditional limit value approach.
- **Water Resources Act 1991 -** This Act governs the quality and quantity of water by outlining the functions of the Environment Agency, discharge consenting; and sets out offences relating to water. The Environment Agency has the power to bring criminal charges against people or companies responsible for crimes concerning water.
- **Land Drainage Act 1991, as amended by the Land Drainage Act 1994 -** The Act requires that a watercourse be maintained by its owner in such a condition that the free flow of water is not impeded. The 1994 Act amends the Land Drainage Act of 1991 in relation to the functions of internal drainage boards and local authorities.
- **Flood and Water Management Act 2010 -** The Act requires flood and coastal erosion risk management authorities (that did not previously have such a duty) to exercise their flood and coastal erosion risk management functions in such a way as to contribute towards the achievement of sustainable development.
- **Environmental Permitting (England & Wales) Regulations 2010 -** These Regulations provide a consolidated system of environmental permitting in England and Wales.

10.1.1 National Policy

10.1.1.1 National Planning Policy Framework (Revised July 2018)

The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England. Planning Practice Guidance 'Flood Risk and Coastal Change' was published alongside the 2012 NPPF and is to be updated in due course to reflect changes in the new version of the NPPF. These documents identify how new developments must take into account flood risks, including making allowance for climate change impacts, and ensure no increase risk to people and property elsewhere. All applications in the following areas should be accompanied by a Flood Risk Assessment (FRA) – all projects in Flood Zones 2 and 3 (medium and high probability of river and tidal flooding); projects of 1 hectare or greater in Flood Zone 1 (low probability of river and tidal flooding); projects which may be at significant risk from other sources of flooding (local watercourses, surface water, groundwater or reservoirs); or where the Environment Agency has notified the local planning authority that there are critical drainage problems.

The National Planning Policy Framework (paragraphs 155 to 158) makes clear that inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk.

10.1.2 Local Policy

10.1.2.1 Strategic Flood Risk Assessments

Level 1 Strategic Flood Risk Assessments (SFRA) are primarily desk-based studies using information and data collected from a variety of stakeholders, including the Environment Agency, local planning authorities and water utility companies. The collation, review and preparation of this information allows a broad scale assessment of flood risk, which provides details of historic flooding incidents, areas at risk and areas which may become at risk from flooding in the future. It also identifies details of existing flood defences intended to reduce the aforementioned flood risk. Furthermore, consideration of the impact of new development upon flood risk is of critical importance.

The primary purpose of the Level 1 SFRA is to present sufficient information to enable the local planning authority to apply the Sequential Test to areas of search. The output of the SFRA is relevant not only to planning and development control, but also to site specific flood risk assessments and mapping for emergency planning, alleviation of flood risk within existing urban development and surface water management plans.

10.2 Study area

The Study Area consists of a 500m radius around Hicks Gate Roundabout. This Study Area has been defined giving regard to type of works and likely impacts associated with each of the element of works and is considered to be sufficient and appropriate given the stage of assessment.

10.3 Baseline Environment

10.3.1 Watercourse Features

The River Avon, a designated Main River[29], passes through the northern edge of the Study Area. A tributary to the River Avon, passes under the A4174 approximately 140m to the north of Hicks Gate Roundabout; this tributary flows in a westerly direction (refer to Figure 10.1).

10.3.2 Water Quality

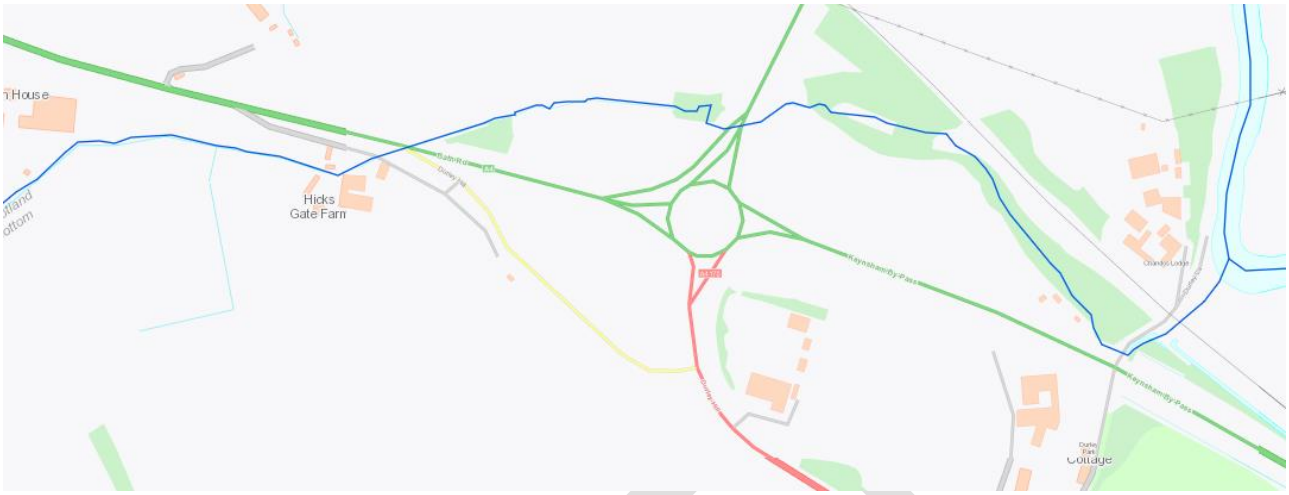
Data from www.magic.gov indicates there are no groundwater Source Protection Zones (SPZ) within the Study Area and that Based on the guidance notes provided by the EA:

- **Secondary A** – permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.
- **Secondary B** – predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers.

the formations beneath the proposed Scheme location are allocated as Secondary A and B aquifers.

[29] 'Main rivers' are usually larger rivers and streams. The Environment Agency is responsible for maintenance, improvement or construction work on main rivers to manage flood risk.
https://environment.maps.arcgis.com/apps/webappviewer/index.html?id=17cd53dfc524433980cc333726a56386

Figure 10.1: Map showing main rivers close to the Hicks Gate Roundabout.



Source:
https://environment.maps.arcgis.com/apps/webappviewer/index.html?id=17cd53dfc524433980cc333726a56386
[accessed 19.09.2018]

10.3.3 Flood Risk

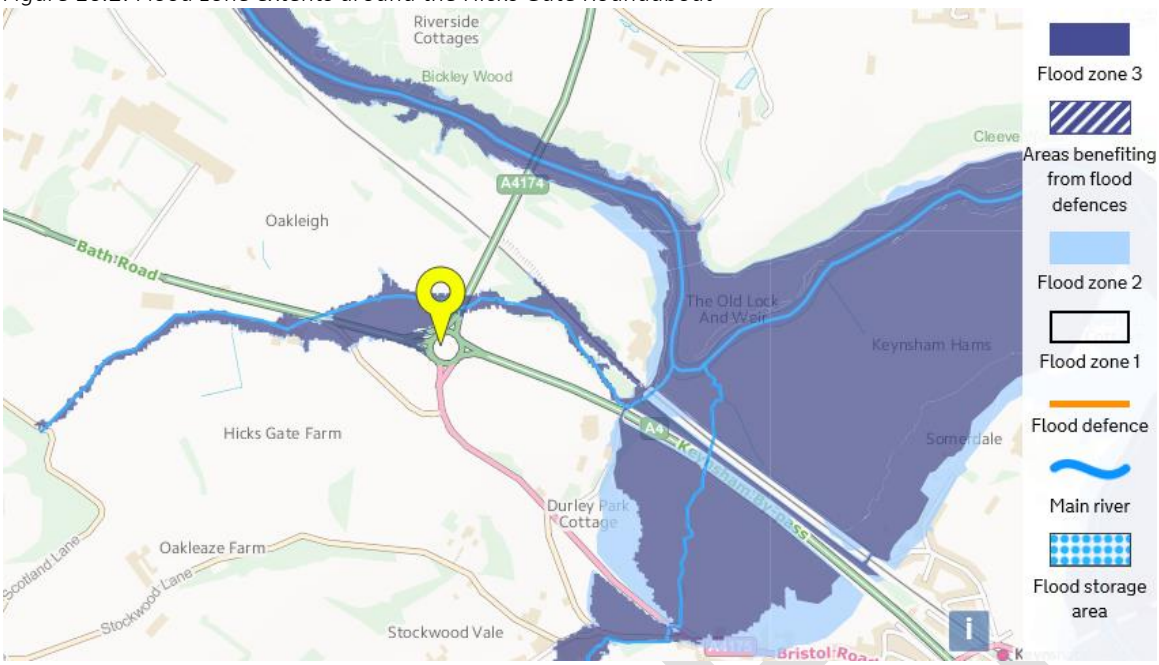
In Table 1 of the Technical Guidance to the NPPF, Flood Risk Zones are defined as:

- Flood Zone 1: Low Probability – Land assessed as having a less than 1 in 1,000 chance of river or sea flooding in any year (<0.1%).
- Flood Zone 2: Medium Probability – Land assessed as having between 1 in 100 and 1 in 1,000 chance of river flooding (1%-0.1%) or between a 1 in 200 and 1 in 1,000 chance of sea flooding (0.5%-0.1%) in any year.
- Flood Zone 3a: High Probability – Land assessed as having a 1 in 100 or greater chance of river flooding (>1%) or a 1 in 200 or greater chance of flooding from the sea (>0.5%) in any year.
- Flood Zone 3b: Functional Floodplain – This zone comprises land where water has to flow or be stored in times of flood.

As shown in Figure 10.2, land to the north east, south east and south west of Hicks Gate Roundabout lies predominantly within Flood Zone 1 (having less than 1 in 1,000-year annual probability of flooding). However, there are areas to the north west that lie within Flood Zone 3 (having less than 1 in 100-year annual probability of flooding), this includes parts of the northern and western arms of the roundabout.

There are also areas identified to be at a risk of surface water flooding as shown in Figure 10.3.

Figure 10.2: Flood zone extents around the Hicks Gate Roundabout



Source: https://flood-map-for-planning.service.gov.uk/confirm-location?easting=498930.783&northing=182992.396&placeOrPostcode=hicks%20gate [accessed 19.09.2018]

Figure 10.3: Surface water flood extents around the Hicks Gate Roundabout

Source: Screen shot taken from https://flood-warning-information.service.gov.uk/long-term-flood-risk/map [accessed 19.09.18]

10.4 Design, Mitigation and Enhancement Measures

Standard mitigation measures should be incorporated within the design to limit the potential for impacts at source wherever possible.

Mitigation during construction will be managed through the implementation of a CEMP. The CEMP will detail the procedures and methods to be followed to minimise the potential environmental effects of construction activities. The CEMP should also describe the procedures to be followed in the event of an environmental emergency such as a fuel or chemical spillage.

Mitigation during operation should be managed through the implementation of a robust surface water drainage system.

10.5 Preliminary Identification of Potential Impacts

All options have the potential to impact the water environment during construction and operation. The magnitude of potential impacts (the degree of change) may be beneficial or adverse.

Works adjacent to watercourses will pose the greatest risk, as will major works such as construction of new structures or road/junction alignments. During construction, there are generally two sources of pollutants.

1. Sediments - An increased pollution risk from elevated suspended solids from the mobilisation of silts and sediments which could potentially impact on the physical, chemical and microbiological water quality characteristics of receiving watercourses.

   Mobilisation of silts and sediments could occur during earthworks (i.e. regrading of land), the movement of heavy plant and runoff from stockpiles. There is high likelihood of silt being generated from these activities will be greater after rainfall events when sediment can be mobilised and washed via the drainage system or directly in runoff from exposed slopes into receiving watercourses. Discharges may also emanate from poor site drainage provision, washing and cleaning activities and after rainfall events that exceed the capacity of the drainage system.

2. Use of polluting substances - There is a risk of accidental spillage of polluting substances or leakage from general equipment use (e.g. storage tanks, leaking valves, refuelling and inadequate storage facilities.

During operation, there are generally two sources of pollutants:

1. Road Run off - Main contaminants from road run-off include:
   - fuel and other oil deposits on the road surface due to leakage;
   - hydrocarbons from exhaust deposits;
   - lead, copper, zinc and cadmium deposits from exhaust emissions and tyre wear;
   - synthetic rubber deposits from tyre wear;
   - chemicals used in windscreen washes such as detergents or de-icer;
   - de-icing agents such as salt, but also potentially including trace amounts of impurities such as cyanide, metals and clays.
   - These pollutants when combined with rainfall can run-off into the highway drainage system and have an adverse effect on the receiving watercourses and their flora and fauna.

2. Accidental spillage - there is a risk that polluting materials may be accidentally spilled onto the road surface as a result of a road accident. Reduction in congestion and improvements to journey time reliability, has potential to reduce the number of accidents, thus resulting in a beneficial impact as a reduced number of spillages would be predicted.

Summary

11.1 Summary of Potential Environmental Impacts

There are few sensitive receptors within 500m of Hicks Gate Roundabout, however during the construction and operation of the development, there is potential for impacts at sensitive receptors. The adoption of site-specific mitigation and standard mitigation measures, would minimise the risks of occurrence and severity of some adverse impacts such as dust effects and statutory nuisance issues; and for others mitigation could be included within the design. There are however some impacts that may not be possible to mitigate; and this has influenced the options selection process.

Some of the potential environmental impacts associated with the options under consideration (Options 1-6 as described in Section 3.2) are as follows:

- All Options that minimise occurrence of traffic congestion have the potential to deliver positive impacts on local air quality. However, traffic modelling will be required to assess whether changing traffic patterns increase or decrease exceedances in AQMAs within the wider area.
- Where works are outside of the existing highway it is considered there is a possibility of encountering archaeological remains. Within the existing highways estate, it is considered less likely that archaeological remains will be present as they will have already been removed or truncated by previous development of the road network.
  - Options 5 and 6 appear to require less land take and therefore potentially have less possibility of encountering archaeological remains in comparison to Options 1, 2, 3 and 4.
  - Option 6 potentially requires the lowering of the existing Hicks Gate Roundabout and therefore there might be more ground works associated with this Option compared to Option 5.
- The scheme has potential to impact upon the landscape character of the area and also has potential visual impacts, including potential impacts on local residential properties and the setting of the Avon Valley Conservation Area.
  - At grade options (i.e. Options 1, 2, 3 and 4) are likely to have less visual impact than Options 5 and 6 which involve 'fly overs'. At grade options also have less potential to impact upon the landscape character of the area.
- All Options will require removal of vegetation (including trees) on both the existing Hicks Gate Roundabout and highway verges.
  - Options 1 and 2, which retain the existing roundabout in its current layout potentially result in a requirement for less vegetation removal. Options which have the least vegetation removal might, in theory, be presumed to have less likelihood of encountering and or impacting protected and or notable species. Ecological surveys and consultation with relevant statutory bodies would be required to inform any chosen option.
- All options potentially bring traffic closer to both domestic and commercial premises. The scheme has the potential to impact on noise levels experienced within nIAs. However, at this stage it is unclear whether the impact would be beneficial or adverse as it will be dependent on the design solution. For example, inclusion of mitigation such as low noise surfacing on carriageways near to the NIAs could result in a reduction in noise levels at sensitive receptors. Further work would be required to determine whether there is an adverse impact on noise receptors. This further work could include monitoring and noise modelling.

- Residential (and other) buildings would not be impacted upon in terms of requiring demolition as a result of any options under consideration at this time, and the scheme is not anticipated to result in any community severance.
- All Option require land take outside of the existing highway boundary. Further investigation should be undertaken into land ownerships in the immediate vicinity of Hicks Gate Roundabout.
- Options 2, 3, 4,5 and 6 require land take from Keynsham Motocross Park. This assumed to be a privately-owned facility, land may not be 'readily available'.
- The scheme has potential to impact upon flood storage volumes and also increase the risk of surface water flooding. Areas of land to the to the north west of the Hicks Gate Roundabout lie within Flood Zone 3 (having less than 1 in 100-year annual probability of flooding). Further investigations should be undertaken to ascertain the occurrence of highway flooding throughout the scheme extents. Once a preferred option is chosen and progressed, refinements should be undertaken to the design to incorporate appropriate mitigation which has the potential opportunity to reduce flooding (surface water and fluvial).
  - Options 5 and 6 do not provide a 'cut through' road between the A4, Keynsham Road and the A4175, therefore these two options potentially affect less land within Flood Zone 3 than Options 1, 2, 3 and 4 which include development on land described as Flood Zone 3.

11.2 Summary of Potential Environmental Opportunities

At this stage of study, Outline Business Case (OBC), it is considered that the overall environmental opportunities are likely to be similar for each Option. Each of the Option has the potential to provide environmental benefits or opportunities. The specific benefits are likely to be dependent upon detailed design and the funding available at the time. Some examples of environmental opportunities are:

- Reduced congestion – All Options are likely to reduce the levels of congestion in the area. Any scheme that minimises occurrences of traffic congestion is likely to deliver positive impacts in terms of local air quality.
- Reduction in greenhouse gas emissions – Reduction in congestion, reduced journey lengths.
- Net gain in tree planting - Planting of native tree and shrub species on the surrounding landscaped areas and in the centre of the Roundabout.
- Provision of a net gain for wildlife - Installation of bat and or bird boxes on existing trees.
- Improved amenity or safety of a route for motorised users and NMUs (specifically pedestrians and cyclists) – All Options introduce signals which provide opportunities for pedestrians and cyclists to more easily cross the highway. However, signals also potentially introduce delays to motorised users.
- Improvements to NMU routes through introduction of more formal crossing points thus encouraging people away from private motor vehicle.
- Options 2, 3, 4, 5 and 6 provide opportunities for the Hicks Gate junction to be linked with the proposed A4-A37 Link Road.
- Options 2, 3, 4, 5 and 6 provide opportunities to facilitate the development of the relocated Brislington Park and Ride site (to the south west of the existing junction).
- All Options offer potential for improvements to access into and out of the Hicks Gate Fire Station.

- All Options offer potential for introduction of noise mitigation in existing NIAs on the A4 Bath Road. However, there could also be impacts on NIAs in the wider area (this requires further consideration).
- All Options offer potential to contribute to reduced flood risk in the area – Improvements to highways drainage may reduce instances of surface water flooding on Hicks Gate Way and around the Hicks Gate Roundabout.

As the options develop, opportunities for environmental enhancements can be given further consideration.

11.3 Early Appraisal Sifting Tool (EAST)

Following initial sifting by the Transport and Highways team, two Options have been considered in further detail; and taken forward for consideration using the Early Appraisal and Sifting Tool (EAST). These Options are:

- Option 2 - At-grade circulatory carriageway enlargement (gyratory), with cut-through link (Variant 1);
- Option 3 - At-grade circulatory carriageway enlargement (gyratory), with cut-through link (Variant 2);

Table 11.1 documents some of the specific potential constraints and opportunities associated with Options 2 and 3. These matters should be given further consideration at the next stage of the project.

Table 11.1: Environmental Impact Table

	Option 2 and 3
Constraints	Refer to Section 11.2 Embankments are proposed on land within Flood Zones 2/3 (to the north east of the existing roundabout). It is considered provision of compensatory flood storage volume may be required to offset any loss of flood plain. Any flood storage required may result in additional areas of land take and thus consideration should be given at an early stage to the requirement for any compensatory storage and if so where/ how this could be provided as additional land take would potentially result in additional environmental impacts.
Opportunities	Potential for improvements to the junction to be undertaken in a phased approach with the priority left turn road from the A4, Keynsham Road on the A4174 to be provided in advance of other works. Furthermore, the Options complement the proposals for the proposed A4-A37 Link Road which passes to the south of Hicks Gate Roundabout. Subject to land availability there could be opportunities to provide landscape planting in locations beyond the immediate highway boundary. This could help to mitigate the impact of a newly configured roundabout arrangement; and could contribute to the overall landscape character of the area in a positive way. The existing roundabout is retained and therefore vegetation within the area can potentially be retained. The existing roundabout might provide a suitable location construction compound.

	Opportunities to provide enhancements to ecological habitats should be explored. Stopping up of the existing Durley Hill Link Road (south of the existing roundabout) provides an opportunity to provide a dedicated NMU route between Keynsham to Brislington and beyond to Bristol. Both Options provide a new Toucan crossing on the A4175 to the south of Hicks Gate Roundabout. Embankments are proposed on land within Flood Zones 2/3 (to the north east of the existing roundabout). It is considered provision of compensatory flood storage volume may be required to offset any loss of flood plain, there is therefore potential opportunity for a betterment to be provided in terms of flood storage volume.

Appendix A: Options and Constraints Plans

Appendix B: Option Drawings